

Guidebook for course providers

D3.4 Training material for activating the supply-side



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Table of Contents

Executive summary	7
Executive summary (Dutch): Samenvatting	7
List of abbreviations	7
1 Introduction	8
1.1 Context of this guide	8
1.2 Purpose of this guide	8
1.3 Reading guide	9
2 Identification of knowledge needs	10
3 Some words on Teaching style	12
3.1 Training philosophy and forms of work	12
4 Target Groups and Competency Profiles	15
4.1 IHRS acquirer	15
4.1.1 Tasks / responsibilities	16
4.1.1 Competency profile	16
4.2 Social process supervisor	16
4.2.1 Tasks / responsibilities	17
4.2.2 Competency profile	17
4.3 Technical process supervisor	18
4.3.1 Tasks / responsibilities	18
4.3.2 Competency profile	19
4.4 Construction Cost Specialist	20
4.4.1 Tasks / responsibilities	20
4.4.2 Competency profile	20
4.5 Building physics energy advisor (energy advisor)	21
4.5.1 Tasks / responsibilities	21
4.5.2 Competency profile	22
4.6 Installation advisor	22
4.6.1 Tasks / responsibilities	22
4.6.2 Competency profile	23
4.7 Implementation Process Supervisor	23
4.7.1 Tasks / responsibilities	23
4.7.2 Competency profile	24
5 MAIN Course: Renovating with guaranteed building performance	25
5.1 Objective	25

5.2	Target group	25
5.3	Main content	25
5.4	Training structure	26
5.4.1	Preparatory assignment	26
5.4.2	Program	26
6	Training by phase	29
6.1	Initiative phase	29
6.2	Courses supporting the initiation phase	29
6.2.1	The importance of good management in a Homeowners Association	29
6.2.2	Dealing with complex decisions	29
6.2.3	How to future-proof HOA apartment complexes	29
6.2.4	Acquisition interviews for cost-controlled renovation of Homeowners Association properties	30
6.3	Courses supporting the orientation phase	31
6.3.1	Survey and evaluation of residents' needs	31
6.3.2	Ambition setting with the DCBA method and morphological design	31
6.3.3	TCO estimation and feasibility study in highly energy-efficient renovation	32
6.3.4	The basics of affordable highly energy-efficient renovation	32
6.3.5	Structural inspection in accordance with NEN 2767	32
6.3.6	Value creation and communication with occupants	32
6.4	Courses supporting the deepening phase	34
6.4.1	Quality assurance in renovations with building performance guarantee	34
6.4.2	Passive house design & construction	35
6.4.3	Calculating with the PHPP software package	35
6.4.4	Energy balance with DesignPH	35
6.4.5	Course on Chain cooperation and continuous improvement	35
6.4.6	Deepening course Energy-efficient balanced ventilation design	36
6.5	Transaction phase	37
6.6	Courses supporting the transaction phase	37
6.6.1	Quality assurance in renovations with building performance guarantee	37
6.6.2	Passive House Trades person course	37
6.7	Construction phase	38
6.8	Courses supporting the construction phase	38
6.8.1	Course on Communication in the construction process	38
6.8.2	Quality assurance in renovations with building performance guarantee	38
6.8.3	Passive House Trades person course	38

6.9	After-care phase	39
6.10	Courses supporting the aftercare phase.....	39
6.10.1	Course on Chain cooperation and continuous improvement	39
6.10.2	Quality assurance in renovations with building performance guarantee	39
7	Conclusion	40
	Appendix 1: Overview of the IHRS- roadmap	41
	Appendix 2: Description of the roles	45
	Appendix 3: 4MAT- model of learning styles	47

Executive summary

To implement energy renovations that go beyond label-A while the initial (low) living costs are retained and building performance standards are guaranteed requires significant levels of knowledge.

This guide is intended for established knowledge organisations in the construction and renovation industry and provides a perspective on knowledge development and transfer for these renovations. It complements existing programmes with suggestions for the structure and content of training programmes for the various stakeholders and professionals involved.

Executive summary (Dutch): Samenvatting

Voor de uitrol van succesvolle energetische renovaties die verder gaan dan label-A met inbegrip van gelijkblijvende woonlasten en gegarandeerde bouwprestatiegarantie is kennis vereist. Deze handleiding is bedoeld voor reguliere kennisorganisaties voor de bouw en renovatiebranche en geeft een doorkijk voor de hiervoor nodige kennisontwikkeling. Voortbordurend op reeds aanwezige trainingsprogramma's geeft deze handleiding de nog deels ontbrekende inhoud en suggesties voor de opbouw in een aanvullend trainingsprogramma voor diverse betrokken stakeholders en specialisten.

List of abbreviations

Abbreviation	Meaning
HOA	Homeowners Association (condominium association)
IHRS	Integrated Home Renovation Services, organisation that is a driving force behind integrated renovations
TCO	Total Cost of Ownership
MYMP/MYMB	Multi-Year Maintenance Plan and associated budget
CRS	Customer Requirements Specifications
WNR	Woonlastenneutrale renovatie (Living cost neutral renovation) c.q. Stichting WNR (WNR Foundation)
EnerPHit	Quality standard for deep retrofit issued by the Passive House Institute
PHPP	Energy calculation tool for energy efficient buildings
DesignPH	3-D-model for preparing PHPP-calculations
V&V plan	Verification and Validation Plan
t.b.d.	To be developed

1 INTRODUCTION

1.1 Context of this guide

This training program is based on the Condoreno-roadmap for integral home renovation services, see Annex 1. This roadmap has been developed to optimize the WNR-model and to provide a blueprint for the adaptation of this IHRS-approach.

Along the development of this roadmap essential roles/functions have been defined. See Annex 2 for a description of these roles. This guide is tailored to the professionals presenting these roles in IHRS-renovations.

1.2 Purpose of this guide

Healthy, comfortable and affordable housing

The reason for developing this training programme is the need for knowledge on the part of various stakeholders in energy saving renovations of buildings with privately held apartments. Expertise, background knowledge and quality assurance are essential for successful renovation with predefined performance targets in which the present and future interests of the residents are paramount.

This manual is intended for educational and training organisations that want to support integrated renovations of apartment buildings, especially apartment complexes with a Home Owners Association (HOA). The training programme is aimed at all stakeholders who are in any way involved in high-quality integrated renovations. This should further a more professional attitude and skills among the building managers. In addition, it may bring building performance contracts within reach that, in turn, can lead to low-threshold (building-related or not) renovation loans.

