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Sustainable Energy Retrofit Process Management for Multi-Occupancy Residential Buildings with Owner Communities

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European foreword

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Introduction

Because of the need to involve multiple co-owners, decision making for refurbishment is more complex and slower in multi-occupancy residential buildings with owner communities (MOBs) than in single-owned buildings. This can lead to refurbishment projects not starting, not proceeding or being cancelled. With the need for a significant increase in the renovation and success rate of the existing residential building stock to achieve EU's energy efficiency targets it is vital that decision making for suitable energy retrofit is executed more efficiently.

It is widely recognised that the necessary technologies to retrofit the residential building stock in the CEN member states to a high standard are already available. The challenge the current CWA intends to overcome is the non-technical socio-economic component of the energy retrofit process. Based on the experience gathered by the CWA working group members from various relevant national and international projects[1] the most significant barriers for the success of the energy retrofit are the suitable information provision and the owner engagement.

The (often large numbers of) co-owners in an owner community (OC) have individually very different expectations and wishes for the future of their building, and, accordingly they weight costs and benefits of refurbishment actions very differently. Thus, it is very difficult to develop a concept that corresponds to the expectations of all co-owners. Because of this decision making barriers, currently, the initial phase of the energy retrofit process, from the initial idea to decision making, lasts on average three years. The process proposed in the current CWA focuses on the optimisation of this initial phase and envisages a duration of one year. It proposes structuring the information collection and workflow, so that the energy retrofit options can be fully analysed, recognising the different interest and priorities of different co-owners, and then presented for agreement by the owner community.

The proposed initial phase process is broad and flexible and is intended to work complementary to different support programmes which already exist, in order to help co-owners of MOBs to implement energy improvements. In summary, the key elements which this process requires are as follows:

— Increase awareness, education of the OC and provide information about inventiveness

— Development of a retrofit roadmap which identifies retrofit opportunities for the building;

— A “custodian” (sponsor or champion) for the retrofit roadmap development from within the building’s co-owner community or property management team;

— An informal consultation process with co-owners to find out their views on the energy retrofit roadmap; and

— A clear decision stage where the owner community agrees to adopt some or all of the recommendations of the roadmap.

This document is meant to describe the proposed initial phase process and by this to support its stakeholders to overcome the barriers of complex governance arrangements in multi-occupancy residential buildings which are recognised in Article 19 (1) of the original Energy Efficiency Directive 2012/27/EU, and confirmed in the updated directive 2018/2002.

In this document, the following verbal forms are used:

— "shall" indicates a requirement;

[1] Significant inputs on this topic were gained during the Horizon 2020 project SMARTER TOGETHER (691876) where the energy efficiency in residential buildings is one of the five key topics.

— "should" indicates a recommendation;

— "may" indicates a permission;

— "can" indicates a possibility or capability.

1 Scope

This CEN Workshop Agreement (CWA) specifies a workflow and an overall quality and process management methodology for the initial (engagement and decision making) phase of the retrofit process in existing multi-occupancy residential buildings with owner communities in CEN member states.

This CWA targets all relevant stakeholders in the initial phase of the energy retrofit process including owner communities, property and facility managers, owner community management boards, planners, energy efficiency consultants, financial institutions, and policy makers.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
owner community
OC
group of co-owners who may be legal or physical persons

3.1.2
co-owner
owner of an apartment, share or freehold in a multi-occupancy building

3.1.3
landlord co-owner
co-owner who is not resident in the MOB, instead renting out the apartment they own. A landlord co-owner may own multiple apartments in the same building

3.1.4
co-owner occupier
co-owner who is resident in the MOB

3.1.5
common parts
spaces or building elements of the building not within the jurisdiction of an individual apartment owner

3.1.6
exclusive parts
spaces or building elements under the jurisdiction of an individual co-owner

3.1.7
building energy saving retrofit
installation and/or implementation of measures for energy efficiency improvement and possibly integration of production from renewable energy systems (RES) in an existing building or civil engineering works

SOURCE: ISO 6707-3:2017, 3.4.15 , modified — ("energy conservation measure" was replaced by "measures for energy efficiency improvement and possibly integration of production from renewable energy systems (RES)")

3.1.8
property manager
any legal or physical person contracted by the owner community for a particular period of time in order to ensure the proper operation of the building

Note 1 to entry: The property manager may for instance be in charge of the relationship with the local authority and contract the maintenance relevant service providers.

3.1.9
custodian
co-owner or property manager who is informally engaged with the coordination of the initial phase process throughout its duration and may be its initiator

Note 1 to entry: The custodian may remain engaged for the whole retrofitting process.

3.1.10
management board
representatives of the owner community consisting of members who are elected periodically by the owner community to ensure that the decisions of the owner community are executed, and/or who take decisions on behalf of the owner community within defined financial and responsibility limits

Note 1 to entry: The structure and decision scope of the management board can differ between countries and may typically include oversight of the activities of the property manager and the maintenance related service providers.

3.1.11
energy retrofit roadmap
workflow plan to guide progress towards a defined energy performance improvement

Note 1 to entry: This may be a target of a whole building Energy Performance Certificate class or an improvement of energy efficiency versus baseline.

3.1.12
initiator
person or entity who proposes the idea of energy saving retrofit in the building

Note 1 to entry: This may be a co-owner, property manager or an external expert.

3.1.13
external expert
physical or legal person with professional expertise in MOB retrofit, who provides support to the custodian in preparing the retrofit roadmap and encouraging its adoption by the owner community

3.1.14
initial phase
phase from the initial idea of building energy saving retrofit proposed by the initiator, to the decision to undertake the retrofit, agreed by the owner community

Note 1 to entry: Agreement among the owner community may require a simple, absolute or qualified majority depending on the scale and type of the aimed measures and relevant member states – building legal regulations (Reference: JRC Report "Energy efficiency upgrades in multi-owner residential buildings"). In England and Wales, a different process applies (see Annex A).

3.1.15
energy efficiency improvement measures
measures to reduce net-energy demand in an existing building which may be physical and/or involve user behaviour and focus on energy consumption and/or production

Note 1 to entry: Referring to EN 15900:2010 section 4.2.f

3.1.16
building element
integral component of the technical building systems or of the fabric of a building

SOURCE: ISO 52003-1:2017, 3.1.4

3.1.17
estimated service life
service life that a building element would be expected to have in a set of specific in-use conditions, determined from reference service life data after taking into account any differences from the reference in-use conditions

Note 1 to entry: The estimated service life is to be defined in the technical specification in the Retrofit process you can use as a reference e.g. EN 15459.

SOURCE: ISO 15686-1:2011, 3.7, modified — ("or parts of a building" was replaced by "element")

3.2 Abbreviated terms

EED – Energy Efficiency Directive [2012/2007/EU] and 2008/2002/EU

EPBD – Energy Performance of Buildings Directive [2018/844]

EPC – Energy Performance Certificate

MOB – Multi-Occupancy Building with owner community

RES – Renewable Energy Systems

SE(C)AP – Sustainable Energy and Climate Action Plan

4 Initial phase workflow

4.1 Overview

This section describes in depth the steps of the initial phase workflow from the emergence of the initial idea to the formal agreement of the owner community to undertake the energy efficiency retrofit. The process involves the development of a roadmap which aims to offer easy to understand retrofit scenarios to the owner community and identifies how retrofit can happen over a number of years, working towards a high energy performance for the building. Finally, a well informed decision by well-prepared co-owners is the main target of the proposed process. The main steps are:

a) Initial idea;

b) Information collection and processing;

c) Preliminary energy retrofit roadmap;

d) Co-owners consultation;

e) Revision and finalisation of the energy retrofit roadmap;

NOTE Includes collection of contractor information.

f) Preparation of quality management plan;

g) Adoption of the energy retrofit roadmap;

h) Update of roadmap and quality management plan based on decision taken.

The following figure assumes the initial phase workflow.

