EUB
SuperHub

European Building Sustainability performance and energy certification Hub

D4.2 – Pragmatic and innovative approaches to public engagement and social acceptance

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Abbreviations

BER	Building Energy Rating (used in Ireland)
EBVS	European Business Valuation Standards
EE	Energy Efficiency
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
EVS	European Valuation Standards
GHG	greenhouse gas
HVAC	heating, ventilation, and air conditioning
IVS	International Valuation Standards
IVSC	The International Valuation Standards Council
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
LEED–ND	Leadership in Energy and Environmental Design for Neighborhood Development
NSA	neighbourhood sustainability assessment
nZEB	nearly-Zero Energy Building
PVT	Planning and verification tool
RICS	Royal Institution of Chartered Surveyors
TEGoVA	The European Group of Valuers' Associations
USGBC	U.S. Green Building Council

Glossary

The terms commonly used in real estate and mortgage marketplace:

Appraisal	A professional analysis used to estimate the value of the property.
Asset	Anything of monetary value that is owned by a person or company. Assets include real property, personal property, stocks, mutual funds, etc.
Assessed Value	Typically, the value placed on property for the purpose of taxation
Assessor	A public official who establishes the value of a property for taxation purposes
Condominium	A unit in a multiunit building. The owner of a condominium unit owns the unit itself and has the right, along with other owners, to use the common areas but does not own the common elements such as the exterior walls, floors and ceilings or the structural systems outside of the unit; these are owned by the condominium association. There are usually condominium association fees for building maintenance, property upkeep, taxes and insurance on the common areas and reserves for improvements.
Comparable	A property deemed by the valuer to be similar to the one being valued
Cost approach	A valuation approach which provides an indication of value based on the economic principle that a buyer will pay no more for a property than the cost to obtain a property of equal utility, whether by purchase or by construction, including the cost of sufficient land to enable that construction. It will often be necessary to make an allowance for obsolescence of the subject property compared with a brand-new equivalent one.
Depreciation	A decline in the value of a house due to changing market conditions or lack of upkeep on a home

Income approach	An approach that provides an indication of value by converting future cash flows to a single current capital value
Income property	Real estate developed or purchased to produce income, such as a rental unit
Market approach	A valuation approach where the valuation is produced by comparing the subject property with the evidence obtained from market transactions that fulfil the criteria for the relevant basis of value
Market Value	The current value of your home based on what a purchaser would pay. An appraisal is sometimes used to determine market value. The estimated amount for which the property should exchange on the date of valuation between a willing buyer and a willing seller acting independently of each other after proper marketing wherein the parties had each acted knowledgeably, prudently and without being under compulsion
Property	Land and buildings on, below or above ground including pipes, cables and other equipment connected thereto
Real estate	Land and all things that are a natural part of the land (*e.g.* trees, minerals) and things that have been attached to the land (*e.g.* **buildings** and site improvements) and all permanent building attachments (*e.g.* mechanical and electrical plant providing services to a building), that are both below and above the ground

1 Executive summary

A key goal of Work Package 4 is to collect the views and opinions of stakeholders and end-user communities on the project's methodology for novel assessment and certificate design currently being developed in the digital platform. In addition, the work focuses on identifying and characterising market actors' roles and needs across scales in both the building certification and assessment value chains to establish an appreciation of public perceptions and acceptance of current market-based and official energy performance certificate (EPC) programmes.

To achieve this, three complementary tasks frame the body of work undertaken to address these objectives. This deliverable presents the outcomes of work undertaken in a desk-based critical review of public engagement programmes from a variety of sectors across Europe. Consequently, this review identifies and appraise good practices and transferable lessons from projects in other sectors, including *e.g.*, renewable energy, electronic appliances, and other property development activities in order to assess the "preconditions" influencing stakeholders to hold certain views about energy efficiency in buildings and sustainability. How these perceptions transfer in relation to energy performance certificates, especially the effect smart solutions (SRI) and thinking in "life cycles" associated with investments is also explored. While effort for this deliverable has been primarily desk-based, it has been informed by the engagements in T4.1 (reported in Deliverable 4.1) and work in T4.3 (reported on in Deliverable 4.3).

This deliverable is the second of three complementary reports examining the public engagement and social acceptance of EPCs and their pertinence to the EUB SuperHub platform.

2 Introduction

2.1 Background and context

Achieving sufficient energy efficiency developments to buildings across the EU necessitates significant changes in how the built environment is observed. There is a requirement to take a more holistic view of buildings, based on an in-depth understanding of societal trends and the dynamics driving the marketplace. Accordingly, energy performance assessments and certificates of buildings need to evolve to reflect the technological development and the needs of the society. Moreover, within the EU, they must be consistent throughout the Member States.

The EUB Superhub project arises from the premise that the next generation of energy performance certification should take advantage of the impending era of big data, where buildings can be observed with ever increasing levels of detail via a larger number of stakeholders, and with ever increasing amounts of available information on the operational use of buildings. The project supports the evolvement of the building certification process in the EU through the development of a scalable methodology to view, assess and monitor the buildings throughout their lifecycle. Consequently, this methodology proposes to capture some of the more complex aspects of the construction sector, such as embedded energy and related costs.

2.2 Purpose and structure of the document

The work outlined in this report stems from activities undertaken as part of a work programme devised for Work Package 4 of the EUB SuperHub project, titled '*Stakeholder involvement and social acceptance studies of EUB SuperHub*'. This work package addresses the following key objectives:

- explore the views and opinions of end-user communities and key stakeholders on the EUB SuperHub methodology, specifically the unique assessment and certificate design to be implemented in a digital environment.
- identify and characterise the roles and needs of market actors throughout value chain(s) which deliver building- and district-level building certification and assessment.
- examine public understandings and social acceptance of the current market-based and official certificates.

The objective of this report is to offer a critical review of public engagement programmes from a variety of sectors across Europe. In this context the report aims

to (i) identify and assess good practices and transferable lessons from projects in other sectors in order to identify innovative methods for more effective communication; (ii) examine issues of spatially explicit information and technology'; (iii) consider the impacts of social media and increased usage of information and communication technology in investors, private and public sector decision making; and (iv) assess the "preconditions" influencing stakeholders to hold certain views on energy efficiency in buildings and on energy performance certificates. This deliverable is designed to complement and inform the empirical work described in deliverable 4.3.

2.3 Structure of the document

This deliverable, '*Pragmatic and innovative approaches to public engagement and social acceptance*', has been produced through a detailed review of the relevant literature on public engagement. The report is structured in the following manner:

1. Introduction: provides an overview of the EUB SuperHub project, including background and contextual information.
2. Methodology: outlines the methodological approach to data collection as part of this deliverable, referring primarily to the desk-based research and thematic analysis procedures.
3. Public engagement and social acceptance: an exploration of the relevant literature relating to public engagement and social acceptance with a focus on energy and the built environment.
4. Discussions, recommendations, and conclusions: Summarises key findings of this report, forwards recommendations, and outlines their significance to the overall project.

3 Methodology

3.1 Research approach

The objective of the research presented in this report is to define principles and guidelines for public engagement and education about building performance certification in general, and the EUB SuperHub methodology in particular. This section outlines the methodology adopted for this work, described by Crotty (1998, 3) as the "*strategy, plan of action, process of design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes*".

The primary focus of the research is to develop a better understanding of how public engagement programmes are implemented across a variety of sectors in Europe. Key to this approach is the identification and assessment of good practice (and where applicable, highlight transferable lessons) from projects operating in other sectors, including, *e.g.,* renewable energy, electronic appliances and other property development activities. This research is the second of three related tasks within a package of work exploring stakeholder involvement and social acceptance related to building certification. This work package was divided into three components.

- The first task concerned with "*mapping of stakeholder interaction and identification of market actors' needs*" was reported in an earlier output[1]. In this work, a social constructivist epistemic view of knowledge was adopted, and a mixed methods approach to data collection and analysis was devised involving a review of literature, surveys, and in-depth interviews, coupled with a generic thematic analysis of resultant data.
- The second task, the research for which is the subject of this document, comprised a desk study within which a review of literature formed the basis of knowledge generation. This literature review was informed by the surveys and interviews undertaken as part of the realisation of the other tasks within this package of work.
- The third task aims to establish principles for public engagement and education about the EUB SuperHub methodology and to develop guidance on communication. The report[2] of this third component is being prepared concurrently with this document. In research approach in this work also took

[1] Dunphy, N. P., Quinlivan, L., & Lennon, B. (2023). *D4.1 – Mapping of stakeholder interaction and identification of market actors' needs.* A research output of the EUB Superhub H2020 Project.
[2] Dunphy, N. P. & Lennon, B. (2024). *D4.3 – Critical review of education and public engagement*. A research output of the EUB Superhub H2020 Project.

a social constructivist perspective and adopted a mixed methods methodology similar to that undertaken in the initial task.

As explained above the research reported in this document is one of three interlinked components, which collectively are exploring the social aspects of building certification. Within the science and engineering disciplines there is a tendency to take methodological considerations somewhat for granted. The vast majority of scientists and engineers share a positivist stance seeing the world as based on fixed facts, ordered with certain discernible laws. In this perspective the so-called scientific method[3] (paradigmatic of objective research) it is seen for many as the only legitimate means of knowledge generation.

In the social sciences, while the scientific method is used by many, there is not the same hegemony and other research philosophies are acknowledged are having a place. As such, we took into account the ontological and epistemological issues key to research design, including any explicit and implicit assumptions held by the researchers as part of the overall research paradigm adopted for the work (Morgan & Smircich 1980). The research conducted is this work package is fundamentally concerned with the study of social phenomena. We are in agreement with Charmaz's critique (2003, 83) that deductive quantitative approaches tend to reduce "*qualities of human experience to quantifiable variables*", which often ignore the fact that the world is essentially a social construction. One that is subjective to observers and/or negotiated within groups, and not fully understood using primarily objectivist approaches found within social sciences. We therefore draw on an anti-foundationalist ontology[4] and take a social-constructivist epistemic[5] view of knowledge. Accordingly, within this work package, in addition to review of the literature, qualitative data gathering and analysis techniques are used to understand the perceptions, attitudes, and practices that coalesce along the real estate value chain as they relate to energy performance certification and building assessment.