Confidence in supply and process

Integral performance guarantees for highly energy-efficient renovations can generate confidence among residents and apartment owners, making them more likely to agree to an integral renovation offer¹. Conversely, these guarantees also strengthen the operational commitment of the renovation providers involved. Designing highly energy-efficient buildings will include measures beyond the easy first steps that suffice for a simple label A target. A truly energy saving renovation relies on construction activities of a superior quality. These design and construction efforts require competent designers and builders, both building-wide and on the level of construction components.

After promising a high quality, contractors, installers and component suppliers will feel obliged to better coordinate their efforts. This can make the renovation faster, more fine-tuned and scaled up and may lead to the formation and presentation of more integrated and comprehensive renovation services. In addition, the present training programme can form the basis for a licensing structure for and by providers of integral renovations (IHRS). By providing a solid base for quality control, the training will both strengthen the IHRS process and bolster the confidence of those offering it.

¹ Here, we mean by integral renovation an approach that takes into account the long-term costs and consequences of design choices for the (future) residents. An integral approach focuses on the ultimate desirable outcome for the occupant and ensures that partial aspects such as health, usability, maintenance, safety etc. are balanced in design decisions.

Affordable through high quality

The successful transition to a high-performance energy-efficient building requires an effort to finance the higher initial investment costs. A guarantee for the very low energy demand of the building after renovation - implying guaranteed minimal operating costs - can provide the missing link to (additional) long-term affordable loans².

In view of the long lifetime of most buildings, renovations that will result in highly energy efficient buildings can perfectly meet investors' demands: low risks, high returns and sustained long-term performance. A guarantee of very low energy requirements and low maintenance costs make highly energy-efficient renovations economically attractive because of their relatively low overall costs in the utilisation phase. The risk of taking on a larger loan as required for higher-quality construction can be more easily accepted in the context of guaranteed low operating costs.

To interest flat owners in investing in higher quality, long-term loans are essential, for example loans for 30 years instead of the usual 10 to 20 years. Once the owner-occupants are aware of the beneficial effects on operating costs of a high-quality building envelope, they may be willing to enter affordable financing schemes for the high initial costs. Long-term guarantees of integral performance can make investors feel comfortable to the point that they offer long-term financing schemes. This ensures low interest rates and low monthly payments. Together with low energy costs, it creates an "offer you can't refuse" for flat owners.

1.3 Reading guide

This manual is a guide for training organisations. It describes the starting point, the knowledge prerequisites and a general perspective on the preferable teaching style. After a general description of the target groups that may be reached with this training programme, this manual elaborates on the essential specific roles/functions within an integral renovation process that includes a building performance guarantee.

Next, this manual describes a comprehensive course about integral renovations with building performance guarantee that is considered a central course for stakeholders involved in setting up an integral home renovation service (IHRS).

Subsequently, courses for specific disciplines are described for each phase in the design and implementation process.

For the sake of readability, this document uses the masculine form. Of course, this also always refers to the female variant.

² See "Asser Servicekostenmodel".

2 IDENTIFICATION OF KNOWLEDGE NEEDS

Energy renovations of privately owned apartment buildings do not rely on off-the-shelf solutions. Each project is different as well as complex, and renovation is first and foremost a social challenge. Any change in an owner-occupied apartment building is tied to a collective decision-making process, in which residents, usually laymen, have to make decisions about often complex technical aspects with long-term financial consequences. Owners be supported in this by clear and simplified formulations to arrive at a good understanding of the consequences of the decisions to be made. Confidence in the professionals involved is crucial, and this requires extensive competence in communication with residents.

Social competencies are required not only in the relationship with residents but also in interdisciplinary collaboration: Successful energy renovations feature streamlined collaboration of competent designers and builders as well as good communication with those responsible for the general conditions such as policy makers, lawyers and financiers. Optimizing these collaborations can lead to the resolution of important issues, such as the development of a financing scheme that utilises the qualities of the proposed renovation. Streamlined interdisciplinary collaboration is at the root of any IHRS. That type of organisation requires supportive process management and communication skills from all involved. This is the "soft side" of renovation that is often neglected in technical training. Collaboration with more social trainers can resolve this barrier.

The level of knowledge in the field of energy saving building and renovation has risen sharply in both the Netherlands and Belgium in recent years, especially in Flanders. This was driven mainly by successively more demanding building regulations and it focused on the minimum energy performance requirements for buildings³. These regulations and the associated labelling system are generally applied to energy saving renovations of collectively owned apartment buildings as well. However, this does not turn out to be particularly efficient with respect to the government's goal of an energy supply without fossil fuels.

To keep the future energy supply reliable and affordable, a substantial reduction of the energy demand in the winter months is required. High energy-saving targets are often compromised by limited investment budgets. To make a building highly energy efficient requires going beyond the 'low hanging fruit' when it comes to energy saving measures. Also, comfort and health aspects rarely have the necessary priority when designing energy measures. Moreover, designers and builders of energy saving features often are not fully aware of the risks in building physics (e.g. moisture). These buildings are so extreme in their energy efficiency that they are susceptible to errors in design, construction or commissioning.

The engineering and development of highly energy-efficient renovations requires considerably more attention to building physics than is commonly brought to bear today. In addition, the building and its installations must be well matched. Otherwise, renovations aiming at high quality can become prone to design, construction and commissioning errors, leading possibly to failure costs and perhaps to damage claims. This may involve not only the hygrothermal aspects including prevention of condensation and mould, but also thermal and acoustic comfort, air quality, quality of use, operability, etc. Given the high complexity of energy-oriented renovation, systematic quality assurance during the construction process is indispensable.

³ E.g. the training BEN bouwen (VEKA) or Opleidingen Bouw en energie (SMB) for energy expert, type A/B

The training programme offered in this manual will create more awareness of risks among professionals and it offers methods to deal with these risks. These methods can be extended into performance guarantees for buildings, that can be used readily by those who offer highly energy saving renovations. Performance guarantees will augment confidence on the part of residents, investors and policy makers.