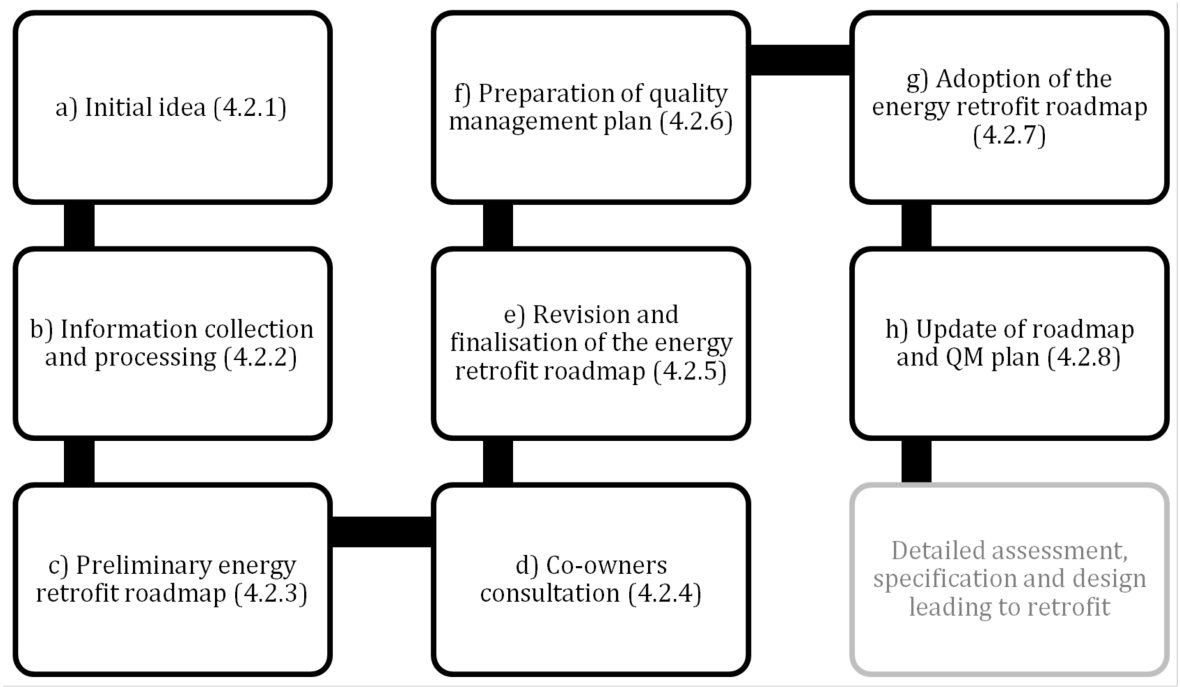


Figure 1 — Initial phase workflow

4.2 Steps of the initial phase process

4.2.1 Initial idea

The initial idea for a retrofit action may come from:

— a motivated co-owner;

— the management board;

— a motivated property manager; and/or

— an external expert;

— a local government agency or representative responsible for implementation of an energy efficiency plan (e.g. SE(C)AP of Covenant of Mayors).

For the idea to be progressed, it will need the active support of a member of the owner community or the property manager. This person becomes the custodian for the retrofit initiative to the wider owner community.

If relevant, the custodian should seek an informal agreement from the owner community before proceeding to the next steps.

4.2.2 Information collection and processing

Information collection about the owner community and the building shall be done with an active involvement of the custodian and probably also an external expert.

The information obtained shall be material: financial, technical, behavioural and socio-economic and should be collected in discussion with (and/or):

— Property manager (know-how about owner community);

— Building technician/property manager (know-how about structural properties, building's energy system, energy consumption, maintenance requirements, etc.);

— Management board (governing documents, condominium agreements, finances of the owner community);

— Entities existing at the municipal level (know-how about funding and/or technical support).

NOTE It is not envisaged that information should be collected directly from individual co-owners at this stage.

As much information as possible shall be collected under the following headings:

— The building and its energy systems

  — The building's energy performance (ie assuming a standardised occupancy)

  — Actual energy consumption

  — Condition of building elements and systems

  — Building structure

  — Building services

- Identified potential maintenance
- Identified potential energy efficiency measures

NOTE This information will be collected from: energy bills, Energy Performance Certificate, any other energy audits undertaken, building surveys, technical documentation relating to the building services and systems.

- The owner community
  - The governance arrangements of the MOB;
  - Demographic composition of co-owners;
  - Financial situation of the owner community (including maintenance fund and provisions);
  - Future plans for the facility development;
  - Preferences and concerns of owners (perception, interest, concerns, other preferences such as level of comfort, flexibility, improved air quality, modernisation and renovation of kitchen and bathroom).

  This information will be collected from (where available): a review of the accounts and governing documents for the MOB, discussions with property managers and management boards.

- Financing and the Regulatory Environment
  - Availability and applicability of financial and funding sources for energy improvements (loans and revolving funds, subsidies, tax relief, and energy performance contracting possibilities);
  - Planned urban transformation and densification in the area;

  This information will be collected from the municipality and relevant advisory bodies.

  The information processing, based on the information collection, should then present a clear summary of:

- Status quo of the overall energy performance of the building and building elements and systems
- Wider technical issues relevant to the energy retrofit (e.g. structural condition);
- Regulations applying to the building (e.g. minimum energy performance standards, health and safety issues, building and urban planning);
- Attitudes and socio-demographic status of the co-owners
- A list of possible energy efficiency improvements to the building

4.2.3 Preliminary energy retrofit roadmap

The information obtained and processed, shall be combined with additional professional knowledge of the technical features, costs and benefits of different energy efficiency measures, in order to produce a draft energy retrofit roadmap. Sometimes the custodian may bring the expertise, but in most situations it is envisaged that this will require an informal and free of charge input from an external expert unless public funding is available.

The measures proposed in the roadmap should be reasonably summarized and staged to distribute the financial burden over time. The proposed date of realization and the willingsness also may depend on if there are necessary non-energetic retrofit/maintenance measures to use cost synergies.

The roadmap can apply both to the whole building and the individual apartments. It may consider technical, organisational and behavioural energy retrofit measures including:

- Technical measures
    - Insulation of the building envelope; ceilings, basement, floor, walls and underground garage;
    - Retrofit or replacement of the windows;
    - Heating energy efficiency improvement;
    - Connection with district heating / cooling;
    - Domestic hot water energy efficiency improvement;
    - Cooling and ventilation improvements;
    - Installation and integration of renewable energy sources and energy storage technologies;
- Financial schemes
    - Green mortgages;
    - Special loans for owners communities;
    - Innovative financing schemes (eg. crowd funding)
- User behaviour training;
    - Contractual agreement
        - Formation of energy community where co-owners collaborate to produce and self-consume and/or export clean energy;
        - Energy performance contracting with third party financing and guaranteed energy performance improvement;
        - Heating as a service, Chauffage, Managed Energy Saving Agreement (MESA), etc;
        - Purchase of equipment from suppliers
        - Leasing;

It shall highlight the co-benefits of the proposed energy efficiency measures including their unique selling points for the OC.

The preliminary roadmap shall be end to end to include all phases from origination to energy efficiency improvement reporting (economic value of all benefits, including building value increase);

The preliminary roadmap shall present indicative costs and benefits of relevant scenarios including the status quo.

The preliminary roadmap shall explain how the proposed measures ensure compliance with related regulations e.g. Energy Performance of Buildings Directive (EPBD), and Energy Efficiency Directive (EED).

The energy retrofit roadmap shall consider that for different measures, different decision making processes might be necessary (see Annex 1), noting that in many countries, different majorities are required, depending on the measure proposed. The decision making process will also depend on the governance arrangements prevailing in that building (e.g. is there an active management board?).

4.2.4 Co-owners consultation

The preliminary energy retrofit roadmap may be presented to the co-owners in the following ways:

— Contact landlord co-owners and co-owner occupiers and distribute the preliminary information by involving both groups into the informal information process

— Organise an informal information event for landlord co-owners and co-owner occupiers, highlighting the benefits for the two groups, that may be different;

— Distribut further information materialafter the discussion;

This is an informal process. The informal consultation shall:

— Explain the initial idea and possible next steps to the co-owners

— yield information to refine the roadmap;

— be simple, transparent and clear about benefits and risks,and estimated costs and direct and indirect financial incentives;

— highlight the benefits and possible synergies with other necessary optimization measures for the whole OC such as planned repair and maintenance actions;

— explain the circumstances of such a project and the extent of the construction process;

— explain the full range of benefits from the proposed improvements including: CO_2 emission reduction, comfort, property value, etc.;

— give the co-owners the opportunity to participate and articulate their personal views on the overall energy retrofit roadmap and the specific scenarios it presents;

— clarify the duration of the process, based on different scenarios;

— be used for the identification of the main obstacles, possible main questions of the owner community;