3.2 Literature Review

The research reported in this deliverable is a desk study involving a review of literature[6]. An essential aspect to all research is the undertaking of a review of literature that is pertinent to the study topic. Composed of a collection and synthesis of previous research (Baumeister & Leary 1997; Tranfield *et al.* 2003), a

[3] Weinberg (1995) observes that most scientists do not understand the scientific method, rather they just do – he compares it to someone riding a bicycle, saying "*if they think too much about it, they are likely to fall off*".
[4] Anti-foundationalist ontology (view of the nature of reality) holds that (social) reality does not have an objective existence, independent of the observer (Moses & Knutsen, 2012).
[5] Constructivism sees the world in an as a social construction, which needs to be interpreted (*Ibid.*)
[6] Albeit, as mentioned above informed by surveys interviews elsewhere in the workpackage.

literature review allows for a systematic exploration of existing theories, practices, and indeed wider knowledge on the topic being explored (Webster & Watson 2002). While a literature review is often seen as a precursor to 'real' work it is in fact an integral and essential part of research and should not be seen as something separate. Reviewing literature is an important and worthwhile research method in its own right and can lead to new knowledge and insights (Webster & Watson 2002, Torraco 2005).

While guidelines for conducting a literature review differ, depending on the type of review being carried out, Snyder (2019) offers three broad categories of literature review to consider namely, 1) the systematic, 2) semi-systematic, and 3) integrative review. Under the correct circumstances, each provides considerable potential for addressing research questions.

The approach undertaken for this literature review has been adopted from Smith *et al.*'s (2021) comparable study on key concepts of education and public engagement strategies linked to public acceptance in the renewable energy industry. Gathering and analysing secondary data for this purpose can best be described as an integrative literature review, one that "*reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on a topic are generated*" (Torraco, 2005, p. 356). Understanding the dynamics of public engagement has grown in recent decades (Sandlin *et al.,* 2010) with most peer-reviewed articles and books examined written since 2000 in addition to foundational works published prior to then. In adopting an integrative analytical approach, we identified sources from scholars across the globe and from a variety of disciplines including, though not limited to, education, philosophy, sociology, psychology, public administration, political science, and science-technology-society studies (Smith *et al*., 2021).

The search and analysis were both systematic and dynamic, and organised around the two key terms of *public engagement* and *social acceptance*. Emerging themes and meanings were then identified through assessment, critique, and a synthesis of the relationships each theme has with the other to create an overarching framework for establishing new knowledge (Torraco, 2005). Systematically, our approach was to use similar search expressions across multiple databases including Elsevier Scopus, Google Scholar and UCC library OneSearch, setting the search parameters to relevancy, citations, and date in that order (Table 1). While dynamically, a forward and reverse snowballing approach was adopted for referencing applicable sources identified in the associated bibliographies of key texts with both original articles and other sources referenced within being captured in the process.

Table 1 Search term examples and databases used

Examples of search terms used	**Databases searched**
Education AND social acceptance Social acceptance AND renewable energy Public pedagogy Typologies of public engagement Importance of place in social representations Public engagement methodologies Deliberative democracy AND engagement Ethics of social intervention Rationality and emotion in public engagement Effective public messaging	Web of Science Science Direct JSTORS ProQuest Cambridge core Wiley online Library Taylor & Francis eBooks and eJournals Scopus SocINDEX OneSearch (university search energy for books and journal articles

In addition, the seven-task framework presented by Fink (2010, 5), and summarised in Deliverable 4.1 was implemented and acted as a guide for the literature review for this report, and briefly outlined below:

- A research question to orientate the review was selected.
- Applicable bibliographic databases and other literature sources were identified.
- Appropriate search terms and combinations were workshopped by the research team and deployed using Boolean operators 'and', 'or', 'not' to search for relevant material.
- Implement an initial screening criteria, to reduce the amount of identified literature to a (more) manageable amount (e.g., screening out non-energy related material).
- Implementing a second stage screening focusing on the research methodological background, apparent quality, and rigour of the work

identified. This initial and subsequent screening enabled us to identify articles that were more directly applicable to the research themes being explored.

- A sixth step comprised an actual review of the selected and collected literature in an iterative process of reading, annotating, organising, summarising, and analysing the data.
- Finally, a synthesis of the research was undertaken and produced as a review. that is "*original, perceptive and analytical*" (Jesson & Lacey 2006: 142).

Subsequently, this report focuses on literature focused on public engagement and social acceptance, before looking at applicable programmes across different sectors.

4 The evolving role of building energy performance certification

4.1 Building Energy Performance Certificates (EPCs): An introduction

Building Energy Performance Certificates (EPCs) are credentials relating to the energy efficiency of buildings provided by a rating scheme. They can be best understood as a means of provide information to consumers on buildings they plan to purchase or rent. They provide an energy performance rating and typically recommendations for include cost-effective improvements. In doing so they may a critical role in promoting greater energy efficiency standards for the built environment. At a minimum, EPCs offer practitioners a tool for engaging with clients who may be largely unfamiliar with the engineering and environmental factors impacting a building's energy performance. A key strength EPCs offer is a standardised assessment of a building's energy efficiency and carbon emissions, and they also provide a tangible measure for comparing the energy performance of residential, commercial, and public buildings.

The inception of EPCs can be traced back to the European Union's Energy Performance of Buildings Directive (EPBD), which was established to enhance the energy efficiency of buildings across EU member states, thereby contributing to the reduction of greenhouse gas emissions and the promotion of sustainable energy use (European Parliament, Council of the European Union, 2012). The directive mandates that an EPC must be made available for buildings when constructed, sold, or rented out. EPCs and inspections of heating and cooling systems have become important tools help improve the energy performance of buildings, ensuring quality, harmonisation and accessibility.

EPCs classify a building's energy efficiency based on a harmonised scale using only letters from A to G, with A representing the most energy-efficient buildings and G the least. This rating is determined by evaluating various aspects of the building, including materials used in its construction, the heating and cooling systems installed, its degree of insulation, and the integration (if any) of renewable energy sources. Alongside the efficiency rating, EPCs often provide recommendations for improving the building's energy performance, suggesting upgrades or modifications that could lead to increased efficiency and reduced energy costs (DLUHC, 2024).

A primary aim of EPCs is to raise awareness among homeowners, tenants, and potential buyers about a property's energy consumption, thereby influencing property investment, rental decisions, and encouraging the uptake of energy-saving measures. By making energy performance transparent, EPCs play a pivotal role in driving the market towards more energy-efficient buildings, aligning with broader environmental goals to reduce energy use and mitigate climate change impacts.

Globally, the concept of EPCs has been adopted and adapted to fit national contexts, reflecting a widespread recognition of the importance of improving building energy efficiency as part of multilateral climate change mitigation strategies. Countries outside the European Union, including Australia and Canada, have developed their own energy performance certification schemes to encourage better energy practices within the building sector and to support national environmental objectives (NSW Government, 2024; Government of Canada, n.d.).

Building Energy Performance Certificates therefore are an important instrument in international efforts to improve the energy efficiency of existing building stock, while also future proofing new builds. By providing a clear and accessible evaluation of a building's energy performance, EPCs facilitate informed decision-making that supports energy conservation, cost savings, and environmental sustainability.

4.2 A Brief History of Building EPCs

The current iteration of building energy performance certification can be dated back to the early 1990s with the emergence of Energy Performance Certificates as a core instrument for achieving energy efficiency in buildings and the culmination of efforts by various stakeholders in the building sector across member states. This translated into the Energy Performance of Buildings Directive (EPBD) in 2003 with European Union (EU) member states playing a significant role in promoting the adoption of EPCs as a means to improve building energy performance and reduce energy consumption.

The Energy Performance of Buildings Directive (EPBD), introduced in 2002 and revised in 2010, laid the foundation for the development and implementation of EPCs across EU member states. The EPBD defined EPCs as certificates that indicate the energy performance of a building or building unit, providing essential information on energy consumption and efficiency (Maldonado *et al*., 2011).

Building certification programs, such as Leadership in Energy and Environmental Design (LEED)[7] and Building Research Establishment Environmental Assessment Method (BREEAM)[8], are pivotal in promoting sustainability in the construction sector. However, the effectiveness of these programs often hinges on public understanding, acceptance, and participation. The various certification schemes such as BREEAM, LEED, Miljöbyggnad[9], and Svanen[10] have been developed to enhance building energy performance and sustainability. These schemes offer benchmarking, rating, and labelling processes to assess and improve the energy efficiency of buildings (Pérez-Lombard *et al*., 2008).

Over the years, EPCs have evolved to include a range of data features such as building reference, geometry, certificate methodology, energy consumption, performance calculations, energy system installations, recommendations, and additional information. These certificates serve as valuable tools for informing building owners, occupants, real estate agents, and other stakeholders about the energy performance of buildings (Pérez-Lombard *et al*., 2008).

Quality control measures for EPCs have been established in all EU member states to ensure data accuracy and reliability. Despite the progress made in collecting EPC data, concerns have been raised about data quality, particularly regarding the performance gap between estimated and actual energy performance. Studies have also highlighted the need for further improvement in data quality, including the use of intelligent tools for quality checking and harmonisation of quality checks on EPCs (Pasichnyi et al., 2019).

So far, EPC initiatives have been initiated across various global regions. These programs serve as rating systems, encapsulating the energy efficiency of buildings and are proving pivotal to the transformation of existing buildings into nearly zero-energy structures that align with governmental decarbonisation objectives. For instance, ENERGY STAR, a collaborative effort between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA), aims to

[7] This global standard was first developed by the non-profit organisation U.S. Green Building Council.
[8] Developed by the UK's Building Research Establishment (BRE) in 1990
[9] The Swedish Miljöbyggnad (MB) consists of two major schemes: one for new construction, and one for existing buildings with projects that meet requirements being awarded certificates at three levels: Gold, Silver, or Bronze.
[10] The Nordic Swan Ecolabel is the most stringent ecolabel in the Nordic countries and is awarded to goods and services that meet ambitious environmental, climate and health requirements there.

enhance energy efficiency by furnishing data on residential energy usage. Notably, ENERGY STAR-certified homes exceed standard building codes by at least 10% in energy efficiency (EPA, 2021). Typically, an EPC includes a label presenting the building's energy performance rating, basic building details (such as age and location), and professional recommendations for enhancing energy efficiency (Zuhaib *et al*., 2022).