Scientific research into a structurally sound and operationally affordable (i.e. energy saving) new construction and renovation has led to the Passive House Standard, which is used worldwide. This goes beyond national energy standards by offering proven tools to achieve future-oriented and feasible building and renovation concepts. The feasibility of Passive House technology in existing apartment buildings has been demonstrated in Dutch pilot projects. Managing the design and construction processes to meet high performance targets and offering building performance guarantees now make long-term financing possible in this realm. The long-term loan for the renovation costs once again ensures permanently low living costs and thus feasibility of the high-quality approach. This creates a sound business case for a future-oriented renovation approach.

The technical baggage for this is available basically in present day design and consulting offices, architects and engineering firms; general principles such as the “Trias energetica” are well known⁴. Also, in renovation advice, the presentation of the financial impact based on the total cost of living is becoming more common. But specific knowledge that comes in handy in the integral approach of high-quality energetic renovation is not yet common among most consulting and executing companies. Moreover, there are many misconceptions regarding the integration of the building envelope and installation technology and their possible synergies, regarding the building physics of high-quality insulation, and regarding important comfort and health aspects of highly energy-efficient buildings.

To set up and scale up an integrated renovation service (IHRS), it is necessary to gather the knowledge gained in pilots and in advanced experimental organizations and transfer this to suitable advisors.

The Dutch foundation "Kennisinstituut KERN" facilitates knowledge transfer by using experienced frontrunners as teachers and by channeling scientific research on highly energy-efficient construction and renovation into practice.

It offers a regular program on

- technology of integrated building envelope and installation design;
- energy calculation and building physics in very low energy renovations;
- quality assurance in design and execution.

In addition to this, a high-quality renovation approach requires specific skills regarding

- integral design and engineering (co-creation in integrated renovation strategies with performance guarantees, process management, tailored contracts);
- determining total housing costs;
- communicating with and providing guidance for residents.

Regarding the latter skills, KERN is in the process of developing appropriate training courses.

⁴ Quote Johan Van den Driesche, Embuild October 2023

3 SOME WORDS ON TEACHING STYLE

3.1 Training philosophy and forms of work

Integral = interdisciplinary

Successful and affordable (near) energy neutral renovation and construction requires an integral approach from design through commissioning and beyond, even more than conventional construction. In the decision-making process during the renovation project, considerations must be given continually across a range of disciplines. These include disciplines such as process management, structural and installation engineering, as well as less obvious disciplines such as cost calculation and building physics. After all, an adjustment in one domain almost always has consequences for other domains and possibly also for the overall performance of the building. Not only the energy performance, but also the performance in terms of, for example, user functionality, comfort and health. This requires careful integral coordination.

The advantage of working integrally is that there is no accumulation of costs (e.g. through extra measures for sustainability, traditional design, risk hedging for innovation), resulting in better-integrated and more affordable buildings. For integral working, the mere presence of technical knowledge for the various disciplines is not enough. During all phases of the project, different people from complementary disciplines, including the client, will have to cooperate intensively. Often these do not simply speak the same language and have different perspectives. This means that collaboration skills are needed, as well as appropriate forms of contract, for example, that encourage the desired way of working together. Integral design techniques, such as BIM, that support mutual communication and information flow can help.

Finally, there is a need for a common language regarding desired performance with respect to energy, comfort, health, costs, etc.: What do we actually mean when we use certain terms and what is or is not included in the calculations? Making the ambitions and preconditions explicit and measurable at the beginning of the project creates an unambiguous view of the destination for all parties involved. Through the use and intelligent interpretation of a functional program of requirements and a validation & verification (V&V) plan throughout all project phases, the proper course of action can then be secured throughout the project.

The construction chains under consideration generally show a transformation of the roles and boundaries of the participating organisations. They are becoming more professional, more customer-oriented and more cost-effective, with a higher quality as the norm.

Therefore the various subtopics in the curriculum are treated in this manual from an integral perspective: what is the issue at hand and how is it related to other issues in other domains.

People-sensitive and Practice-oriented

Those participating in the course may have different learning styles. Their favourite form can be identified by the 4MAT method⁵, see Appendix 3. Preferably, participants differ in their backgrounds. To help stakeholders develop towards an integral approach, a highly practical training program was developed in which all relevant aspects of sustainable and energy-efficient building are addressed as well as their interrelationships.

⁵ 4MAT is based on four styles of learning distinguished by David Kolb, see www.4mat.eu.

Starting from the necessary theoretical background, the trainers always make the connection with building practice, based on experience in progressive projects. In addition, they let the participants work a lot on recognizable cases, sometimes even on their own projects or tasks. Serious gaming is also used wherever possible to practice integral collaboration skills.

The idea behind this emphasis on hands-on practice is that theory on its own is generally poorly remembered and rarely leads to behavioural change. Also, it makes the translation to one's own work practice easier. An additional effect is that the course days are varied for the participants, who do a lot of their own work with all kinds of assignments, and that the time spent on the course, as they themselves often say, appears to "just fly by."

Knowledge modules

Knowledge modules are short and powerful interventions (half-day to two days) that provide participants with knowledge or skills or a tool to better perform daily work. These modules take place in the form of workshops, lectures and/or regular courses. They form an addition to the conventional courses.

Coaching on the job

As soon as what is learned in the modules is applied in daily practice, new questions may arise. Coaching on the job means that a trainer periodically observes/co-operates in the project and coaches the project team members on the implementation of what was learned. This can be organized as periodic supervision or incidental consulting.

Number of participants

We aim for groups between 10 and 15 participants to ensure maximum interaction. Of course, other group sizes are also possible. A non-homogeneous group with participants from different fields is preferable because interdisciplinary discussions are very enriching and enlightening for the participants. The number of trainers depends on the topics and the expected group size and the expected variety of participants.

Teaching materials

Teaching materials are usually provided with each training session. The materials include a summary of the material offered and possibly references for relevant background information. Course materials are provided digitally. This can be a one-time delivery via email but can also be access to an online e-learning environment for a period of time. This is determined in consultation with the client/teachers involved.

Certification

Upon completion of a training course, individual certificates of participation may be issued.

For a recognisable quality assurance of integral renovations, a more structural and robust certification of integral housing renovation service providers and stakeholders is needed. This certification should create confidence in the results of renovations done by Integrated Home Renovation Services.

KERN is preparing a course that can prepare for a certification (tailored to the WNR-process). A national roll-out deserves further investigation, for example by Condoreno's National Advisory Board (NAB). As of yet, a nation-wide course in the Netherlands for managers of renovation processes is only in the making.