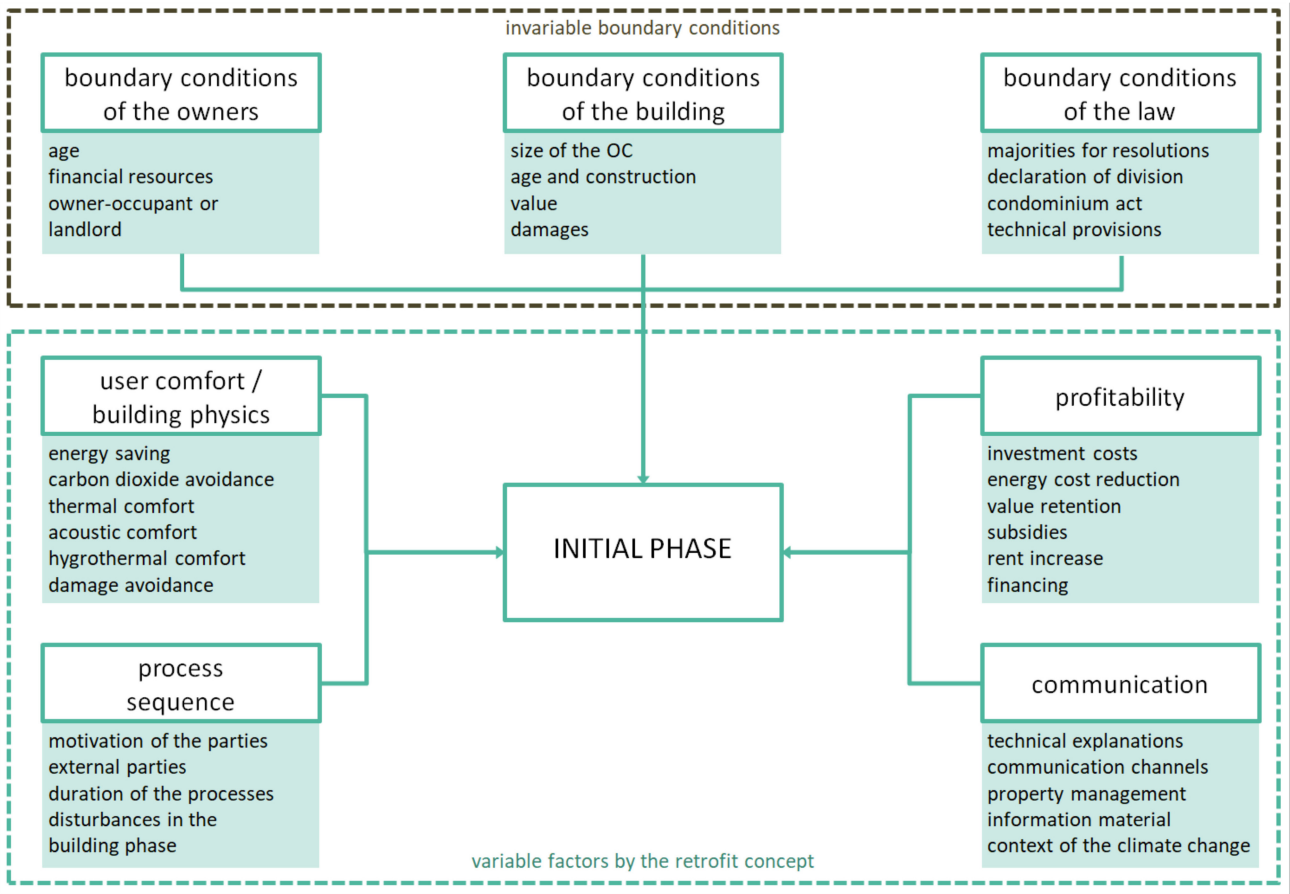
— be used for the identification of the likely challenges to the formal adoption of the retrofit proposals and to prepare solutions for overcoming those.

4.2.5 Revision and finalisation of the energy retrofit roadmap

Based on views collected during the consultation process the roadmap shall be revised, elaborated where needed and finalised. This may be undertaken in consultation between the external expert(s) and the custodian, and shall in all circumstances be in agreement with the custodian.

Preliminary contracting information should be gained. This includes material and transparent information about the estimated costs, benefits, risks, the timeline and the different retrofit steps from different contractors.

The final roadmap shall as a minimum cover issues as shown in Figure 2.



SOURCE: Fraunhofer IBP 2017

Figure 2 — Influencing factors for the retrofit roadmap development.

The retrofit roadmap also creates transparency and predictability for the owners and thus also acceptance of the refurbishment measures as well as confidence on the financeability. They see that a clear concept is in place for the next years can prepare themselves early for any financial burdens. Thus, the custodian, the property manager or the management board should present the maintenance reserve and the planned financing possibilities as needed to explain it to the owners.

In summary, the energy retrofit roadmap shall present the costs, proposal for the financing method of the project, direct financial benefits and co-benefits of the energy retrofit process and the risks for owner community.

4.2.6 Preparation of quality management plan

Beside the retrofit roadmap, prior the decision making moment of the initial phase of the retrofit process a quality management plan should be defined. It should define the methods, tools and relevant stakeholders for the continuous quality monitoring and control during the planning, procurement, construction, and after-retrofit-operation phases – based on the scenarios proposed in the roadmap.

Due to the variety of possible influencing factors on the owners' decision for an energy retrofit and the quality of the retrofit process in all of its steps (as mentioned before), the quality management roadmap shall pay attention to following factors:

- Quality management during the planning and procurement
  - an expert (planner/architect) shall elaborate the refurbishment construction plan;
  - Monitoring during the installationAn expert (planner/architect/engeneer) should monitor the work stage and the retrofit process coordination;
- Communicating and explaining the current state to the property manager and co-owners;
- Ensure cooperation between the involved building trades;
- Quality Check before and after commissioning of the installed equipment, energy systems, etc;
- Define responsible person for
  - managing eventual corrective actions;
  - Cost management;
  - Cost and timeline control.
- Quality management/Monitoring after the implementation
  - Define person in charge and a timespan for measuring and monitoring
    - the energy efficiency improvement over time;
    - the financial outcomes of the project.

The quality management during the retrofit phase, after the agreement of the OC on it, shall be considered as an independent position in the retrofit cost estimation.

4.2.7 Adoption of the energy retrofit roadmap

As the final part of the initial phase process the property manager/(external) expert shall present the energy retrofit roadmap in a suitable way for decision by the co-owners, along with considerations on the quality management of the implementation of the proposed energy efficiency measures. While the exact decision making process will depend on prevailing property law and the building's governance arrangements, in the large majority of countries it is envisaged that the decision making should take place, ideally at the ordinary general assembly or an extraordinary GA, focussed on retrofit.

The decision may relate and be devided into three steps:

1. Step: adoption of the roadmap as a long term improvement plan for the building;

2. Step: detailed planning of one or more measures in the roadmap;

3. Step: implementing of/to investing in one or more measures recommended in the roadmap.

Where a decision is taken to plan and/or adopt specific measures the needed majority of co-owners shall allocate funding required.

If more than one meeting is needed, the subsequent meeting should be organised apart from the ordinary assemblies focusing on the remaining critical issues to be solved.

NOTE In England and Wales the decision will be taken by the freeholder, but before proceeding with refurbishment the freeholder will consult, in line with regulations, with the leaseholder community. See Annex 1

4.2.8 Update of roadmap and quality management plan based on decision taken

At the general assembly, and subsequent meetings if required, it shall be decided which particular measures from the roadmap shall be taken forward by the OC . Following the general assembly, the retrofit roadmap and quality management plan shall be revised based on the decision taken.

Optimally at the general assembly the OC shall assign particular budget for the detailed retrofitting technical concept (eg. the definition of the energy efficiency measure technical specification) and the cost benefits analysis.

Note: the cost benefit analysis shall include the risks assessment and their allocation, the availability of incentives, the hypothesized contractual agreement with supplier(s) the financeability (bankability) of the project, the timeline to implementation,

The detailed technical concept integrated in the revised retrofit roadmap and quality management plan shall then be agreed, in line with the governance arrangements for the building (eg. by the management board).

Annex A
(informative)

Type of ownership and governance

A.1 General

The specific application of the process described in this CWA will differ substantially between member states depending on ownership and governance rules for multi-occupancy apartment buildings. There is substantial variation in rules between – and even within – member states about what it means to "own" an apartment. Alongside differences in ownership arrangements, different jurisdictions set different rules around building management processes, with many countries having changed rules to make it easier for co-owners to agree to make energy efficiency improvements. Finally, rules will differ depending on wider rules and national standards around the provision of energy advice. This appendix considers how these issues which will affect the application of the CWA process we describe, focusing on a number of countries as examples.