EPC programs not only serve as potent tools for energy conservation and greenhouse gas (GHG) emissions reduction in residential areas but also provide policymakers with improved building stock data, facilitating effective policy monitoring during implementation. EPCs have been instrumental in decision support planning, encouraging homeowners to renovate buildings (Chegut *et al*., 2014). Moreover, they have emerged as significant instruments in advancing the decarbonisation of building stock across all sectors (Li *et al*., 2019), with countries across the EU and beyond utilising EPCs to establish mandatory minimum energy performance standards for existing buildings (Volt *et al*., 2020). The broader adoption of EPCs and their data also extends support to local governments, real estate agencies, and academic research, while also contributing to the formulation of urban energy policies (Pasichnyi *et al*., 2019). Recent research has predominantly focused on assessing the usefulness and reliability of EPCs. While some studies have pointed out the limited impact of EPCs on homeowners' energy retrofitting behaviours and purchasing decisions (Christensen *et al*., 2014), many researchers and industry experts contend that EPCs can address challenges related to housing decarbonisation, deep retrofitting, recommendation development, future energy savings, and overall sustainability (Anđelković *et al*., 2021). However, achieving widespread acceptance of EPCs on a global scale poses challenges. Key reasons include insufficient information provided to motivate homeowners to engage in EPCs and retrofit their buildings, as well as limited implementation in some countries, resulting in a lack of reliable information for home energy planning, a requirement stipulated by EPCs (Mangold *et al*., 2015).

5 Public engagement and social acceptance

There is clear value in, and demand for, communicating the energy efficiency of a home. In one study conducted in the United States, for example, over half of apartment residents said that they wanted to know specifically about the energy efficiency of the apartment before renting, and 25% said that it would have a strong or very strong impact on their decision to rent (Charlesworth *et al*., 2018). The following subsections outline current thinking on public engagement and social acceptance of EPCS, and other relevant applicable descriptions of note, using specific examples and case studies found in the literature.

5.1 Considering Effective Public Engagement

Numerous studies on public communication and outreach programmes have tended to focus less on the methods employed and more on the tone and content of those communications. In terms of the content of any messaging, Gerdien de Vries suggests one should "*keep it simple, balance the message, and provide an action perspective*" (2020: 263), while other studies note focusing on specific actions and "how-to skills" are key to successful communication (Vedung, 1999; Casado *et al*., 2017). Taking an economic focus, when paired with the "action perspective", can also be especially effective as consumers and companies may be particularly motivated by the expense of inefficient energy use (Hidalgo *et al*., 2014; Rodríguez & Eras, 2024).

In a case study in the coastal city of Barranquilla, Colombia, Rodríguez and Eras (2024) found social media and internet communication to be most effective in reaching especially younger residents. While in another, a study of Display® Posters energy efficiency placards on buildings in Europe and their efficacy in actually improving energy performance, found that the placards themselves serve as a recognisable form of public communication with local governments needing to engage in further communication activities in order to ensure impact. This study identified a number of key measures to be conducted for effective communication and engagement, including providing education and training programmes to building managers supported by more general events (they suggest a minimum of three per year); internal communications using newsletters, intranet, CYBER Display® ambassadors within the buildings themselves; in addition to school programmes; local press articles and media outreach; and regular staff training workshops (Bull *et al*., 2012). Notably, this study also found that energy awareness training for staff and building users, though the most common form of outreach activity, was actually less successful in encouraging change than were organising

local media campaigns, attending users club events, using promotional stickers, and monitoring behavioural change.

There is a growing body of research around responses by various stakeholders to renewable energy projects, especially given the proliferation of both onshore and offshore wind projects, but also more recently solar parks too. A large part of this discourse has tended focused on the ways in which social media actively influences societal perceptions of renewable energy (*e.g.* see Corbett & Savarimuthu, 2022), with surveys considering aspects of demographics, psychology, concerns around justice, and expected positive or negative impacts on jobs (Wiersma & Devine-Wright, 2014). These studies parallel those described above but also found that effective communication around renewable energy should be not only actionable and grounded in economic issues but should also be highly-localised in their focus given people are generally more motivated by how their communities will be impacted than by global issues per se (Parks & Theobald, 2013).

5.2 "Smart data": Eco-feedback, social interaction, and gamification

A systematic literature review conducted by Paone and Bacher (2018) on the feedback mechanisms for changing tenant behaviour focused on "eco-feedback", "social interaction", and "gamification." This work fits within a larger body of literature on the use of "smart data" and an "internet of things" in which appliances and homes are networked with one another and produce data on their respective usage, which can then be either reported or used to adjust consumption (Fensel *et al.*, 2017; Barrios-O'Neill & Schuitema, 2016). Each of the three feedback mechanisms is integrated with information and communications technology (ICT) in order to track tenant energy usage and efficiency. Eco-feedback can be considered any mechanism for reporting a tenant's energy use and allows the tenant to visualise past and current energy consumption, and is typically presented on paper printouts, emails/letters, websites, or in-home display units (Paone & Bacher, 2018; Khosrowpour *et al.*, 2016).

Social interaction in this context can refer to any form of eco-feedback that incorporates a social element, often in the form of some sort of social networking. This is based on the theory that people are more likely to adopt energy-conscious behaviours if they are sharing their and their appliances' energy usage data amongst a larger community (Gulbinas *et al.*, 2014; Paone & Bacher, 2018).

Gamification can be seen as an extension of eco-feedback and, potentially, of social interaction that introduces "game-like" features to energy savings and efficiency. A 2015 review of gamified energy savings programmes and systems found a wide variety of approaches to this, with different degrees of virtualisation, progress monitoring, social interaction, involvement of public utilities, and data integration,

applied in homes, communities, and workplaces (Grossberg 2015). The review found that the most successful gamified energy saving systems integrated real-world data and a social element, as well as the mechanisms of challenge and reward that characterise successful game design in general.

Gamification was a component of the FEEdBACk European Research Council (ERC) Project, which proposed a suite of software and mechanisms for promoting energy-efficient behavioural change. The proposed suite would be built upon an integrated platform, allowing communication between devices and homes and easier development and expansion of apps for monitoring as well as games or gamified eco-feedback software (Soares *et al*. 2021).

Fleury *et al*. (2018) took a novel approach to gamification by way of a virtual reality game called Virtual Energy Hero, created as a means of increasing smart energy, "smart city", and renewable energy public awareness and knowledge in the city of Winterthur in Switzerland (see also West *et al*. 2019). The theory underlying the project is that users will be encouraged to engage with energy efficiency by way of an actual game—taking gamification more literally—and through a virtual-reality platform creating stronger linkages between the game and real-world energy-conscious behaviour. The game further encourages players to join an online "innovation platform" as a means of further engagement (West *et al*. 2019).

5.3 Engagement programmes across different sectors

A great challenge for any public information campaign is reaching those members of the public, likely the majority, who are not already interested in engaging with an issue. Indeed, they may even be unaware of the issue altogether and therefore be in need of "awareness-building". While the methods described above can encourage behavioural change amongst recipients who are exposed to them, these approaches cannot, on their own, reach those members of the public living outside of buildings or homes in which they have been deployed.

5.3.1 Medical and public health engagement

Remarkably, the range and depth of literature available on the methods for public engagement and communication remains somewhat scant. Communication activities and the materials used are often taken together without a thorough evaluation of which prove the most effective in encouraging participation or changing behaviour. Much of what has been written about communication with the public is centred around public health, most notably following the COVID-19 pandemic. This overlaps with a sizeable body of literature on appropriate crisis and disaster response. Writing on the topic of public engagement in clinical ethics, Bowman (2017) for example, describes a certain bias in public engagement

programmes towards 'expert' voices and approaches to engagement through collaborations around public radio and theatre. Both methods can reach audiences who would otherwise not show an interest in clinical ethics and engages them through candid and unmediated interactions with 'lay' perspectives (or patient voices in the former case). Such approaches offer a means for building a philosophically rich storytelling structure (particularly in the latter case) by "*explor[ing] questions of identity, the ethics of innovative medical treatments, and trust in relationships (both therapeutic and personal)*" (Bowman, 2017: 48). Other arts-based approaches, including theatre, film, role-playing workshops, collaborative art, and music, engaging the public on issues relating to age, dementia, and women's health. Viewed together, they demonstrate strong potential for shifting perceptions and encouraging a more open and transparent spaces for citizens to engage in much needed critical dialogue (Siette *et al*. 2023; McCauley *et al*. 2019). Theatre has also been employed to spread public health awareness in Myanmar, particularly in demonstrating safe hygiene practices and behaviours, and also in building trust in antibiotics and correct use of new medicines (Swe *et al*. 2020).

Gamification is also held up as a useful means for engaging the public on health-related topics. A 2024 study in the context of the Global Action Plan on antimicrobial resistance (AMR) examines twelve AMR games, examining the characteristics mentioned in section 5.2, particularly challenge and a feeling of reward. As in "internet of things" style engagements, they demonstrate that gamification can be an effective way to create linkages for the public between scientific concepts and real-world consequences (Trehan *et al*. 2024). These principles could readily be applied to interacting with the public about building codes and energy efficiency standards, though it may not suit those looking to adopt a more standardised approach as they tend to be either ad-hoc, with games created, released, and promoted on the usual app stores, or shared with limited, more 'captive audiences' as discussed seen with the examples in section 5.2.

From the literature, there are notable engagement methods applied outside of public health and crisis response discourses, with science outreach and engagement being a comparatively frequent topic of interest. An illustrative example is "Chips for Everyone", which is an electrical engineering outreach programme designed to encourage interest and understanding in semiconductor technology, but applied to traditionally non-scientific venues, including fairs, shopping centres, shows, school workshops, and collaborations in music, art, and video production (Magill, 2010; Magill & Roy, 2010). To achieve a diversity of outreach activities, the Chips for Everyone team draws from the experiences and skills with members who are engineering academics, musicians, artists, education

academics, public engagement specialists, and student teachers in technology. While the outreach in this case is geared towards attracting students to semiconductor engineering, it also draws heavily from the arts to create interactive presentations that capture both the aesthetic beauty and the functionality of microchips.