To secure the necessary technological know-how and design quality, it is recommended to link up with the international quality assurance structure for passive building, developed and managed by the Passive House Institute. This structure has been tested already. See: https://passivehouse.com/03_certification/03_certification.htm

Exams for the Passive House Designer and Passive House Tradesperson are organised at Kennisinstituut KERN regularly offered twice a year.

4 TARGET GROUPS AND COMPETENCY PROFILES

This guide focuses on aspiring providers of an integrated renovation service and private and/or public stakeholders who play a role in this service, specifically the

- General members of HOAs, of resident sustainability committee, of Association's Board;
- Social process supervisor;
- Local government or local energy service desk employee;
- Technical process supervisor;
- HOA (Homeowners Association) manager;
- Architect/construction engineer;
- Building physics experts on energy/acoustic/fire issue;
- Building survey specialist;
- Structural engineer;
- Installation advisor;
- Financial advisor;
- Building cost specialist;
- Asbestos specialist;
- Ecologist;
- Legal expert;
- Renovation provider (director, project manager, technical draftsman, work planner, calculator, communications officer);
- Installers;
- Suppliers;
- Quality coordinator;
- Commissioning specialist;
- Monitoring specialist.
- Maintenance specialist;
- Investors.

These roles/functions belong to an integrated renovation service, whereby this list of roles is not exhaustive and in the design of projects and services some functions may be combined to be performed by a single person or organisation. For further explanation of these roles, see Appendix 2.

The following are the key competency profiles for an IHRS including the skills needed and training advice.

4.1 IHRS acquirer

The IHRS (Integrated Housing Renovation Service) Acquisition Officer can explain the comprehensive cost-controlled renovation approach to potential clients and perform the initial test of whether a project qualifies for an integrated approach (often by sketching a few scenarios). This role suits energy advisors of condominium renovations who endorse low total costs of living as the guiding principle and who integrate that approach into their working method. He is responsible for carefully carrying out a building inventory and combining this with the client wishes and requirements to develop a few renovation scenarios and preparing associated feasibility analyses. He also ensures client-tailored communication of the results of the scenario study.

4.1.1 Tasks / responsibilities

Orientation phase:

- Establish contact with the HOA Board of directors;
- Preparing and conducting client interviews;
- Conduct building survey - condition measurement cf. national norm (e.g. NEN 2767⁶) including construction, installations, architectural and energetic conditions, identifying all possible bottlenecks/challenges and opportunities? (Asbestos, bats, solar panels...);
- Checking fire safety situation and requirements;
- Assessing the risk of the presence of asbestos, carrying out or supervising asbestos inspections.
- Initial energy measurement: collect current energy consumption data (via network manager/energy supplier, of this building and of average buildings of this size);
- Retrieve important information, what is going on, what is the (renovation) history of the building, rough assessment of the technical condition of the building and its installations;
- Assessing whether the project fits within the scope of a renovation that focuses on integral costs of living (e.g. considering insulation measures that have been carried out in the past, legal and financial situation, presence of a district heating system, etc.);
- Variants study to roughly work out different renovation scenarios (or have them worked out) using an integral costing approach;
- Present in detail to the board of the owner association what an integral cost-controlled renovation approach entails, provide objective information;
- Preparing an offer suitable to the situation and the building for a feasibility study including any appropriate more detailed surveys;
- Participation in project evaluation.

4.1.1 Competency profile

Experience / basic competencies professional profile

- ≥ 5 years of construction-related work experience, or:
- Affinity with construction and master's level education;
- Strong communication skills;
- Experience in sales.

Required additional competencies

- Detailed knowledge of housing renovation as a cost-controlled effort;
- Experience/understanding of how and why to work integrally;
- Particulars of Homeowners Associations - legal and organizational;
- Basic technical and energy knowledge.

Recommended training

Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren;
Course on Acquisition of cost of ownership-driven renovation for HOA's, e.g. Acquisitiegesprek woonlastenneutrale renovatie VvE;
Possibly additional courses on Communicating with customers.

4.2 Social process supervisor

A social process supervisor supports the activities of the sustainability committee on behalf of the HOA. He directs the process and his role as an outsider allows him to ensure a safe atmosphere during residents' meetings. He provides support to the HOA during all phases, is

⁶ Dutch norm for condition measurement of building- and installation parts

attentive to the social aspects during the decision-making process by the HOA members and can mediate and advise in communication if necessary. He monitors the completion of the correct steps in the process of a HOA from initiative to after completion of the renovation.

4.2.1 Tasks / responsibilities

Overall process:

- Securing the sequential steps in the customer journey to a high-quality approach
- Providing necessary information and experience regarding comprehensive renovation

Initiation phase:

- Supporting the sustainability committee in tasks such as collecting resident evaluations and resident communication, organizing general meetings and information meetings ect.
- Advice on drawing up joint goals regarding sustainability
- Advice in requesting scenario sketches

Orientation phase:

- Support sustainability committee in collecting building data, energy consumption ect.
- Support decision-making process HOA for the renovation scenario to be worked out

Deepening phase:

- Support in conducting comprehensive occupant survey
- Support of functional requirements testing
- Support decision-making process regarding functional requirements

Transaction phase:

- Support communication regarding choice of renovation provider
- Support communication and decision-making process regarding the assignment of renovation including possible changes to the deed of subdivision and financing scheme.
- Support communication regarding permits, subsidy and financing applications

Aftercare phase:

- Support resident communication regarding complaint handling and aftercare.

4.2.2 Competency profile

Experience / basic competencies professional profile

- Bachelor's degree in management or > 2 years of project management experience;
- Experience supervising HOAs or other types of collective private clients;
- High-level communication skills (project management and conflict mediation).

Required additional competencies

- Knowledge of roadmap for integral energy renovation
- Knowledge of subsidies, schemes, etc.

Recommended training

- Course on Acquisition of cost of ownership-driven renovation for HOA's, e.g. Acquisitiegesprek woonlastenneutrale renovatie VvE;
- Communication training, NLP

4.3 Technical process supervisor

The technical process supervisor is the spider in the web the deepening phase and the transaction phase. During these phases, the process supervisor is responsible for all support activities to make the process run smoothly during the designing process. He supervises the design process and ensures that the steps are taken as scheduled (in sequence and predictable) so that the process is completed on time and within budget. The technical process supervisor represents the IHRS/ design team to the client and other stakeholders, prepares presentations regarding the technical decision making process of the client. He is responsible for the implementation of quality assurance and functions as a point of contact for all parties involved in these phases. He also handles internal project evaluation.