Some legal experts have suggested that legally-proscribed ownership arrangements in multi-owned apartment buildings can be placed in three broad groups:- the dualistic system where apartment owners have individual ownership of their apartment and joint ownership of the land and common parts of the building; the unitary system where apartment owners co-own the whole building and have exclusive individual rights of permanent occupation of their apartment; and the outlier systems, of which the major example is England and Wales's freehold/leasehold system where a third party owns the land and building with apartment owners having very long leases to individual apartments[2]. This appendix therefore discusses governance arrangements in member states representing these three categories: Germany's condominium (dualistic) system; Sweden's and the Netherlands' unitary systems; and England and Wales's freehold/leasehold "outlier" system.

The European Commission's Joint Research Council produced a Technical Report in 2018 based on data gathered from legal experts in seven countries, called *Energy efficiency upgrades in multi-owner residential buildings: Review of governance and legal issues in 7 EU Member States*.[3] This provides extensive information on governance arrangements in different countries.

A.2 Policy context

The *JRC EE/Multi-owner Report* explains the policy context as follows:

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[2] This sentence based on Bright, 2018, *Governance Barriers To Energy Upgrades In Apartment Block, Framing and Mapping the Problem* (Presentation, slide 7) available at https://law.nus.edu.sg/apcel/activities/2017/Framing%20and%20Mapping%20Governance%20Barriers%20%20to%20Energy%20Upgrades%20in%20Apartments_Susan%20Bright_2%20Oct%202017.pdf

It is important to note individual systems do not fall neatly into these three categories (e.g. Ireland has evolved from a freehold/leasehold system towards a more unitary model) and terms such as "condominium" and "co-operative housing" can be used with different meanings in different countries.

[3] Energy efficiency upgrades in multi-owner residential buildings: Review of governance and legal issues in 7 EU Member States, European Commission, 2018 Available at: http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110289/energy_efficiency_upgrades_in_multiowner_apartment_buildings_final.pdf Referred to going forward as "JRC EE/Multi-owner Report"

"Apartment ownership models entail complex governance processes, strict rules regulating multilevel decision making procedures and grey areas in legal frameworks, which are all regarded as hurdles discouraging or delaying parties from entering into agreements that facilitate energy efficiency upgrades. The EU Heating & Cooling Strategy describes, inter alia, the challenges to upscaling energy efficiency upgrades of private buildings and suggests that different building ownership forms require different approaches to drive energy efficient upgrades[4]*. The Strategy, inter-alia, recognises the issue of split incentives as a key barrier in deterring owners from making energy efficiency investments in apartment buildings, a significant segment of EU's residential building stock.*

"Despite this long-lasting barrier, little attention has been drawn on how to resolve it and current public policy interventions have made relatively little progress towards providing effective solutions that align incentives between concerned actors. To help overcome this issue, the Energy Efficiency Directive (Directive 2012/27/EU) includes a provision in its Article 19(1)(a), which calls for Member States to evaluate and if necessary take appropriate measures to remove regulatory and non-regulatory barriers to energy efficiency. In particular, it requests Member States to address the split of incentives between the owner and the tenant of a building or among owners, with a view to ensuring that these parties are not deterred from making efficiency-improving investments. Measures may include rules for dividing the costs and benefits between them and measures regulating decision-making processes in multi-owner properties."[5]

A.3 Examples of ownership and management arrangements, and considerations for application of this CWA process in different countries.

A.3.1 Bulgaria

A.3.1.1 Multi-ownership in Bulgaria

The traditional predominant private property of Bulgaria gradually increases at the expense of public (state and municipal). By 2015, private dwellings (physical and legal entities) reached 97.6%. [6]

Over 85 % of the population of the Bulgarian cities occupy large MOBs with OCs (Georgiev – DBU - 2017). Historically these buildings were erected in the period 1945 – 1989. Often the owner communities, legally defined by the national Condominium Management Law (Zakon za Etazhnata Sobstvenost), are not legal bodies.

Currently there are National and European Renovation programmes[7], which fund the energy retrofit of MOBs with a mixture of EU and national funding by 100 %. Soon the funding scheme is expected to be updated, so the grant funding rate will sink. Important is, that in order an OC to apply for this funding, it should be registered as a legal entity. Very often this is an unexpected administrative hurdle for the successful energy retrofit of many MOBs in Bulgaria. The decision making for the retrofit applications based on predefined programme's criteria is to be done by special departments of the municipal Government, which assess the applications and act as the contact point for the OCs in the particular

[4] https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v14.pdf

[5] JRC EE/Multi-owner Report, page 2,

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110289/energy_efficiency_upgrades_in_multiowner_apartment_buildings_final.pdf

[6] Housing Sector Assessment. 2017. National Center for Regional Development

[7] National Programme for Energy Efficiency in Multi-family Residential Buildings and separate schemes for energy renovation of MOBs under the Operational Programme "Regions in Growth" 2014-2020

cities and communities. The two renovation programmes for MOBs are managed by the Bulgarian Ministry of Regional Development and Public Works.

There should be an operation costs budget of every OC, agreed by it at the general assembly. Often economically unfeasible co-owners are not able to contribute to the foreseen running costs. Normally, if a retrofit action is envisaged, an extraordinary general assembly gets organised by the so called building manager (Domoupravitel). It is usually a co-owner, elected periodically by the OC. There the envisaged energy or structural retrofit is to be discussed. A qualified majority of the votes is needed for both registering the HOA and a successful pro retrofit decision. The estimated costs are to be presented at a later stage after energy and technical audits are prepared.

A.3.1.2 Application of the CWA in Bulgaria

a. Usually the building manager is the custodian of the retrofit process in Bulgaria. In some cases this person is a retired civil engineer or an architect, who is aware of the technical difficulties and opportunities for the MOB to be retrofitted and also able to manage the process. In the most cases the custodian is initially not sufficiently informed about the possible and suitable technical measures and needed relevant stakeholders, in order the retrofit process to be managed in a successful and smooth way.

b. The national legislation in Bulgaria defines the obligations of a property manager (chairman of the HOA management board) in the Condominium Management Law, as well as the obligations of the energy efficiency expert in the Energy Efficiency Law, who needs to do a mandatory energy audit as a base for the energy retrofit planning and planning execution, according to the conditions of the National Programme for Efficiency in Multi-family Residential Buildings. Often the quality management of the process is not overtaken by any particular stakeholder, due to a gap in the quality monitoring definition and monitoring in Bulgaria.

c. One of the biggest problems of Bulgaria and the capital Sofia is the air pollution with particulate matter (The Health and Environment Alliance, 2014). As among the main causes seems to be the residential heating using woodfuel and coal, the energy retrofit of MOBs has a good potential as a long-term solution against air pollution.

Therefore, the current CWA is going to help the National and local authorities to legally define and organise the OC and energy retrofit relevant legislation and regulation. On the other side, the CWA will be a useful tool for the Building managers to initiate and manage energy retrofit measures.

A.3.2 England and Wales

A.3.2.1 Multi-ownership in England and Wales

Around 1 in 5 households live in flats in England and Wales[8]. In England and Wales, apartment buildings are owned as whole buildings by freeholders, with apartments owners having a long term (typically 100 or 1000 year) lease from the freeholder to occupy and use the apartment. The freeholder receives payments (known as ground rent) from the leaseholders and can pass on the costs of repair and maintenance to the leaseholders as a “service charge.” The relationship between the freeholder and the apartment owners (leaseholders) is thus governed by the lease agreement between them, which *inter alia* will typically specify: the leaseholder's rights to make improvements inside their flat; which parts of the building are the responsibility of the freeholder and which of the leaseholder; the amount of

[8] JRC EE/Multi-owner Report, page 3,

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC110289/energy_efficiency_upgrades_in_multiowner_apartment_buildings_final.pdf

ground rent; the terms under which repairs and maintenance can be undertaken; if the freeholder has the right to undertake and pass on the costs of improvements. Managing agents will typically be used to manage larger apartment buildings.

Where freeholders wish to undertake major repair maintenance or improvement works (with costs to leaseholders of over £250 each), a statutory consultation process (known as Section 20 consultation) with leaseholders must be followed.

The freeholder/leaseholder ownership model introduces a split incentive[9] around refurbishment because the freeholder typically does not live in the building. A further barrier is that often leases do not allow freeholders to charge the costs of building improvements (only repairs and maintenance) to leaseholders.