Another interesting approach has been “guerrilla marketing”, a general term for a multitude of communication strategies that are considered unconventional in either their tone or the vehicle for communication used. However, they have grown in popularity in recent years and have been employed in a variety of sectors including science outreach and in the promotion campaigns of some museums (Nechita, 2014; Domingues, 2024). These campaigns have also either applied gamification tools or at least been informed by the concept. Again, an array of methods can be used, including ‘ambient advertising’ which can take the form of, as in an example offered by Nechita (2014), a lava flow simulation on an airport baggage conveyor to promote a Pompeii exhibit, as well as projected images and video. These are more sophisticated and difficult to make, obtain permits for, and deploy than conventional posters or TV ad buys, but they also can effectively engage the public in frequented or targeted spaces and as a result create greater interest in the product or service being campaigned on.

6 Discussion

6.1 Public Engagement in building energy performance certifications

As we have seen in other sectors, public engagement has the potential to play a critical role in the energy transition to mitigate against climate change and promote sustainable development. Certainly, much more than it currently is and in particular on helping to improve building energy efficiency. The active participation of the public in energy efficiency initiatives can lead to significant reductions in energy consumption, lower GHG emissions, and realise substantial economic savings that could be used shore up much needed social protection services elsewhere. Public engagement in building certification programmes can take various forms, including community consultations, educational programmes, participatory decision-making, and feedback mechanisms.

These engagement strategies usually express an aim to involve stakeholders in the certification process, taking onboard their views and ensuring their needs are considered. However, despite the potential promise of EPCs in decarbonising the building sector, the application of limited or short-sighted public engagement

programmes which often appear more to be box-ticking exercises than real engagement have impacted their implementation and execution (Schuitema *et al*., 2020). In addition to a real commitment to engage on the part of project leads, resolving this issue necessitates a deeper understanding of public perceptions and attitudes of those being asked to participate in a particular programme, while conducting transparent explorations of the potential benefits and pitfalls that takes into account the need for public acceptability over simple acceptance/acquiescence. This requires greater levels of active listening and a much greater acceptance on the part of project leads that while engagement can be messy, the results can be transformative. The literature appears to coalesce around the following areas to consider:

1. *Awareness and Behavioural Change*: is a popular with energy incumbents, their representative bodies, and policymakers, *e.g.*, the International Energy Agency (IEA) emphasises the importance of information and awareness campaigns in driving energy efficiency improvements across sectors (IEA, 2018). Public engagement initiatives can help raise awareness about the importance of energy efficiency and how individual actions can make a significant difference to wider efforts to reduce consumption. Educational campaigns, workshops, and community programmes can inform the public about energy-saving practices and technologies. However, the mistaken assumption that information provision leads to behavioural change, reducing energy consumption and builds wider acceptance and utilisation of the energy performance certifications has been highlighted in the literature, including some of the authors of this report.
2. *Policy Support and Implementation*: public support is essential for the successful implementation of energy efficiency policies and programmes. Engaged and informed citizens are more likely to support and comply with energy efficiency regulations and initiatives. The European Union's Energy Efficiency Directive, for example, includes provisions to promote public access to information and foster public participation in achieving energy efficiency targets (European Parliament, Council of the European Union, 2012).
3. *Feedback and Continuous Improvement*: public engagement can provide valuable feedback to policymakers, utilities, and businesses on the effectiveness of energy efficiency programmes and policies. This feedback loop can lead to continuous improvement and refinement of strategies to better meet the needs of the public and achieve energy-saving goals.

Public engagement offers significant potential to realising collaborative pathways towards improving building energy efficiency, but as suggested here and elsewhere, not all engagements with citizens are or have been deployed equally (*e.g.*, see Dunphy & Lennon, 2022; Lennon & Dunphy, 2023). By fostering awareness, supporting policies, driving market transformation, initiating community projects, and providing feedback, the public can play a vital role in achieving energy-saving objectives if allowed to do so. The collective action and participation by empowered, informed individuals and communities can contribute not only to environmental benefits but also towards promoting economic and social well-being.

6.2 Illustrative Case Studies

While there are limited examples specifically dealing with public engagement and energy performance certification, particularly in a European context, we did find several illustrative examples from further afield which demonstrate how other jurisdictions are conducting such work.

6.2.1 Case Study 1: Sustainability in Public Buildings in Korea

A recent study by Baek (2021) focuses on the sustainability strategies deployed for public buildings in South Korea through implementation of the Energy Efficiency Certification System, focusing primarily on public sports facilities. A key strategy was the implementation of energy efficiency certification systems to promote sustainable practices in public buildings, emphasising the role of public engagement in achieving sustainability goals. The study suggests several potential improvements at the institutional level to further enhance energy efficiency in public buildings, with key recommendations include:

1. Expanding Government Publicity and Support Initiatives: To promote energy efficiency in public buildings, the study recommends expanding government publicity and support initiatives. Increasing awareness and providing resources can encourage building owners and managers to prioritise energy efficiency measures.
2. Differential Application of Evaluation Items: Implementing a differential application of evaluation items can help tailor energy efficiency requirements to the specific characteristics of different types of public buildings. This approach can ensure that certification systems are effective and relevant across various building types.
3. Strengthening Incentives: Enhancing incentives for energy efficiency improvements can motivate building owners to invest in sustainable practices. Financial incentives, tax benefits, and other rewards can

encourage the adoption of energy-efficient technologies and practices in public buildings.

By implementing these improvements at the institutional level, stakeholders can potentially enhance the effectiveness of energy efficiency initiatives in public buildings and contribute to the overall sustainability goals of the country (Baek, 2021). National sports centres in Korea have been expanding regionally as part of the government's efforts to promote living-friendly sports facilities, ranging from local public sports facilities to national sports centres, with plans to build more facilities by 2027. While these centres are central to government policy for promoting sports activities, they do use a significant amount of energy. Consequently, the Ministry of Culture, Sports, and Tourism has prioritised the construction of energy-efficient buildings that address the energy consumption challenges associated with operating sports facilities and aligns with the country's goals for energy efficiency and sustainability. The expansion of national sports centres regionally in Korea underscores the importance of incorporating energy efficiency measures in the design and operation of these facilities. By implementing energy-efficient technologies and certification systems, such as the Zero Energy Building certification, the government aims to reduce energy consumption and promote sustainable practices in public buildings. Overall, the regional expansion of national sports centres in Korea presents an opportunity to integrate energy efficiency efforts into the development of new facilities and improve the overall sustainability of public sports buildings in the country (Park, 2015). However, Baek (2021) suggests a review of the energy efficiency plan is needed with information and opinions on the certification system process (particularly budgeting, such as fees) and the possibility of changes to incentives should be provided stakeholders who may lack general knowledge and understanding of building construction.

6.2.2 Case Study 2: Residents' Participation in EPC Programs, Canada

This case study examined residents' intentions to participate in EPC programs in Canada and highlights the importance of understanding public perceptions and attitudes towards energy certification programs and engaging residents effectively. This requires more transparent approaches to addressing their attributions and attitudes towards climate change, showcasing the need for tailored communication and engagement strategies (Chen *et al.*, 2023). When residents perceive the benefits of EPCs and accept certification initiatives like

EnerGuide[11], they are more open to engaging in actions that contribute to reducing residential energy demand and mitigating climate change (Chen *et al*., 2023). This acceptance is important as it serves as a motivating factor for residents to engage in energy-saving behaviours and adopt sustainable practices in their daily lives. Furthermore, residents' attitudes towards climate change and their understanding of the benefits of energy efficiency programmes are interconnected. Positive attitudes to addressing climate change can enhance residents' perception of the benefits of energy efficiency programs, leading to increased acceptance of certification initiatives like EnerGuide (Chen *et al*., 2023). This positive correlation highlights the importance of fostering pro-environmental attitudes among residents to promote their engagement in EPCs. Essentially, residents' perception and acceptance of EPC programmes act as catalysts for their participation in collective action on climate change.

Chen *et al*.'s (2023) survey conducted with 400 residents of Edmonton, Canada, who participated in the EnerGuide programme uncovered some interesting insights regarding residents' attitudes and intentions towards EPC programmes and their impact on collective action on climate change. Key findings include:

1. *Internal and External Attributions of Climate Change*: The study revealed that both internal and external attributions towards climate change significantly influence residents' attitudes to taking collective action to reduce residential sector energy demand. Internal attributions had a stronger direct influence on attitudes compared to external attributions, emphasising the importance of individual beliefs and perceptions in shaping attitudes towards climate change.
2. *Residents' Attitudes and Benefits of Energy Efficiency Programmes*: The research highlighted a positive and significant relationship between residents' attitudes towards climate change and the benefits of energy efficiency programmes. Pro-environmental attitudes not only enhanced residents' perception of the benefits of energy efficiency programs but also increase their acceptance of EPC programmes like EnerGuide.
3. *Impact of Energy Efficiency Program Benefits on Participation Intentions*: The study found that understanding the benefits of energy efficiency programs have a significant positive impact on residents' acceptance and acceptability of EPCs. Residents who perceive higher benefits from energy efficiency programs are more likely to accept and participate in initiatives

[11] EnerGuide is the official mark of the Canadian EPC rating and labelling programme for key consumer items, for more information see: https://natural-resources.canada.ca/energy-efficiency/homes/what-energy-efficient-home/welcome-my-energuide/16654.

like EnerGuide, indicating the importance of highlighting the real benefits of such programs in promoting participation.

4. *Mediating Effects of Residents' Attitudes*: Residents' attitudes towards climate change were identified as a mediating factor in the relationship between internal/external attributions and acceptance of the EnerGuide programme. These attitudes indirectly influenced residents' program acceptance and participation intentions, with the effects moderated by the perceived benefits of energy efficiency programmes.