4.3.1 Tasks / responsibilities

Deepening phase:

- Establish scheduling and process monitoring;
- Organize research/design team, delegate tasks and responsibilities to experts; this includes streamlining expert work around Customer Requirements Specifications (CRS), around a verification and validation (V&V) plan, around the feasibility analysis including survey, baseline measurement, renovation scenarios with appropriate building cost as well as Total Cost of Ownership (TCO)-analysis;
- Organize meetings, prepare and report decision lists;
- Set up communication structure for sharing project information (up to date and retrievable);
- Set up customer requirements list, manage customer expectations;
- Draw up CRS: prioritize customer requirements and translate them into functional specifications with associated performance indicators;
- Draw up or have drawn up a V&V plan including maintenance requirements (calling in additional expertise if needed);
- Organize reformulation of the legal framework of the Homeowners Association such as the deed of subdivision and associated regulations if needed, trace any other legal bottlenecks, call in legal specialist if necessary;
- Check financial health of the HOA; check current Multi-Year Maintenance Plan and associated budget (MYMP/MYMB) and adjust it where inappropriate or incomplete, similarly check service cost structure together with building cost specialist;
- Organize assessment of all legal aspects of the renovation scenarios (explore individual and collective consequences);
- Organize the drawing up of a sustainable MYMP/MYMB;
- Manage structural engineering elaboration of the selected renovation design including its MYMP;
- Manage the installation-technical elaboration of the selected renovation design including its MYMP;
- Customer communication, possibly in cooperation with social process supervisor/communication officer;
- Organize morphological design sessions;
- Organize contact with municipality and other authorities such as governments and utility companies for support and approval;
- Perform or have performed any necessary calculations for permits and subsidies, e.g. the Dutch BENG standards for building permits.

Transaction phase:

- Plan and monitor the process of preparing for and implementing the renovation;

- Form and organize the design team, secure delegation of tasks and responsibilities to experts charged with the elaboration of the selected renovation scenario (technical design process, assessment of legal framework, updating MYMP/MYMB and TCO calculation);
- Use V&V plan to have the quality of the renovation design assured and to have this tool ready for assessing the implementation of the renovation, reporting on this to the client, call for the adjustment of the MYMP/MYMBs and V&V plan on the basis of this quality assurance;
- Organize design team meetings, prepare and report decision lists;
- Set up award procedure, call for renovation contractors;
- Execute award procedure main renovation contractor;
- Organize knowledge and information transfer to renovation provider and monitor/supervise the more detailed design process of construction details and technical installations including their MYMP/MYMBs;
- Draw up contract with renovation provider (renovation approach agreement);
- Client communication, consultation with board of Homeowners Association, social process supervision and contact with stakeholders;
- Prepare communication and arrange agreements about potential loans (possibly together with financial expert);
- Search and arrange subsidies and guarantees;
- Set up and keep up renovation dossier;
- Organize project evaluation and supervise the integration of improvements into the renovation (IHRS) process.

Project evaluation:

- Organize and participate in project evaluation;
- Prepare project evaluation report and assess quality assurance process (annual management report).

4.3.2 Competency profile

Experience / basic competencies professional profile

- ≥ 5 years of construction-related project management and design management;
- Experience in process management, lean management;
- Experience in renovation projects;
- Basic knowledge of preparing Multi-Year Plans;
- Energy expert, minimum level EPA-W;
- Experience asbestos inventory (able to assess situation and to direct follow-up steps);
- Basic knowledge of fire safety in apartment buildings;
- High-level communication skills (project management and mediation).

Required additional competencies

- Certified passive house professional, passive house advisor or passive house designer or similar qualification;
- Or involved in this or a similar role in the execution of one or more successful (certified) EnerPHit renovation, passive house renovation or integral renovation projects;
- Experience with integral project budgeting from sketch design to completion and experience with integral feasibility analysis;
- Or: certificate of course in TCO estimation and feasibility study in very energy efficient renovations;
- Knowledge of grants, regulations, etc.

Recommended training

- Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren;
- Course on Acquisition of cost of ownership-driven renovation for HOA's, e.g. Acquisitiegesprek woonlastenneutrale renovatie VvE;
- Course on TCO estimation and feasibility study in highly energy efficient renovations (t.b.d.);
- Course on Chain cooperation and continuous improvement, e.g. Ketensamenwerking renovatie;
- Course on Quality assurance for renovations with building performance guarantee; e.g. Cursus Integrale kwaliteitsborging;
- Course on Communication, e.g. Cursus Communicatie in het bouwproces.

4.4 Construction Cost Specialist

The work of the construction cost specialist largely takes place in the orientation phase, deepening phase and transaction phase. The construction cost specialist is responsible for the preparation of cost estimates for the feasibility analysis (budgeting renovation scenarios) and the preparation of accurate element estimates (bill of quantities) and guidance in the elaboration of the chosen renovation scenario aiming at low living cost, also for the purpose of exploring financing possibilities and selecting a renovation provider.

4.4.1 Tasks / responsibilities

Support the technical process supervisor (and design and construction team) by providing:

- Construction cost estimation and TCO calculations of various renovation scenarios for the purpose of scenario assessment;
- Support the elaboration and financial engineering of the selected renovation scenario by providing:
 - Cost estimates, element quantities and budgets, MYMP/MYMBs and TCO calculations from coarse to fine, following the design as it becomes more detailed and adjustments are made;
 - MYMP/MYMBs (updating current projection, show projection per renovation scenario, fine tuning projections upon elaboration of a sustainable renovation design).
- Support renovation provider selection with:
 - Control and review project budget estimates of renovation provider(s) (using IHRS baseline budget).

Project evaluation:

- Support post-calculation following renovation;
- Participate in project evaluation and implement points of improvement in the integral renovation procedure.

4.4.2 Competency profile

Experience / basic competencies professional profile

- Construction cost expert (master's level), or estimator (master's level) with affinity for element budgeting;
- ≥ 2 years working experience element budgeting;
- Experience in preparing MYMBs.