No specific changes to law around apartment ownership and management have been taken to facilitate energy efficiency improvements in England and Wales. In recent decades, however, apartment owners have a statutory "right to manage": they can choose to come together to take over the management of their apartment building, acting on behalf of the freeholder, and appointing their own managing agents. More powerfully, leaseholders also have a statutory right to jointly purchase their own freehold, where all the apartment owners in building agree to this - in this situation the freeholder/leaseholder split incentive problem is resolved, and the ownership model becomes closer to the unitary system prevalent in Scandinavia. However, even where leaseholders jointly own the freehold, there is no requirement for them to form a jointly-owned company or to stage regular meetings.

There is a significant stock of social housing apartment buildings in the UK. These were built as multi-occupancy buildings without owner communities (because the social housing provider[10] owned all the apartments). Since the 1980s many social housing apartments have been sold into the private sector. This results in many MOBs where the social housing provider is both the freeholder and owns most of the flats directly, but there is also a small group of private leaseholders. Often these private leaseholders act as a barrier to improvement works proceeding because they do not want to pay their share of the costs.

A.3.2.2 Application of the CWA process in England and Wales

In light of the information above about different ownership and management arrangements in the English and Welsh system, the key actors in the decision making stage will differ depending on the governance of the MOBs:

— In a building with a third-party private freeholder the decision to proceed will rest with the freeholder. In practice private freeholders may be disengaged and – because of the split incentive problem – have little motivation to act.

— In a building with a social housing freeholder, the decision to proceed will rest with the social housing freeholder (the difference with the private freeholder is that social housing provider is likely to own most of the apartments in the building and has more interest to act).

[9] It is important to note this is entirely distinct - and exists alongside - the split incentive problem around private rented properties. In a typical English private rented apartment there is a double split incentive barrier to renovation action: between the tenant and the landlord/leaseholder and between the landlord/leaseholder and the freeholder.

[10] Social housing providers – who are regulated and financed to provide low cost housing - in the UK are either local authorities or (usually not-for-profit) housing companies. With an obligation to provide decent homes to their residents, social housing providers are more likely than private freeholders to lead energy improvement processes.

— In a building where leaseholders have exercised their right to manage, the decision will be taken by the leaseholder community in consultation with the property manager, following statutory consultation with the leaseholders

— In a building where leaseholders have jointly bought the freehold the decision will be taken through an agreement between the leaseholder community (through a process that may involve a "general assembly").

In all cases proposed improvement actions (and cost recovery of these) will need to be consistent with leases (though in cases of smaller MOBs exact terms of leases may – in practice - be ignored where all parties want to proceed with the works and have agreed the cost-sharing).

Following a decision, the next step will be a mandatory consultation with leaseholders in line with the Section 20 regulations.

New Retrofit Management Process Standard in England

A new retrofit process standard, PAS2035, has been developed for the UK. This standard applies to dwellings (individual single family houses or apartments), but its principles can be applied to the retrofit process in MOBs, particularly smaller MOBs. PAS2035 requires the appointment of a retrofit co-ordinator to manage the full retrofit process. PAS2035 identifies that, "Domestic retrofit projects range from the installation of single improvement measures to whole-house 'deep retrofit' involving multiple measures installed at the same time."[11] It requires different processes for advice provision, for assessment and design of measures, depending on the complexity and type of the measures involved. The PAS2035 also recommends the development of a medium term improvement plan for homes. [12]

For smaller MOBs in England and Wales, it is recommended that this CWA process is used alongside the PAS2035 process as follows:

- The "external expert" involved in the creation of the Retrofit Roadmap should be a person qualified to act as a PAS2035 Retrofit Co-ordinator

- The development of the Retrofit Roadmap for the purposes of the CWA is understood as development of a medium term improvement plan as described in PAS2035

- As part of the "finalisation of the Retrofit Roadmap", or following the adoption of the roadmap, a Retrofit Assessment of the building as defined in PAS2035 should be carried out by a person qualified to act as a PAS2035 Retrofit Assessor

- Following the adoption of the Retrofit Roadmap, and decision taken as to which measures to proceed with, a Retrofit Design should be prepared by a person qualified to act as a PAS2035 Retrofit Designer.

It is important to note the UK, Energy Performance Certificates are produced at the individual apartment level for apartment buildings. There is therefore little experience or practice in carrying out wholebuilding energy audits for apartment buildings and co-owners are unlikely to already have these.

[11] PAS2035 Draft, P16. NOTE This is not yet finalised or published

[12] PAS2035 S5.2 NOTE This is the draft version

A.3.3 France

A.3.3.1 Housing Stock and Property Law context

In France, condominiums make up 44% of the total housing stock i.e. around 12 million homes, of which 5 million are owned by the social housing sector. Private condominiums therefore represent around 7 million housings or 27% of the main housing sector (PACTE, 2017)[13].

Among the property owners, owner-occupier people in MOBs represent only around 55% of the owners, much less than in the single-family house sector where 90% are owner-occupiers (Boubieux José, 2010)[14].

The multi-family housing sector has a poorer energy performance than the single family one in as much as the final energy consumption for heating and domestic hot water is around 127 kWh/m²(final energy) compared with 122 kWh/m² in SFH. It should be underlined that energy performance in social housing –with a single property owner and manager- is around 30% higher than in private condominiums (CEREN, 2015)[15].

A.3.3.2 Energy Performance of the French MOB stock and overcoming barriers to refurbishment

If the average rate of performant energy retrofit in the French residential sector is more or less equal to the European average (1%), it is significantly lower in private multi-family buildings (Laurent Marie-Hélène, 2017)[16]. In this subsector renovation or especially energy retrofit are limited to single energy efficiency measures such as boiler replacement or glazing replacement (and generally when the service life of the replaced component is obviously over).

Several barriers have pointed out (Gaëtan, 2011)[17] to energy efficiency improvements in French MOBs. These include

— Lack of knowledge of the owner about the energy aspects of their building.

— professional property managers in the condominium sector turn out to have very limited knowledge, skills and interest in energy improvements and they very seldom play a promoting role in the decision process of energy retrofit.

— Financial investment for such works is significant and not every owner can afford to pay their contribution. In this case they may try to block the decision process. However, it must be underlined that

— Ambitious energy retrofit are complex process involving companies coming from different building trades. There are very few project managers (such as architect) in the residential sector, so this task

13 PACTE, P. (2017). Analyse détaillée du parc résidentiel existant.

14 Boubieux José. (2010). *Habitat Actualité, les logemenst en copropriété.* ANIL.

15 CEREN. (2015). Données statistiques du CEREN

16 Laurent Marie-Hélène, T. A. (2017). Prix de la Rénovation et Organisation de la Filière, Tâche 2 Eclairage Euroépen. Projet PROFIL

17 Gaëtan, B. (2011). La décision de rénovation énergétique dans la copropriété : un jeu d'acteurs dynamique ; . Dans B. Gaëtan, Extrait de la thèse de sociologie : Les conditions sociales et organisationnelles du changement des pratiques de consommation d'énergie dans l'habitat collectif.

must be done either by the property manager or by the board of owner whereas none of them have generally the skills and the time to do this job.

— As an example, a very high discrepancy can be observed among the price estimates of the tenders for the same work and it is very hard to explain where the difference comes from without minimal technical knowledge.

— Ensuring a real cooperation between building companies requires professional skills and competences.

The last barrier to overcome is the existence of the "split incentive" challenge, when the household beneficiating from the outcome of the EE retrofit (e.g. tenants paying a lower energy bills) are not the one facing the up-front costs.

Legal actions taken to encourage energy refurbishment and upgrade in MOBs

— An obligation of an energy audit has been therefore set by the law for condominiums with roughly more than 50 homes[18]. However, recommendations resulting from the audit are not binding. Provisions for works has recently become mandatory in multi-owner communities;

— Although a specific "pay-back" contribution is allowed to be add up to the initial rent, it is not enough to cover the investment costs.

— *Voluntary/support actions*

When an ambitious EE retrofit is undertaken in an MOB, the decision is made on arguments related to non-energy benefits (property value, comfort…) or under energy performance obligation when retrofitting the facade. Moreover, in most case of ambitious EE retrofit in MOBs, it is usually a small number of co-owners played a very active role in proposing this refurbishment and ensuring it is voted in the General Assembly.

To deal with the barriers to retrofit in this sector, pilot support programmes targeted at the condominium sector have been developed over the last 10 years (*Coach Copro* Program in Paris (consortium, 2016), *Mur Mur* supporting programme in Grenoble) but they have not become nationally widespread yet. These programmes provide technical, managerial and financial support on the one-stop shop principle. The *Mur Mur* feedback underlines the decisive role of the existence of non-energy benefit to ensure that the decision of ambitious EE retrofit is made.