Overall, the survey offeres valuable insights into the numerous intersecting factors influencing residents' engagement in EPC programmes and their implications for collective action on climate change. The findings underscore the importance of residents' attitudes, perceptions, and acceptance in driving participation in initiatives aimed at enhancing energy efficiency and combating climate change.

6.2.3 Case Study 3: LEED®–ND™ Certification and Community Planning

The Leadership in Energy and Environmental Design for Neighborhood Development (LEED®–ND™) certification has played a significant role in engaging communities in building projects by providing a framework for identifying and implementing sustainable strategies, particularly in terms of community planning and prioritising green spaces, energy efficiency, water conservation, and sustainable waste management. Adopted as the 'de-facto green neighbourhood standard', it is now used to measure the sustainability of neighbourhood design in North America (Szibbo, 2016), it can play a useful role in community and stakeholder collaboration in development decisions. Community planning is achieved through a combination of approaches, including:

1. *Promote Sustainable Site Development*: LEED®–ND™ certification encourages community planners to focus on site selection and developments that have limited environmental impact, including preservation of natural habitats, reducing soil erosion, and promoting water efficiency. By incorporating green spaces and natural elements, projects can improve the overall well-being of residents.
2. *Enhance Energy Efficiency*: LEED®–ND™ certification places a strong emphasis on energy efficiency, urging community planners to integrate renewable energy sources like solar or wind power in the design, resulting in reduced reliance on fossil fuels and limiting greenhouse gas emissions, *e.g.*, efficient lighting design and energy-efficient heating, ventilation, and air conditioning (HVAC) systems can contribute to lower energy consumption overall in a project.

3. *Prioritise Water Conservation*: with water scarcity a significant concern globally, LEED®–ND™ certification addresses this by encouraging community planners to implement water conservation strategies including more efficient irrigation systems, rainwater harvesting, and using water-efficient fixtures and appliances in buildings, all of which help reduce the impact on local water resources.
4. *Improvements to Indoor Air Quality*: LEED®–ND™ certification contributes to improving indoor environmental quality by using low-emission materials, proper ventilation, and effective air filtration systems and heat exchangers leading to improved occupant comfort, productivity, and overall well-being.
5. *Encourages Sustainable Material Selection*: another consideration is in in selecting materials with reduced environmental impact. This involves considering factors like recycled content, locally sourced materials, and renewable resources, helping to reduce waste and contribute to the establishing of a circular economy.

The certification of a LEED®–ND™ project is contingent on evaluation of a set of pre-described 'credit categories', including Smart Location and Linkage, Neighbourhood Pattern and Design, Green Infrastructure and Buildings, Innovation and Design Process, and Regional Priority with the connection between these and the foundational urban sustainability model being very transparent. To be LEED®–ND™ certified, a development complete three stages of certification including 1) a conditionally approved plan, 2) a pre-certified plan, before receiving 3) a certified neighbourhood development award that formally recognises the project has achieved the required credits for certification (Smith, 2014). Wu *et al.*'s (2018) study of 55 projects identified from the LEED project directory of the U.S. Green Building Council indicated that while LEED®–ND™ certification has its marketing benefits, the most commonly achieved credits tended to be in relation to professional site design for habitat conservation, and access to civic and public space, while the least commonly achieved assessment credits included wastewater management, restoration of habitat or wetland, and on-site renewable energy. Sala Benites *et al.* (2022) suggest that while the neighbourhood sustainability assessment (NSA) tools in LEED®–ND™ do help to address São Paulo's climate change policy, there is still a need for improvement.

Incentives offered by state and local governments, such as tax abatements, property tax reductions, fee waivers, and grants, have been effective in encouraging participation in green building practices and can drive investment in sustainable construction practices and encourage private sector use of LEED®. The U.S. Green Building Council (USGBC)'s LEED® for Cities and Communities moves beyond

buildings described above to the district and jurisdiction scale with rating systems designed to help "*local leaders in governments, real-estate, and corporate sectors*" that supposedly will bring a new way of thinking on how cities and communities are planned and developed encompassing social, economic, and environmental performance indicators and strategies. Olubunmi et al.'s, (2016) review of building incentives point to the importance of government in relation to green building and we suggest here is where the development of more targeted communication strategies that prioritise community engagement should focus.

6.2.4 Case Study 4: Innovative educational tools for public Engagement

Hawas & Al-Habaibeh (2017) introduce an innovative educational building simulator tool designed to enrich public engagement regarding energy consumption in buildings in a recent research paper. The educational simulation tool – which includes a small-scale, multi-layered model of buildings where layers of insulation can be added or removed from the building's envelop – is assessed in two comparative case studies through which they test its efficacy in communicating to non-professional stakeholders. The initial case study involves primary school students and focuses on concepts such as insulation, temperature sensors, and energy efficiency. Feedback from both students and educators underscores the tool's efficacy and simplicity in conveying critical messages. While the second case study engages university students across diverse disciplines with the aim of deepening their understanding of insulation's impact on energy consumption in a building. These two cases demonstrate the tool's ability to engage individuals of varying ages and educational backgrounds, while simultaneously enhancing technical competencies and fostering awareness regarding energy efficiency in building structures.

A majority of children and university students found the educational simulator to be an enjoyable way of learning that had both useful messaging and offered ways participants could proactively improve the energy efficiency of a building level. Integrating simulator tools like this into wider strategies designed to promote public engagement with EPC programmes would prove beneficial.

6.3 Adopting pragmatic and innovative approaches to public engagement and social acceptance for EUB SuperHub

Applying lessons learned from the literature, we suggest adopting a four-point plan for implementing a more effective education and public engagement within EUB SuperHub. Focusing on the following key themes, they include establishing:

1. *Innovative Communication Methods*, applying
    a. Creative approaches: Using art, storytelling, interactive tools, and games to foster interest and engagement. Examples include artistic showcases of energy-efficient infrastructure or online platforms using gamification for learning about sustainability.
    b. Stakeholder Engagement: Engaging stakeholders directly in the project to foster ownership and empower participants. This could involve community involvement in EPC initiatives or utilising community feedback to improve local sustainability efforts.
2. *Spatially Explicit Information and Technology*, utilising
    a. Mapping tools: Raising spatial awareness and informing decision-making with platforms displaying environmental data and future projections. such applications could be developed and integrated with the EUB SuperHub platform, visualizing potential impacts and benefits across the participating regions in the EUB SuperHub project.
    b. Data visualisation: Promoting transparency and data-driven engagement through user-friendly dashboards showcasing complex information. We can develop clear and accessible presentations of data related to the EUB SuperHub's impact on the energy consumption of buildings and its long-term environmental impact.
3. *Social Media and Information Communication Technology (ICT)*, comprising
    a. Social media campaigns: Reaching wide audiences and fostering online dialogues through targeted campaigns promoting the EU SuperHub's goals and benefits. We can encourage discussions and address concerns via social media platforms.
    b. Online platforms: Empowering individuals with information and facilitating decision-making. We can improve the already existing dedicated platform of the EUB SuperHub by providing educational resources, engagement opportunities, and tools for stakeholders to contribute and stay informed.

c. Citizen feedback tools: Enabling direct citizen input through the EUB SuperHub online platform for feedback, concerns, and suggestions regarding the EUB SuperHub development and operation.

4. *Preconditions and Stakeholder Views,* including

a. Trust and transparency: Building trust by ensuring transparent communication about potential risks and benefits, addressing concerns openly, and involving stakeholders actively.

b. Diverse needs: Tailoring communication to different stakeholder groups (residents, businesses, policymakers) with varying interests and information needs.

c. Long-term perspective: Emphasising long-term benefits like economic gains, improved health, and climate mitigation to shift perspectives beyond short-term costs.

d. Life-cycle thinking: Framing the EUB SuperHub within a life-cycle approach, considering construction, operation, and end-of-life impacts to demonstrate its overall sustainability benefits.

7 Conclusion

Taken together, the lessons learned from the education and public engagement programmes literature when applied to the EUB SuperHub H2020 Project point to a four-point plan when integrating public perceptions and acceptance of current market-based and official energy performance certificate (EPC) programmes. This desk-based critical review of public engagement programmes from a variety of sectors across Europe identifies and appraises good practices and, where applicable, key transferable lessons from projects in other sectors, including *e.g.*, renewable energy, electronic appliances, and other property development activities to establish an informed assessment of the "preconditions" influencing stakeholders to hold certain views about energy efficiency in buildings and sustainability. How these perceptions transfer in relation to energy performance certificates, especially the effect smart solutions (SRI) and thinking in "life cycles" associated with investments has also been explored.

While this deliverable is primarily desk-based, it has been informed by the engagements in T4.1 (reported in Deliverable 4.1) and work in T4.3 (reported on in Deliverable 4.3) and is the second of three complementary reports examining the public engagement and social acceptance of EPCs and their pertinence to the EUB SuperHub platform.

8 References

Ackermann, F., & Eden, C. (2011). Strategic Management of Stakeholders: Theory and Practice. *Long Range Planning*, 44(3), 179–196. https://doi.org/10.1016/j.lrp.2010.08.001

Alshenqeeti, H. (2014). Interviewing as a Data Collection Method: A Critical Review. *English Linguistics Research*, 3(1). https://doi.org/10.5430/elr.v3n1p39

Anđelković, A. S., Kljajić, M., Macura, D., Munćan, V., Mujan, I., Tomić, M., Vlaović, Ž., & Stepanov, B. (2021). Building Energy Performance Certificate—A Relevant Indicator of Actual Energy Consumption and Savings? *Energies*, 14(12), 3455. https://doi.org/10.3390/en14123455

Baek, S. G. (2021). Plan for the Sustainability of Public Buildings through the Energy Efficiency Certification System: Case Study of Public Sports Facilities, Korea. *Buildings*, 11(12), 589. https://doi.org/10.3390/buildings11120589

Banaitiene, N., Banaitis, A., Arturas Kaklauskas, A., Zavadskas, E. K. (2008). *Evaluating the life cycle of a building: A multivariant and multiple criteria approach*. Omega, 2008. 36(3): 429 441.

Barrios-O'Neill, Danielle, and Geertje Schuitema. (2016). Online Engagement for Sustainable Energy Projects: A Systematic Review and Framework for Integration. *Renewable & Sustainable Energy Reviews* 54 (February):1611–21. https://doi.org/10.1016/j.rser.2015.10.084.