Required additional competencies

- Proven experience with / certificate of course in TCO calculation and feasibility studies for highly energy efficient renovation
- Basic knowledge of Passive House construction and retrofit;
- Experience with MYMB according to WNR-scenarios/standards (long term, including measures for highly energy efficient buildings);
- Familiarity/experience with cost indices for very low energy buildings and integral building activities.

Recommended training

Course on TCO calculation and feasibility studies for very low energy renovation (t.b.d.)

4.5 Building physics energy advisor (energy advisor)

The energy advisor is responsible for a correct renovation design in terms of energy and building physics. He supports the design team in the orientation phase, deepening phase and transaction phase with advice and energy balance calculations. In the construction phase he supports the technical process supervisor with V&V measures and during commissioning he provides verification calculations for comparison with measurement data for optimizing building functions. He also provides the necessary project documentation for energy label sign-off and EnerPHit certification.

4.5.1 Tasks / responsibilities

Orientation phase:

- Support elaboration of CRS / customer expectations: provide functional specifications for energy, comfort, indoor climate with associated performance indicators;
- Assess current situation and energy design / calculate energy performance of renovation scenarios through DesignPH/ PHPP;
- Calculate heating and cooling requirements and advice on technical installation capacities;
- Supply input parameters for TCO calculation;
- Provide information for external verification (EnerPHit certification etc.).

Deepening phase:

- Support technical elaboration of the selected renovation design;
- Fine-tune energy balance calculation;
- Give advice on the technical design;
- Supply input parameters for elaborating TCO calculations;
- Support implementation of V&V plan;
- Provide information for external control (EnerPHit certification etc.).

Transaction phase:

- Give advice for installation engineering;
- Supply input parameters for TCO-calculation;
- Provide support in drafting minimum requirements for maintenance measures;
- Support implementation of V&V plan for the renovation design;
- Support the drafting of performance agreements for the renovation (off-take agreement);
- Provide / prepare documentation for EnerPHit certification, for calculating the national energy requirements and for the renovation file.

Construction phase:

- Support implementation of V&V plan and support WNR process supervisor in supervision;
- Provide / prepare documentation for EnerPHit certification, for calculating the national energy requirements and for the renovation file.

Project evaluation:

- Participate in project evaluation and incorporate improvement points into the integral renovation process.

4.5.2 Competency profile

Experience / basic competencies professional profile

- ≥ 2 years of work experience in construction or installation engineering (college level);
- Knowledge of energy regulations and by-laws (to be able to estimate consequences).

Required additional competencies

- Either: Passive house designer certificate
- Or: Passive house craftsman certificate + demonstrable experience in designing (certified) passive houses;
- More than 2 years demonstrable work experience with PHPP calculation / tools for computing energy balance in very energy efficient buildings and heat flow calculations;
- Basic knowledge of TCO calculation.

Recommended training

- Passive House Designer Course, e.g. Passive House Design & Construction;
- Or: Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren and course on Energy Balance with PHPP/DesignPH, e.g. Cursus Rekenen met de nZEB-tool.
- Course Energy Balance with DesignPH; e.g. Cursus Energiebalans met DesignPH
- Course on Calculating heat transfer in thermal bridges.

4.6 Installation advisor

The installation advisor supports the design team with installation advice; in the orientation phase this applies to the installation engineering part of the renovation scenarios and to the preparation of the V&V proces and in the deepening and the transaction phases this applies to in the elaboration of the installation engineering in the chosen renovation scenario and to the actual V&V of the design.

4.6.1 Tasks / responsibilities

Orientation phase:

- Support elaboration of the CRS into functional specifications of energy, comfort, indoor climate with associated performance indicators;
- Assessment and possible adjustment of existing MYMP (installation-technical);
- Feasibility assessments of installation design of draft renovation scenarios;
- Support in drafting new MYMPs (per scenario);
- Support with drafting the request for renovation provider;
- Draw up V&V plans (technical installation part).

Deepening phase:

- Elaborate technical installations of the selected renovation design including associated MYMP/MYMBs;
- Support in drafting performance contract/purchase agreement;

- Quality assurance design in accordance with V&V plan.

Transaction phase:

- Knowledge and information transfer for technical elaboration of selected renovation design incl. MYMP/MYMBs;
- Monitoring and supervising the implementation of the V&V plan.

Construction phase:

- Support WNR/renovation execution process supervisor in monitoring V&V plan implementation during execution;
- Same during commissioning.

Project evaluation:

- Participate in project evaluation and assimilate improvement points in integral renovation process.

4.6.2 Competency profile

Experience/basic competencies professional profile

- ≥ 5 years of work experience in building installation technology including installation design and implementation (master's level);
- Basic knowledge of MYMP/MYMBs for maintenance of installations.

Required additional competencies

- Certified Passive House Designer or Passive House Craftsman or similar qualification
- Knowledge of/experience with passive house installations and their sizing.

Recommended training

- Passive House Designer Course, e.g. Passive House Design & Construction;
- Or:
- Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren and course on Energy Balance with PHPP/DesignPH, e.g. Cursus Rekenen met de nZEB-tool;
 - Deepening course on the design of energy-efficient balanced ventilation systems.
- And:
- Course on Quality assurance for renovations with building performance guarantee; e.g. Cursus Integrale kwaliteitsborging.

4.7 Implementation Process Supervisor

The implementation process supervisor represents the IHRS and represents/advocates the interests of the HOA's during the implementation of the renovation. His contributions take place in the construction phase and aftercare phase. Then he oversees supervision and support activities to ensure the process runs optimally. The process supervisor is the contact person for the IHRS to the client and to the other stakeholders, and in that context he organizes meetings and presentations. He supports the renovation provider in the implementation of quality assurance and is the point of contact for all parties involved in these phases.

4.7.1 Tasks / responsibilities

Construction phase:

- Streamline communication with and between members of the Homeowners Association and the renovation provider;

- Supervise quality assurance implementation in line with V&V plan;
- Manage use and improvement of V&V plan;
- Organize preparation of renovation file with information about delivery and quality checks;
- Organize update of sustainable MYMP/MYMBs and of package of predictable prerequisites regarding maintenance.