— Financial investment can be supported by specific national or regional measures (subsidies, Energy Efficiency Certificates (White Certificates), soft loans…) but knowing and using all this measures requires skills in financial engineering. Some building companies in the residential sector have actually developed this kind of competence, which can help the decision process.

A.3.3.3 Application of this CWA process in France

In applying this CWA process in France it is important to note that "Management Board" is actually made of two entities:

— The board of owner (*conseil syndical*) whose member are chosen by a vote of the owner general agency;

[18] Actually condominiums with more than 50 « entities » (including apartment, garage, cellar).

— The property management entity (*syndic de copropriété*) which is under the supervision of the former and manages regular operation & maintenance and also refurbishment works. This entity is either professional (e.g. subsidiary of a real estate agency) or non-professional (this entity is made of volunteers among the owners). It is responsible for consulting and selecting potential companies (short list) for these operations. In order to get their offer and price estimate. On this basis, the companies in charge of these duties are eventually chosen by vote of the general assembly. In most cases of MOBs, the property management entity can choose companies for an urgent task without consulting the general assembly for limited works with a price under a given threshold (hundreds of euros).

A.3.4 Germany

A.3.4.1 Multi-ownership in Germany

About 22 % of the living units in Germany are placed in MOBs. By this, this type of buildings is the second more important for the residential market in Germany. (Statistische Ämter des Bundes und der Länder, 2011) Further (This type of buildings is inhabited by ca. 19 % of the German population. 54 % of the living units at the MOB are rented, another 42 % of those are self-used by the co-owners, 3,2 % are not used and ca. 1 % are used as a vacation homes. (Statistische Ämter des Bundes und der Länder, 2014)

70 % of the apartments in MOBs in Germany are not retrofitted yet (IWISR 2012). Therefore they represent a large potential for energy saving on the German residential buildings market.

According to the relevant legislation in Germany, there is currently two types of ownership, as follows: The composite ownership (Gemeinschaftseigentum) covers parts of the building that are typically considered communal include the roof, façade, entrance hall, lift, staircases, other exterior surfaces such as windows, the land on which the building is constructed as well as any other buildings on the plot which are not legally constituted as special ownership units (Sondereigentum) assigned to one of the owners only. There is a part of the composite ownership called co-ownership share (Miteigentumsanteil), which always belongs to the special ownership units of a particular co-owner. This type of ownership is the third one, defined by the WEG in Germany.

The co-owners are obliged by the WEG to cover as OC the maintenance costs for the composite ownership units. The so called operation costs (Betriebskosten - Wohngeld) are to be listed in the annual economic plan (Wirtschaftsplan) of the MOB, respectively the OC. The operation costs are to be distributed among the co-owners according to the particular co-ownership share. Most likely the annual economic plan is prepared by the property manager, who is also responsible for the accounting of the operational costs. The presentation of these in comparison to the annual economic plan usually takes place at the general assembly and it is an obligatory element of the agenda.

There is fixed maintenance and emergency measures costs fund (Rücklagen), defined annualy by the OC at the general assembly, which are paid monthly by the co-owners. Usually this fund is not meant to cover extracurricular or additional costs like costs related to an energy saving retrofit.

The ownership and all relationships within this context are regulated in the Apartment Ownership Act 1951 (Wohnungseigentumsgesetz, WEG). The administration of the building is regulated in sections 20-29 WEG5. In the context of energy efficiency renovations and modernisation, Section 21 (5) WEG introduces two important principles of proper administration: the principle of “due maintenance and repair of the jointly owned property” (Section 21 (5) no. 2 WEG) and duty of “building a reasonable maintenance reserve fund” (JRC EE/Multi-owner Report, section 21 (5) no. 4).”

“According to Sections 20, 26 WEG, an administrator or property manager (Verwalter) needs to be appointed by the assembly of owners (Wohnungseigentümerversammlung). In theory, this “administrator” could be one of the co-owners, but typically it is a staff member of a building management company. The responsibilities of the administrator or property manager are regulated by

section 27 WEG. They are, inter alia, to implement resolutions of the assembly and ensure the enforcement of the house rules, to take all necessary measures required for the proper maintenance and repair of the jointly-owned parts of the property, to take other necessary steps as may be required in urgent cases to preserve the jointly owned property, and to collect the money to be paid in relation to matters jointly affecting the co-owners or the day-to-day administration of the jointly owned property.

Generally, the administration of the common property is a task of the assembly of owners and the administrator (cf. section 20 WEG) who is elected by the assembly of owners for up to five years, see section 26 WEG). A further board is not required. The assembly can, however, establish an advisory board or management board (Verwaltungsbeirat, section 29 WEG) by majority, consisting of three co-owners."

"The property manager must convene the assembly of owners at least once a year (section 24 (1) WEG). Moreover, the property manager has to hold a further assembly of owners, if decisions are necessary, which cannot wait till the next regular assembly of owners is hold. For an established community, it is also common, that the assembly of owners meets only once a year."

In order the OC is allowed to take decisions at the general assembly, there should be more than 50 % of the composite ownership units represented by owners or their attorneys.

The types of decisions and majorities of the OCs in Germany are as follows:

Simple majority (Einfache Mehrheit)

At this case at least 51 % of the votes of the present co-owners and attorneys are needed. This kind of majority is needed for the agreement on simple maintenance measures.

Qualified majority (Qualifizierte Mehrheit)

At least 51 % of all votes of the MOB should be collected.

Double qualified majority (Doppelt qualifizierte Mehrheit)

At least 50 % of the present co-owners and attorneys and at least 75 % of all co-owners shall agree on the particular issue. Exactly this type of agreement is needed for starting an energy saving retrofit.

Absolute majority (Allstimmigkeit)

This type of agreement is needed if the external outlook of the building needs to get modified. It is very rare. All 100 % of the co-owners, present at the land register, need to agree.

Decision of all the relevant co-owners (Abstimmung aller Betroffenen)

Mandatory if only part of the co-owners of the OC is directly affected by some event or problem, which needs a fast solution. For example a damaged roof, damaged or not-existing, but needed sun shading, tree removal etc.

Circular decision making (Umlaufbeschluss)

This type of agreement is needed e.g. in case if the OC cannot be present at the General assembly. So the decision documents are circulated among all the co-owners and a 100 % majority is needed.

The policy instruments in Germany, which are relevant to the energy saving retrofit are as follows:

Key to policy type abbreviations used in this table:

'Information' means information provision; 'Demand' refers to those policies directed at creating demand; 'Supply' to those affecting the supply chain; 'Financial' includes funding and fiscal measures; 'Regulatory' includes legal and regulatory policy.

Table 1 — Energy retrofit in MOB: Relevant national and international policy documents for Germany

Policy	Type
Building Regulations	**Regulatory**
Energy Consultancy and Energy Checks of the Federation of German Consumer Organisations (Energieberatung und Energie-Checks der Verbraucherzentralen Bundesverband)	**Information**
BAFA Onsite Consultancy (BAFA Vor-Ort-Beratung)	**Information**
Market Incentive Programme for Renewable Energies in Heat Market (Marktanreizprogramm für erneuerbare Energien im Wärmemarkt– MAP)	**Financial**
Energy efficiency checks for households (StromsparChecks für Haushalte)	**Information**
Quality assurance of existing energy consultancy (KfW list of approved consultants online available)	**Regulatory**
Granting tax incentives for energy efficiency renovations	**Financial**
Smart Metering	**Regulatory, Information**
Energy Performance of Buildings (Directive 2002/91/EC). EU EPBD legislation mainly incorporated into the Energy Savings Ordinance (Energieeinsparverordnung-EnEV). **Energieausweise**	**Regulatory** **Regulatory**
Private financing measures: Crowd financing for funding energy efficiency improvements (with energy bill savings used to pay return to investors).	**Financial**
Public financing programs: KfW, Local funds, Städtebauförderung	**Financial**

SOURCE: Fraunhofer IBP 2017, reproduced with the permission of the authors.

These are to be observed in the context of the energy retrofit roadmap development process, led and moderated by the custodian.

The most relevant of those is the Energy Efficiency Ordinance (Energieeinsparverordnung EnEV), which has a mandatory character and determines the minimal energy efficiency standard for the MOB, which shall be reached after the energy efficiency retrofit.