Baumeister, R. F., & Leary, M. R. (1997). Writing Narrative Literature Reviews. *Review of General Psychology*. 1(3), 311-320. https://doi.org/10.1037/1089-2680.1.3.311

Bem, D.J., (1995). Writing a Review Article for Psychological Bulletin, *Psychological Bulletin*. 118(2), 172-177 https://doi.org/10.1037/0033-2909.118.2.172

Bourne, L., & Walker, D.H.T. (2005). Visualising and mapping stakeholder influence. *Management Decision*, 43(5), 649–660. https://doi.org/10.1108/00251740510597680

Bowman, C., & Ambrosini, V. (2000). Value Creation versus Value Capture: Towards a Coherent Definition of Value in Strategy. *British Journal of Management*, 11(1), 1–15. https://doi.org/10.1111/1467-8551.00147

Bowman, D. (2017). "The Moral of the Tale: Stories, Trust, and Public Engagement with Clinical Ethics via Radio and Theatre." *Journal of Bioethical Inquiry* 14 (1): 43–52. https://doi.org/10.1007/s11673-016-9766-5.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Bryman, A., & Bell, E. (2011). Business Research Methods (third edition). Oxford, UK: Oxford University Press.

Bryson, J. M. (2004). Stakeholder Identification and Analysis Techniques. *Public Management Review*, 6(1), 21–53. https://doi.org/10.1080/14719030410001675722

Bull, R., Chang, N., & Fleming, P. (2012). The Use of Building Energy Certificates to Reduce Energy Consumption in European Public Buildings. *Energy and Buildings* 50 (July):103–10. https://doi.org/10.1016/j.enbuild.2012.03.032

Caelli, K., Ray, L., & Mill, J. (2003). "Clear as Mud": Toward generic qualitative research. *International Journal of Qualitative Methods*, 2(2), 816–819.

Cafferata, R., & Mari, M. (2015). L'evoluzione del settore immobiliare secondo un approccio di filiera. In R. Cafferata (Ed.), *Real estate. Tendenze evolutive del settore* (pp. 9–41). Bologna: Il Mulino.

Casado, F., Hidalgo, M. C., & García-Leiva, P. (2017). Energy efficiency in households: The effectiveness of different types of messages in advertising campaigns. *Journal of Environmental Psychology*, 53, 198–205. https://doi.org/10.1016/j.jenvp.2017.08.003

Charlesworth, H., Munger, P., & Yoon, P. (2018). Maximize Resident Engagement with Energy Efficiency. NAA. Online: https://www.naahq.org/maximize-resident-engagement-energy-efficiency

Charmaz, K. (2006). *Constructing Grounded Theory*. Thousand Oaks: Sage Publications.

Check, J., & Schutt, R. K. (2012). Survey Research. In J. Check & R. K. Schutt (Eds.), *Research Methods in Education* (pp. 159–186). Thousand Oaks and London: Sage Publications. https://doi.org/10.4135/9781544307725.n8

Chegut, A., Eichholtz, P., & Kok, N. (2014). Supply, Demand and the Value of Green Buildings. *Urban Studies*, 51(1), 22–43. https://doi.org/10.1177/0042098013484526

Chen, X., Gou, Z., & Zhang, H. (2023). Residents' participation in energy performance certification for collective action on climate change: the case of EnerGuide. *Frontiers in Psychology*, 14. https://doi.org/10.3389/fpsyg.2023.1196208

Christensen, T. H., Gram-Hanssen, K., de Best-Waldhober, M., & Adjei, A. (2014). Energy retrofits of Danish homes: is the Energy Performance Certificate useful? *Building Research & Information*, 42(4), 489–500. https://doi.org/10.1080/09613218.2014.908265

Clavin, A., Moore-Cherry, N., & Mills, G. (2021). Mapping Green Dublin: Co-Creating a Greener Future With Local Communities. *Urban Planning*, 6(4), 96–109. https://doi.org/10.17645/up.v6i4.4533

Corbett, J., & Roy Savarimuthu, B.T. (2022). From Tweets to Insights: A Social Media Analysis of the Emotion Discourse of Sustainable Energy in the United States. *Energy Research & Social Science* 89:102515. https://doi.org/10.1016/j.erss.2022.102515

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3–21. https://doi.org/10.1007/BF00988593

Currie, R.R., Seaton, S., & Wesley, F. (2009). Determining stakeholders for feasibility analysis. *Annals of Tourism Research*, 36(1), 41–63. https://doi.org/10.1016/j.annals.2008.10.002

Dahlström, K., & Ekins, P. (2006). Combining economic and environmental dimensions: Value chain analysis of UK iron and steel flows. *Ecological Economics*, 58(3), 507–519. https://doi.org/10.1016/j.ecolecon.2005.07.024

Davis, J., Mengersen, K., Bennett, S., & Mazerolle, L. (2014). Viewing systematic reviews and meta-analysis in social research through different lenses. *SpringerPlus,* 3, 511. https://doi.org/10.1186/2193-1801-3-511

de Vries, G. (2020). Public Communication as a Tool to Implement Environmental Policies. *Social Issues and Policy Review*, 14(1), 244–272. https://doi.org/10.1111/sipr.12061

Denzin, N.K., & Lincoln, Y.S. (2005). Introduction: the discipline and practice of qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research* (third edition, pp. 1–32). Thousand Oaks, CA, USA: Sage Publications.

DLUHC (2024). Energy Performance Certificates. Department for Levelling Up, Housing and Communities, UK. [Online]. Available: https://dluhcdigital.blog.gov.uk/category/energy-performance-certificates/

Dörnyei, Z. (2007). *Research Methods in Applied Linguistics: Quantitative, Qualitative and Mixed Methodologies*. Oxford: Oxford University Press.

Dunphy, N. P., & Lennon, B. (2022). Whose Transition? A Review of Citizen Participation in the Energy System. In *Routledge Handbook of Energy Transitions* (Vol. 2, Issue 101022791, pp. 430–444). Routledge. https://doi.org/10.4324/9781003183020-30

Dunphy, N. P., Morrissey, J. E., & MacSweeney, R. D. (2013). Analysis of stakeholder interaction within building energy efficiency market. UMBRELLA FP7 Project: Grant agreement number 314343. https://doi.org/10.5281/zenodo.3479491

EPA (2021). About Energy Star. Environmental Protection Agency, USA [Online]. Available: https://www.energystar.gov/about

European Parliament, Council of the European Union (2010) Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)Directive 2010/31. Directive EU 2010/31 of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings. [Online]. Available: https://eur-lex.europa.eu/eli/dir/2010/31/oj

European Parliament, Council of the European Union, (2012) Directive 2012/27. Directive EU 2012/27 of the European Parliament and of the Council on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC. | FAOLEX. [Online]. Available: https://www.fao.org/faolex/results/details/en/c/LEX-FAOC117373/

Evans, J.R., & Mathur, A. (2005). The value of online surveys. *Internet Research*, 15 (2), 195–219. https://doi.org/10.1108/10662240510590360

Fellows, R.F., & Liu, A. M.M. (2008). *Research Methods for Construction* (third edition). Chichester, UK: Wiley-Blackwell.

Fensel, A., Tomic, D.C., & Koller, A. (2017). Contributing to Appliances' Energy Efficiency with Internet of Things, Smart Data and User Engagement. *Future Generation Computer Systems* 76 (November):329–38. https://doi.org/10.1016/j.future.2016.11.026.

Fink, A. (2010). *Conducting Research Literature Reviews* (third edition). Thousand Oaks and London: Sage Publications.

Fleury, N., Harte, A., & Ramram, A. (2018). Virtual Reality Gamification of Smart Energy-Smart City Technologies. Worcester Polytechnic Institute. https://api.semanticscholar.org/CorpusID:199087465

Fontes Domingues, P.J. (2020). *Guerrilla Marketing and Serendipitous Encounters with Science: Exploring Innovative Communication Strategies for Public Engagement*. PhD Thesis. Universidade do Porto (Portugal) ProQuest Dissertations & Theses, 30783086. https://hdl.handle.net/10216/128467

Forman, J. and Damschroder, L. (2007). Qualitative Content Analysis. In, Jacoby, L. and Siminoff, L.A. (Eds.) *Empirical Methods for Bioethics: A Primer* (Advances in Bioethics, Vol. 11), Bingley: Emerald Group Publishing Ltd, pp. 39-62. https://doi.org/10.1016/S1479-3709(07)11003-7

Freeman, E. (1984). *Strategic Management: a Stakeholder Approach*. Pitman Inc.

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, 204(6), 291–295. https://doi.org/10.1038/bdj.2008.192

Government of Canada (n.d.). Natural Resources Canada. [Online]. Available: https://natural-resources.canada.ca/home

Grossberg, F. (2015). Gamified Energy Efficiency Programs. Report No. B1501. Washington, DC: American Council for an Energy-Efficient Economy.

Gulbinas, R., Jain, R. K., Taylor, J. E., Peschiera, G., & Golparvar-Fard, M. (2014). Network Ecoinformatics: Development of a Social Ecofeedback System to Drive Energy Efficiency in Residential Buildings. *Journal of Computing in Civil Engineering,* 28(1), 89–98. https://doi.org/10.1061/(ASCE)CP.1943-5487.0000319

Hammond, M., & Wellington, J. (2013). *Research Methods - the Key Concepts*. London and New York: Routledge.

Hawas, A., & Al-Habaibeh, A. (2017). Innovative concept of an educational physical simulation tool for teaching energy consumption in buildings for enhancing public engagement. *Energy Procedia*, 142, 2942–2952. https://doi.org/10.1016/j.egypro.2017.12.312

Hoff, J.L. (2007). Life Cycle Assessment and the LEED® Green Building Rating SystemTM. in RCI 23rd International Convention & Trade Show. Phoenix: Roof Consultants Institute

Holowka, T. (2021). Engaging with state and local governments on LEED. U.S. Green Building Council. [Online]. Available: https://www.usgbc.org/articles/engaging-state-and-local-governments-leed

IEA. (2018). Market Report Series: Energy Efficiency 2018 – Analysis and outlooks to 2040. International Energy Agency. [Online]. Available: https://www.iea.org/reports/energy-efficiency-2018

Joffe, H. (2012). Thematic Analysis. In D. Harper & A. R. Thompson (Eds.), *Qualitative Research Methods in Mental Health and Psychotherapy: A Guide for Students and Practitioners* (first edition), pp. 209–223. New York: John Wiley & Sons.