Commissioning:

- Oversee project delivery;
- Streamline communication with and between members of the Homeowners Association and renovation contractor;
- Supervision of delivery and processing of monitoring data;
- Organization of project evaluation by residents;
- Planning of integral commissioning and supervision of quality assurance in line with V&V plan;
- Oversee adequate service in case of defects;
- Complete renovation file upon commissioning;
- Organize post-calculation of the renovation and input key figures into cost database of IHRS.

Project evaluation:

- Organize and participate in project evaluation;
- Monitor the embedding of improvements in the integral renovation process of IHRS.

4.7.2 Competency profile

Experience / basic competencies professional profile

- ≥ 5 years of experience in construction-related project management during execution;
- Experience with planning and management of integral construction processes and lean management;
- High-level communication skills (project management and mediation).

Required additional competencies

Certified passive house professional, passive house advisor or passive house designer or similar qualification;

Or involved in this or a similar role in the implementation of one or more successful (certified) EnerPHit renovations, passive houses or integral renovation projects.

Recommended training

- Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren;
- Course on Quality assurance for renovations with building performance guarantee; e.g. Cursus Integrale kwaliteitsborging;
- Course on Chain cooperation and continuous improvement, e.g. Ketensamenwerking renovatie;
- Course on Communication in the construction process, e.g. Cursus Communicatie in het bouwproces.

In the following chapter, you will read a description of the main training for stakeholders of a GWDR. This training concerns the specific challenges of high performance energy renovations with guaranteed building performance for HOA properties.

5 MAIN COURSE: RENOVATING WITH GUARANTEED BUILDING PERFORMANCE

5.1 Objective

To gain insight into the result-oriented methodologies for successfully renovating and maintaining apartment buildings.

This course gives stakeholders involved in renovations for Homeowners Associations the necessary tools and insight to achieve energy efficiency that goes beyond label A. This training gives confidence in the possibilities to enter into renovations that aim to bring down living costs by using a performance guarantee.

The course provides insight into the optimization opportunities in the regular renovation process to achieve high sustainability ambitions and to include the client and other stakeholders in the process. Course participants will also learn about the challenges and synergetic relationships in highly energy-efficient construction. This course prepares stakeholders to develop or engage in an IHRS business model.

5.2 Target group

All professionals involved in the management, maintenance and renovation of apartment buildings, e.g:

- HOA (Homeowners Association) manager;
- Architect/construction engineer;
- Construction managers;
- Social and technical process supervisor;
- Energy experts;
- Building cost specialist;
- Renovation provider (director, project manager, technical draftsman, work planner, calculator, communications officer);
- Installers;
- Suppliers;
- Investors.

Level of this course: Masters and higher

5.3 Main content

Integrated and streamlined renovation process

- Successful realization of renovation, transformation and maintenance of houses and apartment buildings having predictable performance and quality;
- Quality optimization and assurance before and during renovation;
- Integral approach by involving all parts of the building and looking at total costs over the desired lifetime;
- Calculating the total costs of ownership during the life span of the building (TCO-model) including trade-off between cost on the one side and energy performance, comfort, health on the other;
- Cost parameters;
- Cost reduction/value creation through the optimization of the renovation process.

Interdisciplinary collaboration

- Optimal effective cooperation between all stakeholders, the benefits of an IHRS and how to develop an integrated renovation service.
- Optimization of processes through an intrinsic drive and reduction of failure costs;
- Organizing job satisfaction for all involved;
- Clear agreements in your project about demarcation lines between parties involved.

Understanding the customer journey

- Supporting decision making by the clients
- Customer is king, identify the values/wishes behind what is said at first;
- Making customer needs and wishes measurable in the solution space of the design brief (how do you know if something is a good decision if you don't know exactly what it will deliver overall?);
- Communication with residents.

5.4 Training structure

This program is in-progress i.e. only indicative.

5.4.1 Preparatory assignment

A few weeks before the start of the course, participants receive a preparatory assignment. By studying some material in the run-up to the training and translating it to one's own practice, a flying start can be made in the training and embedding the training material is facilitated. The time investment for this assignment is about two to three hours.

5.4.2 Program

Module 1: The essence of results-oriented working

- Cost drivers in renovation - an exploration
- Results-oriented approach: The four components
 1. Guiding principles for behaviour and action;
 2. Organization: organizing collaboration: organizational structure, goal setting, roles and responsibilities;
 3. Consultation structure: including how progress is monitored and how that leads to decisions;
 4. Improvement structure: what if something goes wrong? How do we improve our processes and collaboration every day?
- How to define and strengthen these four components. The objective is paramount, i.e. results-oriented work and life.
- Existing result-oriented methodologies, first (global) insights into result-oriented methodologies such as AZEB 17-step methodology⁷, RGS: 3 + 7 process phases methodology⁸, Lean⁹, etc. Where and how do we find the four components for result-oriented work?

⁷ AZEB stands for Affordable Zero Energy Building and was a European research project aiming to accelerate the implementation of high energy building. AZEB provides a method for an optimal design and construction process that achieves predetermined integral project goals. Going through its 17 process steps leads to high construction quality at lower costs. To learn more: www.azeb.eu

⁸ RGS stands for Result-oriented collaboration and aims to make parties, involved in maintenance to work together optimally towards improved maintenance quality, prevention of failure costs and increased customer satisfaction. For more information: Leidraad Resultaatgericht Samenwerken

⁹ Lean is a business strategy, originating from the automotive industry (Toyota), where the entire organization focuses on creating optimal customer value at the lowest possible effort.

- Optimal effective cooperation between all stakeholders, the benefits of an IHRS and how to develop an integrated renovation service.

Module 2: Roadmap integral renovation, customer wishes and requirements and communication

- Overview of phases and steps
- Customer requirements and customer specification
- Balanced set of functional requirements
- Relevant indicators for affordable renovations
- Validation and Verification (measuring is knowing)
- Integral process management
- Communication and decision-making with residents – the customer journey.