A.3.4.2 Application of this CWA process in Germany

The maintenance process of MOB and the decision making process at OCs in Germany are clearly and well defined by the legislation. The significant hurdles for the energy retrofit measures to be implemented in German MOBs and respectively agreed by OCs in Germany are to find in the initial phase. The majority of OCs adopts an energy retrofit plan, prepared in advance by a relevant expert, contracted by those and coordinated by the property manager. Normally the timeline between the initial idea, often initiated by the property manager or the management board, and the agreement of the OC on the proposed energy retrofit exceeds 3 years. Normally at the first general assembly the general idea for retrofit gets presented, after which the OC agrees if the idea should be followed further on or not. If there is a positive agreement, an external expert gets contracted to develop a preliminary retrofit plan or several different retrofit scenarios. At the second general assembly the OC agrees on one of the proposed retrofit scenarios to be further on developed. At the third general assembly the OC agrees if and in how far to adopt the proposed retrofit plan. So, usually the initial phase process takes long. By preparing different scenarios, individually fitted to the demands of the particular MOB and OC, and consulting those with the OC meanwhile, the prephase runtime can be shortened on 1 year. Therefore this CWA, as well as the hopefully following CEN standard on this topic, perfectly fills the gap regarding the clear information of the OC members and increasing the motivation of the OC members and their willingness to undertake actions towards energy retrofit. This gap exists in the OCs in Germany and respectively makes the German Federal and European energy saving goals to be reached in much longer time as estimated. This CWA should influence the policy makers and other relevant stakeholders in Germany, in order legislative and organisational optimization measures to be undertaken.

The CWA is going to serve as a solid base and support tool to property managers, management boards and interested co-owners, willing or already started an energy retrofit process, in order these can successfully operate, manage and monitor the process.

A.3.5 Italy

According to I.STAT[19] there are 12.187.668 residential buildings of which about 52 % are single family house and 25% have 3 or more apartments. Current estimation[20] of the number of multi owners building (Condomini) is about 1 million, 8 % of the total stock with 11,5 million apartments –owners. The emissions of the residential and tertiary sectors account for 73 Mt of CO_2 (2015), representing 27% of the total.

Unless specified in the purchase contract, parts of the residential building that are typically commonly owned by all co owners include: the roof, the façade, the entrance hall, the lift, the staircases, other collective areas, gardens, the land on which the building is constructed as well as any other buildings on the plot which are not legally constituted as special ownership units assigned to one of the owners only.

The ownership and all relationships and obligations within this context are regulated in the Apartment Ownership contract and building code of conduct. The administration of the building is regulated by the civil code and the law 220/2012 updated with the Decree 145/2013. In the context of energy efficiency renovations and modernisation, there are two important principles of proper administration:

a) the principle of “due maintenance and repair of the jointly owned property”;

b) the obligation to reduce the non renewable primary energy consumption of the building and promoting the use of renewable resources as appropriate.

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19 I.Stat (Italian Statistics) http://dati-censimentopopolazione.istat.it/Index.aspx

20 Anaci-Censis

The administrator (Amministratore) of the building is appointed by the assembly of owners and his professional qualification complies with the requirements of Decree 140/2014. He's appointed for two consecutive years and his mandate can be renewed by the assembly of owners as many times as they wish. The responsibilities of the administrator are regulated by law 220/2013 and 145/2013. He has , inter alia, the responsibility and accountability to: implement resolutions of the owners assembly, ensure the enforcement of the house rules, to take all necessary measures required for the proper maintenance and repair of the jointly-owned parts of the property, take other necessary actions, as may be required in urgent cases, to preserve the safety of the jointly owned property, comply with regulatory requirements, collect the money from owners for the day-to-day administration of the jointly owned property or the implementation of approved projects (eg building retrofitting).

A further board is not required. The assembly can, however, establish an advisory board consisting typically of three co-owners (Consiglieri).

The administrator must convene the assembly of owners at least once a year to approve the income statement of the previous year and the budget for the coming year. Moreover, the administrator has possibility to hold extraordinary assembly of owners, if decisions are necessary, which cannot wait till the next regular assembly of owners is hold.

The decision about new investments, such as building retrofitting, requires a qualified majority of the owner's property that depends both from the civil code and the building regulation code of conduct.

A.3.6 Netherlands

For every multi-occupancy building, the law requires the establishment of an association of owners ("Vereniging van Eigenaren", abbreviation VVE). This association can consist of both residential and non-residential owners, but also of businesses that might be located in the building, such as shops and hairdressers. The VVE has the obligation to meet annually and take joint decisions by majority on proposals for maintenance and upgrading, such as cleaning and possibly shared utilities as district heating, but also on repairments and upgrading, such as roof reparation and double glazing VVE's need to have a chair, secretary and treasurer. They can range from 2 to hundreds of owners. In the case of small VVE's, for example former villa's converted to multi-occupancy buildings, the VVE might be inactive, the so-called "sleeping" VVE's.

VVE's are usually organised per building and its annexes as garages etc. The VVE member owns their part of the building (the dwelling or business place) while they have a proportionate share in common spaces as corridors and gardens. Many VVE's outsource the management of the VVE to a dedicated organisation, mostly a real estate company, The monthly fee for maintenance of the building includes also the costs for this outsourcing.

A.3.7 Norway

The Norwegian housing market is dominated by single-family houses (about 57% in 2017), and homeownership is with nearly 80% very high. Of the roughly 2.2 million residential buildings in Norway in 2017, about 22% is a multi-owner, multi-dwelling apartment in a block of four or more floors.

For the purpose of the CWA, multi-occupancy and multi-dwelling residential buildings in Norway can basically be categorised in:

— Ownership of a part of a multiple-family house (for example horizontally or vertically divided when semi-detached or a quarter on the house)

— Members of cooperative in a housing cooperative entitle to use an apartment in the building (e.g. Borettslag). The dwellings have been financed through long-term mortgage-secured bank loans of the cooperative, whereas the remainder is financed through member contributions, who might have taken up a mortgage themselves as well to finance their monthly contribution. Housing

cooperatives offer indirect ownership as they are societies, owning the property (land and building) while members have a permanent and exclusive right to use one of the units. A variant on the housing cooperative is the housing company where shareholders are entitled to use an apartment (Lilleholt, 2017)[21]. The latter form was popular between the world wars but is not so common anymore. This cooperative can be in the form of terraced houses or apartment blocks. Usually it concerns row houses and smaller terraced houses ("rekkehus").

— High-rise buildings of four or more floors with apartment ownership, the so-called condominiums. According to Norwegian legislation, every owner co-owns the whole property including its units or apartments. The owners have a permanent and exclusive right to the use of one of these units. Legislation describes in great detail the rules of owner meetings, on election of a board and on talking decisions with majority, but there is not a mandatory association for the management of the property (Lilleholt 2017).

Renting with a public task is not a separate category in legislation, although special rules for groups with specific needs apply. In order to provide social housing, municipalities can buy apartments in condominiums and housing cooperatives or housing companies for rental purposes. As there is only one type of tenure in the rental sector, and tenancies with a public task and other residential tenancies are not distinguished, specific types of tenure with a public task do not exist (Lilleholt, 2017). In this document, main focus is on condominiums.

Regarding energy efficiency related refurbishment, Thyholt et.al. (2009)[22] analysed the potential for making the Norwegian housing stock more energy efficient while using more renewable energy. They concluded at that time that there is a huge potential for improvement, especially in houses built before 1990. Thermal insulation with a package of 20 cm, new windows and 70-75% heat recovery of ventilated air, could reduce the energy use with 40%. However, single-family houses, especially small and semi-detached houses built between 1945 and 1990, account for the larger part of this reduction potential, namely 70%. The lack of offers of complete renovation packages in a market dominated by traditional building warehouses and single product vendors, is one of the main challenges in making the Norwegian housing stock more energy efficient. At the other hand, although the potential for energy efficiency in housing co-operatives is relatively smaller, the established relation between cooperative and members could lead to better response on this challenge and thus more impact (Thyholt et.al. 2009).

A.3.8 Sweden

In much of Scandinavia a unitary model of apartment ownership is prevalent. The example of Sweden is provided in this paragraph (A2.2.1).

51% of Swedish homes are apartments in multi-dwelling buildings (with more than 2 apartments). Most Swedish apartments are rented while 41 percent are *bostadsrätt* – usually translated as "tenant-owned dwellings"[23] where apartment residents own a share in a non-profit co-operative housing

[21] Lilleholt, K. (2017), Abridged national report for Norway. TENLAW: Tenancy Law and Housing Policy in Multi-level Europe. Oslo, University of Oslo.