Joffe, H., & Haarhoff, G. (2002). Representations of far-flung illnesses: The case of Ebola in Britain. *Social Science and Medicine*, 54(6), 955–969. https://doi.org/10.1016/S0277-9536(01)00068-5

Joffe, H., & Yardley, L. (2004). Content and Thematic Analysis. In *Research Methods for Clinical and Health Psychology* (pp. 56–68). Thousand Oaks and London: Sage Publications. https://doi.org/10.4135/9781849209793

Jolliet, O., Soucy, G., Shaked, S., Saadé-Sbeih, M., & Crettaz, P. (2015). General Principles of Life Cycle Assessment. In *Environmental Life Cycle Assessment*. CRC Press.

Kaplinsky, R., & Morris, M. (2012). *A handbook for value chain research*. Brighton: University of Sussex.

Kavanagh, D. (1998). *Multi-firm, temporary networks: A study of process*. Unpublished Doctoral thesis: Lancaster University.

Khosrowpour, A., Xie, Y., Taylor, J.E., & Hong, Y. (2016). One Size Does Not Fit All: Establishing the Need for Targeted Eco-Feedback. *Applied Energy* 184 (December):523–30. https://doi.org/10.1016/j.apenergy.2016.10.036.

Kvale, S. (1983). The qualitative research interview: A phenomenological and a hermeneutical mode of understanding. *Journal of Phenomenological Psychology*, 14, 171-196. https://doi.org/10.1163/156916283X00090

Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. Thousand Oaks and London: Sage Publications.

Lanning, M. J., & Michaels, E. G. (1988). *A business is a value delivery system*. In McKinsey Staff Paper (No. 41).

Lennon, B. & Dunphy, N.P. (2023). Mind the gap: citizens, consumers and unequal participation in global energy transitions. In (eds.) Nadesan, M.H., Pasqualetti, M.J. and Keahey, J., *Energy Democracies for Sustainable Futures*. Elsevier. https://doi.org/10.1016/B978-0-12-822796-1.00035-8

Li, Y., Kubicki, S., Guerriero, A., & Rezgui, Y. (2019). Review of building energy performance certification schemes towards future improvement. *Renewable and Sustainable Energy Reviews*, 113, 109244. https://doi.org/10.1016/j.rser.2019.109244

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., Clarke, M., Devereaux, P., Kleijnen, J., & Moher, D. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. *Annals of Internal Medicine*, 151(4). https://doi.org/10.1136/bmj.b2700

Lowe, M. & Gereffi, G. (2008). An Analysis of the U.S. Real Estate Value Chain with Environmental Metrics. Report prepared for Environmental Defense Fund. Durham: Duke University. http://dx.doi.org/10.13140/RG.2.1.5172.9689

Macfadyen, G., Nasr-Alla, A. M., Al-Kenawy, D., Fathi, M., Hebicha, H., Diab, A. M., Hussein, S. M., Abou-Zeid, R. M., & El-Naggar, G. (2012). Value-chain analysis — An assessment methodology to estimate Egyptian aquaculture sector performance. *Aquaculture*, 362–363, 18–27. https://doi.org/10.1016/j.aquaculture.2012.05.042

Magill, J. (2010) Chips for everyone: Exploring engineering engagement through practical interactive simulation. In: Filippoupoliti, A. (ed.) *Science Exhibitions: Communication and Evaluation*. Series: Science Exhibitions (2). Museums etc: Edinburgh, pp. 388-411. ISBN 9780956194381

Magill, J., & Roy, S. (2010). Chips for Everyone: A Multifaceted Approach in Electrical Engineering Outreach. *IEEE Transactions on Education* 53 (1): 114–19. https://doi.org/10.1109/TE.2009.2025267.

Maldonado, E., Wouters, P., & Papaglastra, M. (2011). Implementing the Energy Performance of Building Directive (EPBD). Featuring Country reports 2010, Jan. 2011.

Mangold, M., Österbring, M., & Wallbaum, H. (2015). Handling data uncertainties when using Swedish energy performance certificate data to describe energy usage in the building stock. *Energy and Buildings*, 102, 328–336. https://doi.org/10.1016/j.enbuild.2015.05.045

Mathur, V.N., Price, A.D.F., Austin, S., & Moobela, C. (2007). Defining, identifying, and mapping stakeholders in the assessment of urban sustainability. In M. Horner, C. Hardcastle, A. Price, & J. Bebbington (Eds.), *Proceedings: SUE-MoT Conference 2007: International Conference on Whole Life Urban Sustainability and its Assessment*. https://dspace.lboro.ac.uk/2134/5202

McCauley, M., Thomas, J., Connor, C., & van den Broek, N. (2019). B!RTH: A Mixed-Methods Survey of Audience Members' Reflections of a Global Women's Health Arts and Science Programme in England, Ireland, Scotland and Switzerland. *BMJ Open* 9 (12): e027531. https://doi.org/10.1136/bmjopen-2018-027531.

McPartland, R. (2016). What Is BREEAM? NBS. 2016. https://www.thenbs.com/knowledge/what-is-breeam.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*, 22(4). https://doi.org/10.5465/amr.1997.9711022105

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Annals of Internal Medicine*, 151(4), 264–270. https://doi.org/10.1136/bmj.b2535

Morant, N. (2006). Social representations and professional knowledge: The representation of mental illness among mental health practitioners. *British Journal of Social Psychology*, 45(4), 817–838. https://doi.org/10.1348/014466605X81036

Morgan, G., & Smircich, L. (1980). The case for qualitative research. *The Academy of Management Review*, 5(4), 491–500.

Morrissey, J. E., Dunphy, N. P., & MacSweeney, R. (2014). Energy efficiency in commercial buildings: Capturing added-value of retrofit. *Journal of Property Investment and Finance*, 32(4), 396–414. https://doi.org/10.1108/JPIF-01-2014-0008

Moses, J. W., & Knutsen, T. J. (2012). *Ways of Knowing: Competing Methodologies in Social and Political Research* (2nd edition). London: Palgrave Macmillan.

Naji, S., & Gwilliam, J. (2022). The Potentials of BREEAM Communities in Addressing the Adaptive Governance in Theory and Practice. *Environment, Development and Sustainability* 24 (6): 8287–8312. https://doi.org/10.1007/s10668-021-01783-5.

Nechita, F. (2014). The New Concepts Shaping the Marketing Communication Strategies of Museums. *Bulletin of the Transilvania University of Brasov, Series VII: Social Sciences & Law* 7 (56) (1): 269–78.

NSW Government (2024). National Australian Built Environment Rating System (NABERS). Federal, State and Territory governments of Australia [Online]. Available: https://www.nabers.gov.au/

O'Toole, C. (2023). Exploring rent pressure zones: Ireland's recent rent control regime. *International Journal of Housing Policy*, 1–22. https://doi.org/10.1080/19491247.2022.2155338

Ochsendorf, J., Keith Norford, L., Brown, D., Durschlag, H., Hsu, S.L., Love, A., Santero, N., Swei, O., Webb, A., & Wildnauer, M. (2011). *Methods, Impacts, and Opportunities in the Concrete Building Lifecycle*, in MIT Concrete Sustainability Hub Report Series 2011, Cambridge: Massachusetts Institute of Technology.

Olander, S. (2007). Stakeholder impact analysis in construction project management. *Construction Management and Economics*, 25(3), 277–287. https://doi.org/10.1080/01446190600879125

Olubunmi, O. A., Xia, P. B., & Skitmore, M. (2016). Green building incentives: A review. *Renewable and Sustainable Energy Reviews*, 59, 1611–1621. https://doi.org/10.1016/j.rser.2016.01.028

Onwuegbuzie, A. J., & Frels, R. (2016). *7 Steps to a comprehensive literature review. A multimodal and cultural approach*. Thousand Oaks and London: Sage Publications.

Palmer, K., & Walls, M. (2017). Using information to close the energy efficiency gap: a review of benchmarking and disclosure ordinances. *Energy Efficiency*, 10(3), 673–691. https://doi.org/10.1007/s12053-016-9480-5

Paone, A., & Bacher, J.-P. (2018). The Impact of Building Occupant Behavior on Energy Efficiency and Methods to Influence It: A Review of the State of the Art. *Energies* 11 (4): 953. https://doi.org/10.3390/en11040953

Park, D., Yu, K., Yoon, Y., Kim, K., & Kim, S. (2015). Analysis of a Building Energy Efficiency Certification System in Korea. *Sustainability*, 7(12), 16086–16107. https://doi.org/10.3390/su71215804

Parks, J.M., & Theobald, K.S. (20130. Public Engagement with Information on Renewable Energy Developments: The Case of Single, Semi-Urban Wind Turbines. *Public Understanding of Science* 22 (1): 49–64. https://doi.org/10.1177/0963662511400962.

Pasichnyi, O., Wallin, J., Levihn, F., Shahrokni, H., & Kordas, O. (2019). Energy performance certificates — New opportunities for data-enabled urban energy policy instruments? *Energy Policy*, 127, 486–499. https://doi.org/10.1016/j.enpol.2018.11.051

Pérez-Lombard, L., Ortiz, J., & Pout, C. (2008). A Review on buildings energy consumption information. *Energy and Buildings*, 40, pp. 394–398. https://doi.org/10.1016/j.enbuild.2007.03.007.

Petrov, I., & Ryan, L. (2021). The landlord-tenant problem and energy efficiency in the residential rental market. *Energy Policy*, 157, 112458. https://doi.org/10.1016/j.enpol.2021.112458

Ponto, J. (2015). Understanding and Evaluating Survey Research. *Journal of the Advanced Practitioner in Oncology*, 6(2): 168–171. http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4601897/

Porter, M.E. (1985). *The Competitive Advantage: Creating and Sustaining Superior Performance*. Washington DC: Free Press.