[22] Thyholt, M. T. Dyrstad Pettersen, T. Haavik, B.J. Wachenfeldt (2009), Energy Analysis of the Norwegian Dwelling Stock. Subtaks A – Internal Working Document. Solar Heating and Cooling Program, IEA. Task 37. Advanced Housing Renovation by Solar and Conservation

[23] http://www.scb.se/en/finding-statistics/statistics-by-subject-area/housing-construction-and-building/housing-construction-and-conversion/dwelling-stock/pong/statistical-news/dwelling-stock-2017-12-31/

company that owns their building. The co-operatives typically own one estate or building, though larger co-operatives may have up to 500 dwellings. [24]

On buying their share in the co-operative, apartment owners gain the right to unlimited occupation of an apartment, and will pay a monthly fee to cover "capital investment in maintenance and improvement, collective services and shared utilities and spaces."[25] This includes heating and hot water, and sometimes electricity is also included in the fee. The apartment owner has rights to make improvements in their apartment apart from in some circumstances where this may impact on the wider building: the housing co-operative may manage funds to help pay for improvements inside apartments.

Residents meet annually and elect a voluntary governing committees. Apartment owners "can take part in the decision-making through their right to vote on issues presented during general meetings. Between the meetings, the board is free to make most decisions without consulting the members." [26]

Individual co-operatives are usually members of a national entity: HSB (The Tenants' Savings and Building Societies) or Riksbyggen (The Cooperative Building Organization of the Swedish Trade Unions). These entities provide centralised services for their members, including relating to management/upkeep.[27]

[24] Sustainability ISSN 2071-1050 www.mdpi.com/journal/sustainability Article Organizational Challenges in the Adoption of Building Applied Photovoltaics in the Swedish Tenant-Owner Housing Sector

[25] Ruonavaara, Hannu. (2005). How Divergent Housing Institutions Evolve: A Comparison of Swedish Tenant Co-operatives and Finnish Shareholders' Housing Companies. *Housing Theory and Society* - HOUS THEORY SOC. 22. 213-236. 10.1080/14036090500375373.

[26] Challenges in property management within the Swedish cooperative housing sector https://www.diva-portal.org/smash/get/diva2:901662/FULLTEXT01.pdf

[27] Sustainability ISSN 2071-1050 www.mdpi.com/journal/sustainability Article Organizational Challenges in the Adoption of Building Applied Photovoltaics in the Swedish Tenant-Owner Housing Sector

Annex B
(informative)

Barriers, opportunities, and risks

The entire range of possible barriers and opportunities for the decision making process towards the energy retrofit of a MOB with OC includes the so called a. influenceable and b. non-influenceable factors.

a. Includes the psychological readiness of the co-owners, based on the innovation affinity, but also the investment maturity.

b. Includes the age of the building, the demographic structure of the OC, the financial situation of the OC, as well as the inter-OC-relations and understanding.

Some of the most significant and influencing hurdles for the successful agreement of the OC on an energy efficiency retrofit may be:

1) Lack of structured decision making basis

If particular individually developed retrofit scenarios are not been presented to the OC in a structured way and timeline, often these do not get agreed by the OC. This mostly occurs, when an external energy efficiency expert has been contracted by the property manager on behalf of the OC, and presents the results without having sufficient communication with the initiator and/or property manager during the development of the retrofit scenarios.

2) Legal framework

In various EU countries the legal framework regarding the OC structure and management mechanisms, as well as regarding the energy efficiency in existing residential buildings, is still vague or even partially not present.

3) Lack of coordinating unit (person)

As a consequence of the previous issue, there might not be a clearly defined contact and coordinating person for the retrofit of the MOB.

4) Ownership and governance

   i) High rate of landlord owners, which disables the fast and efficient communication on site

   ii) High rate of non-motivated tenants

   iii) High-rate of financially unfeasible co-owners

   iv) Not clearly defined property manager

   v) Non motivated property manager

   vi) Absent initiator and/or custodian

5) Solutions

The main solution for almost all the issues mentioned above is the clear policy making on a national and local level in the particular country. If so, the failure probability is low.

Information campaigns and trainings on MOB governance and management are to be undertaken by cities and communities, in order to inform as wide as possible audience of the relevant stakeholder groups.

The professional education for facility and property managers, and also for energy efficiency experts, is to be further developed and fitted to the current market and social demand.

6) Comparibility of the offers

The presentation method for the retrofit scenarios at the retrofit roadmap shall be clear and understandable. The scenarios should be presented each according to the same information matrix.

7) Procurement

A couple of persistent barriers and obstacles result in lengthy planning and implementation phases, or sometimes even in cancellation of low energy district projects. These barriers and obstacles have been analysed, for instance for CONCERTO programme by Mosannenzadeh et al. (2017), and by the Action Cluster Integrated Planning/Policy and Regulations of the European Innovation Partnership on Smart Cities and Communities.

The most common barriers are

— high initial and operational costs of energy savings and clean energy measures;

— lack of financing and appropriate business models;

— siloed local governments (challenges in the internal communication between different governmental agencies or bodies);

— lack of technical skills in local governments;

— risk aversion by financial organisations and construction sector;

— split incentives;

— specific content uncoordinated in legal an/or regulatory documents;

— prohibitive legislative frameworks, for instance for pre-commercial procurement;

— lack of proven solutions and validated examples;

— difficulties with engagement of local stakeholders.

The latter can be in particular a problem in highly privatised European countries. The multitude of interdependencies existing between relevant stakeholders makes it even more complicated to align interests and create a common operational picture on energy efficiency.

Bibliography

There are existing standards, among them a few EN e.g. EN 15459 (Energy performance of buildings - Economic evaluation procedure for energy systems in buildings) and EN 16247-2 (Energy audits - Part 2: Buildings) and EN ISO 50001 (Energy management systems - Requirements with guidance for use), EN 15900 (Energy efficiency services - Definitions and requirements)

Using the CWA you can make a reference to existing national standards as applicable e.g. PAS 2035:2019 (Retrofitting dwellings for improved energy efficiency: Specification and guidance).

Further Literature

The EU consortia of the project LEAF,[28] consisting of 6 countries, worked on the definition and development of an initial solutions toolkit[29] for the successful energy retrofit of MOBs with OCs.

In the current SCC 1 project SMARTER TOGETHER an in-depth study and based on it roadmap has been developed by Fraunhofer IBP. These are focused mainly on the barriers, opportunities, risks and solutions for the energy retrofit in MOBs in Munich and Germany. A brief overview was published by Georgiev et al. (in german) [30, 31]. Further insights about the barriers, opportunities and risks in the context of Germany can be found as presentation by Georgiev et al., Fraunhofer IBP. [32]

An additional process related and practical guideline for refurbishment in MOB based on legislative German framework is published within SMARTER TOGETHER by MGS GmbH, municipal owned company. A regional Energy agency Freiburg (Energieagentur Regio Freiburg) provides complementarily very comprehensive and helpful website, compendia, advice and workshop service and a toolkit for OCs and property managers regarding energy retrofitting of MOB. [33]

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[28] http://www.lowenergyapartments.eu/

29 National Policy Recommendations for Germany Recommendations for local and national policy on retrofitting multi-occupancy, mixed tenure buildings. NATIONAL REPORT (Low Energy Apartment Futures, Deliverable 7.1), 2016, http://www.lowenergyapartments.eu/wp-content/uploads/2016/02/LEAF_Germany_Policy_Recs_Report_D7.1_Feb16.pdf

[30] G. Georgiev, K. Rupp, G. Grün, Leitfaden für das nachhaltige Prozessmanagement bei energetischen Sanierungsmaßnahmen in: B. Weller, L. Scheuring WEG-in Denkmal und Energie 2019: Energieeffizienz, Nachhaltigkeit und Nutzerkomfort, Springer Wiesbaden 2018, https://doi.org/10.1007/978-3-658-23637-3

[31] "Sanierung von Mehrfamilienhäusern mit Wohnungseigentümergemeinschaft", Fraunhofer https://prezi.com/view/KPxxv0te4Mad9KyqGf68/

[32] Georgi Georgiev, Energy retrofit of multi-occupancy residential buildings with owner communities in EU: status quo. Hurdles for the successful energy retrofit process. Importance of the initial phase. Fraunhofer IBP, 2019 https://prezi.com/view/zprWwavKjntidQih5w5A/

[33] https://www.weg-forum.net/startseite/