Project Management Institute. (2008). *A guide to the project management body of knowledge (PMBOK Guide)* (fourth edition). Newtown Square: Project Management Institute.

Purnomo, H., Guizol, P., & Muhtaman, D. R. (2009). Governing the teak furniture business: A global value chain system dynamic modelling approach. *Environmental Modelling & Software*, 24(12), 1391–1401. https://doi.org/10.1016/j.envsoft.2008.04.012

Reeves, S., Kuper, A., & Hodges, B. D. (2008). Qualitative research methodologies: ethnography. *BMJ*, 337(7668), 512–514. https://doi.org/10.1136/bmj.a1020

Ricciotti, F., Cristofaro, M., Abatecola, G., & Mari, M. (2022). Executive profiles and performance of real estate services: Evidence of reverse causality from Europe. *Cities*, 103854. https://doi.org/10.1016/j.cities.2022.103854

Rich, K. M., Ross, R. B., Baker, A. D., & Negassa, A. (2011). Quantifying value chain analysis in the context of livestock systems in developing countries. *Food Policy*, 36(2), 214–222. https://doi.org/10.1016/j.foodpol.2010.11.018

Rieple, A., & Singh, R. (2010). A value chain analysis of the organic cotton industry: The case of UK retailers and Indian suppliers. *Ecological Economics*, 69(11), 2292–2302. https://doi.org/10.1016/j.ecolecon.2010.06.025

Rodríguez, I.D., & Cabello Eras, J.J. (2024). Public communication campaigns to promote household energy efficiency in Barranquilla (Colombia). Universidad y Sociedad 16 (2): 104–10.

Rowley, J. (2014). Designing and using research questionnaires. *Management Research Review*, 37(3), 308–330. https://doi.org/10.1108/MRR-02-2013-0027

Sala Benites, H., Osmond, P., & Rossi, A. M. G. (2020). Developing Low-Carbon Communities with LEED-ND and Climate Tools and Policies in São Paulo, Brazil. *Journal of Urban Planning and Development*, 146(1). https://doi.org/10.1061/(ASCE)UP.1943-5444.0000545

Saldaña, J. (2013). *The Coding Manual for Qualitative Researchers* (second edition). Thousand Oaks and London: Sage Publications.

Schonlau, M., Fricker, R. D., & Elliott, M. N. (2002). Conducting Research Surveys via E-mail and the Web. Santa Monica: RAND Corporation.

Schuitema, G., Aravena, C., & Denny, E. (2020). The psychology of energy efficiency labels: Trust, involvement, and attitudes towards energy performance certificates in Ireland. *Energy Research & Social Science*, 59, 101301. https://doi.org/10.1016/j.erss.2019.101301

Seo, S., & Hwang, Y. (2001). Estimation of CO 2 Emissions in Life Cycle of Residential Buildings. *Journal of Construction Engineering and Management*, 127(5), 414–418. https://doi.org/10.1061/(ASCE)0733-9364(2001)127:5(414)

Sequeira, D. & Warner, M. (2007). *Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets*. Washington, DC: World Bank Group

Siette, J., Dodds, L., Catanzaro, M., & Allen, S. (2023). To Be or Not to Be: Arts-based Approaches in Public Health Messaging for Dementia Awareness and Prevention. *Australasian Journal on Ageing* 42 (4): 769–79. https://doi.org/10.1111/ajag.13235.

Singleton, R. A., & Straits, B. C. (2009). *Approaches to social research* (fifth edition). Oxford: Oxford University Press.

Smith, A., Quinlivan, L. & Dunphy, N.P. (2021). Deliverable 7.4 Education and Public Engagement Framework for Ocean Literacy. Corporate Deliverable of the SafeWAVE Project Co-Funded by the European Maritime and Fisheries Fund (EMFF) Program of the European Union.

Smith, C. (2000). Content Analysis and Narrative Analysis. In T. Reis & C. Judd (Eds.), *Handbook of Research Methods in Social and Personality Psychology* (pp. 313–335). Cambridge: Cambridge University Press.

Smith, R. M. (2015). Planning for urban sustainability: the geography of LEED ® – Neighborhood Development TM (LEED ® –ND TM) projects in the United

States. *International Journal of Urban Sustainable Development*, 7(1), 15–32. https://doi.org/10.1080/19463138.2014.971802

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Soares, F., Madureira, A., Pagès, A., Barbosa, A., Coelho, A., Cassola, F., Ribeiro, F., Viana, J., Andrade, J., Dorokhova, M., Morais, N., Wyrsch, N., & Sørensen, T. (2021). FEEdBACk: An ICT-Based Platform to Increase Energy Efficiency through Buildings' Consumer Engagement. *Energies*, 14(6), 1524. https://doi.org/10.3390/en14061524.

Stabell, C. B., & Fjeldstad, Ø. D. (1998). Configuring value for competitive advantage: on chains, shops, and networks. *Strategic Management Journal*, 19(5), 413–437. https://doi.org/10.1002/(SICI)1097-0266(199805)19:5<413::AID-SMJ946>3.0.CO;2-C

Swe, M. M. M., Hlaing, P. H., Phyo, A. P., Aung, H. H., Smithuis, F., Ashley, E. A., & Cheah, P. Y. (2020). Evaluation of the forum theatre approach for public engagement around antibiotic use in Myanmar. *PLOS ONE*, 15(7), e0235625. https://doi.org/10.1371/journal.pone.0235625

Szibbo, N. A. (2015). Assessing Neighborhood Livability: Evidence from LEED® for Neighborhood Development and New Urbanist Communities. *Articulo – Revue de Sciences Humaines*, 14. https://doi.org/10.4000/articulo.3120

Torraco, R. J. (2005). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, 4(3), 356–367. https://doi.org/10.1177/1534484305278283

Torraco, R. J. (2005). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, 4(3). https://doi.org/10.1177/1534484305278283

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 14, 207–222. https:// https://doi.org/10.1111/1467-8551.00375

Trehan, R., Goujet, R., Sharma, T., Vats, A., Patel, N., & Bhardwaj, A. (2024). The role of gaming for information, education and communication of AMR: full review of online education resources. *JAC-Antimicrobial Resistance*, 6(3). https://doi.org/10.1093/jacamr/dlae080

Vaismoradi, M., Jones, J., Turunen, H., & Snelgrove, S. (2016). Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice*, 6(5). https://doi.org/10.5430/jnep.v6n5p100

Vedung, E. (1999). Constructing effective Government information campaigns for energy conservation and sustainability: Lessons from Sweden. *International Planning Studies*, 4(2), 237–251. https://doi.org/10.1080/13563479908721737

Villodres, H., del Carmen, M., Casado Castro, F., & García Leiva, P. (2014). "Communicating Climate Change: Improving the Effectiveness of Public Campaigns. *Escritos de Psicología* 7 (2): 28–35. http://www.redalyc.org/articulo.oa?id=271031689004

Volt, J., Zuhaib, S., Schmatzberger, S., & Toth, Z. (2020). Energy Performance Certificates: Assessing Their Status And Potential. [Online]. Available: https://x-tendo.eu/wp-content/uploads/2020/05/X-TENDO-REPORT_FINAL_pages.pdf.

Walker, A., & Newcombe, R. (2000). The positive use of power on a major construction project. *Construction Management and Economics*, 18(1), 37–44. https://doi.org/10.1080/014461900370933

Walter, A., Ritter, T., & Gemünden, H. G. (2001). Value Creation in Buyer–Seller Relationships. *Industrial Marketing Management*, 30(4), 365–377. https://doi.org/10.1016/S0019-8501(01)00156-0

Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, 26(2), xiii–xxiii. https://www.jstor.org/stable/4132319

Weinberg, S. (2001). 8. The Methods of Science . . . and Those by Which We Live. In *Facing Up* (pp. 83–92). Harvard University Press. https://doi.org/10.4159/9780674066403-009

Welch, A., Benfield, K. & Raimi, M. (n.d.). A Citizen's Guide to LEED for Neighborhood Development: How to Tell if Development is Smart and Green. Raimi + Associates and the Natural Resources Defense Council (NRDC). https://www.nrdc.org/sites/default/files/citizens_guide_LEED-ND.pdf

West, M., Yildirim, O., Harte, A.E., Ramram, A., Whitney Fleury, N., & Carabias-Hütter, V. (2019). Enhancing Citizen Participation through Serious Games in Virtual Reality. *Competence Center of Urban and Regional Planning*, 881–88. https://doi.org/10.21256/zhaw-3332.

Wiersma, B., & Devine-Wright, P. (2014), Public Engagement with Offshore Renewable Energy: A Critical Review. *WIREs Climate Change* 5 (4): 493–507. https://doi.org/10.1002/wcc.282.

Wong, G., Greenhalgh, T., Westhorp, G., Buckingham, J., & Pawson, R. (2013). RAMESES publication standards: meta-narrative reviews. *BMC Medicine*, 11: 20. https://doi.org/10.1186/1741-7015-11-20

Wu, P., Song, Y., Hu, X., & Wang, X. (2018). A Preliminary Investigation of the Transition from Green Building to Green Community: Insights from LEED ND. *Sustainability*, 10(6), 1802. https://doi.org/10.3390/su10061802

Zeithaml, V.A. (1988), Consumer perceptions of price, quality and value: a means-end model and synthesis of evidence, *Journal of Marketing*, 52(3), 2-22 https://doi.org/10.2307/1251446

Zhang, Y., & Wildemuth, B. M. (2009). Qualitative Analysis of Content. In B. M. Wildermuth (Ed.), Applications of Social Research Methods to Questions in Information and Library Science. Westport, Conn: Libraries Unlimited

Zuhaib, S., Schmatzberger, S., Volt, J., Toth, Z., Kranzl, L., Eugenio Noronha Maia, I., Verheyen, J., Borragán, G., Monteiro, C. S., Mateus, N., Fragoso, R., & Kwiatkowski, J. (2022). Next-generation energy performance certificates: End-user needs and expectations. *Energy Policy*, 161, 112723. https://doi.org/10.1016/j.enpol.2021.112723