Module 3: Renovation design costs

- Methodologies for multidisciplinary and integral design - Morphological design
- Understanding the importance and methods of aligning renovation measures with optimal usage costs
- Life cycle costs and cost parameters
- Practicing with a Total cost of ownership (TCO) model

Module 4: Cost-effective renovation design

- Introduction to Passive House construction
- Cost effective design principles
- Building physics challenges in renovations with energy targets
- PHPP - the software for guaranteed energy performance
- Appropriate components and semi-finished products
- Quality assurance and certification system

Module 5: Cooperation and quality assurance in implementation

- Co-creation and cooperation as a basis for business
- Purchasing and guarantees
- Contract management, performance contracts
- Optimizing processes and reducing failure costs
- Chain integration and successful (continued) cooperation with partners such as clients, subcontractors, suppliers, employees and users
- Quality aspects during execution
- Working with a V&V plan
- Commissioning
- Monitoring and optimization
- Management and maintenance with building performance guarantee

Module 6: Evaluation and excursion

- Course summary
- Practical applications, tips and tricks, ideas and solutions
- Excursion to one or more relevant example projects. Interview
- Receiving a Certificate of Participation

See online: Renoveren met gegarandeerde gebouwprestaties

The following section will give you an idea of the required training and courses per phase of the renovation process.

6 TRAINING BY PHASE

6.1 Initiative phase

In this phase, residents / members of the Homeowners Association are activated, informed and involved in the decision-making process for the energy saving renovation.

In this phase, it is important that the Association's Board and its members are familiar with what is expected of them during this process, and what they can expect from the parties involved. There are pitfalls and there are steps that can help them become a knowledgeable principal client. They also learn what is needed to develop support among the association membership. Here, a municipality can provide effective support, for example by offering independent information and/or a course and by facilitating activities that will strengthen the organisation and its attitude towards renovation.

Stakeholders involved in this phase, include:

- Members of the HOA including residents in general, members of a sustainability committee, the Association's Board;
- Ambassador of the IHRS (first contact with the client);
- Social process supervisor;
- Municipality;
- Condominium manager.

6.2 Courses supporting the initiation phase

6.2.1 The importance of good management in a Homeowners Association

Target group: Homeowners Association members

Objective: To make residents of an owner-managed association aware of

- their rights and obligations as an association member;
- the importance of good governance;
- the challenges posed by the energy transition and what it means for their Association;
- proper financial planning based on a full Multi-Year Projection;
- the possibility of a cost-neutral renovation of their building;
- the unique working method in an integrated approach such as that offered by WNR.

Duration: 2 hours online

Alternative course in the Dutch speaking part of Belgium: training for the board of co-managers, offered by 'Eigenaarsbond' (Union of Owners' Associations)

6.2.2 Dealing with complex decisions

Target group: Owners' association members

Objective: First introduction to living cost-neutral renovation for board members of Homeowners Associations. Participants become competent principals for integral renovation, know the crucial decision moments and are prepared for the journey to a sustainable building.

Duration: 4 half-day sessions

6.2.3 How to future-proof HOA apartment complexes

Target group: Home Owner Association technical staff/volunteers

Objective: building managers learn the advantages of a high-quality integral renovation and become aware of the consequences of poorly thought-out energy measures.

They learn to see the opportunities for value creation and come to understand how to make their business model more sustainable by participating in an integral renovation project. By developing a sound MYMP/MYMB, these technicians learn to advise Association's Boards in decision-making about the necessary reservation for preparing these projections. They become enthusiastic about high-quality energy renovation and learn how to convey this as ambassadors in Association meetings.

Duration: 3 half days

Alternative course: Renovating with guaranteed building performance

Alternative course in the Dutch speaking part of Belgium: Basisopleiding voor eerstelijnsrenovatieadviseurs (BE-REEL!)

6.2.4 Acquisition interviews for cost-controlled renovation of Homeowners Association properties

Target group: Energy advisor, social process advisors

Objective: The participant learns how to convince the board of a Homeowners Association to commission research into the feasibility of an integral renovation aimed at low overall cost of living. The participant learns the vision and methodology of an integral approach and how to convey this to residents of an Association, including the advantages and possibilities of a future-oriented approach. The talks emphasise the importance of a comprehensive feasibility study that applies the integrated renovation strategy of WNR to the project at hand and compares it with other (more traditional) renovation strategies.

Duration: 3 half-days

Alternative course: Renovating with guaranteed building performance

Orientation phase



In the orientation phase, the most important preconditions are set, within which the renovation should take place. There is an emphasis on analysing the problem, the context and the possible ambitions, translating the residents' wishes into determining what results/performance must be achieved in terms of, for example, ease of use, energy, health, comfort and aesthetics.

In this phase, the Multi-Year Maintenance Plan plays a decisive role and should be sufficiently realistic with a view to the future of the association and the financing of maintenance. The existing technical situation of the building is surveyed and the initial file is compiled.

Based on an initial overview of the residents' wishes and needs, an independent advisor makes an estimate of the possibilities for sustainability (scenario sketches). Here the focus is on creating feasible variants within the previously set preconditions. Special focus here is to incorporate relevant contextual factors to avoid sub-optimal processes, decisions with unexpected side-effects and overly limiting the solution space which may turn out restrictive in later phases.

Stakeholders involved in this phase, include:

- General members of HOA's, of resident sustainability committee, of Association's Board;
- Social process supervisor;
- Municipality;
- Condominium manager;
- Building cost specialist;
- Acquirer of IHRS/renovation projects (e.g. expert feasibility analyst of WNR);
- Building physics energy expert;
- Building survey specialist.

6.3 Courses supporting the orientation phase

6.3.1 Survey and evaluation of residents' needs

Target group: Communication specialist, resident expert, architect, technical process supervisor (quality manager)

Objective: To enable resident specialists to conduct an effective survey in apartment buildings. Using practical examples and sample resident surveys, participants will learn how to translate the information collected into resident requirements. This also highlights the importance of uncovering the question behind the requests. Based on the customer requirements, participants learn to define the objectives of the entire project. These will guide all project decisions and quality control of all steps during the project. It is therefore important to set up a balanced set of functional requirements and performance indicators.

Duration: 2 half-days

Alternative course: Renovating with guaranteed building performance

6.3.2 Ambition setting with the DCBA method and morphological design

Target group: Architect, construction team

Objective: To enable design teams to make structured decisions. They learn to carry out a variance study in which the possible points of interest and interventions are shown in a single overview. Based on this overview, the right connections can be made between intervention choices and implications of these choices. This promotes logical decision making for the renovation scenarios.

Duration: 3 half-days (Forming an opinion, forming a judgement, making a decision)

Alternative course: Renovating with guaranteed building performance supplemented by coaching on the job.

6.3.3 TCO estimation and feasibility study in highly energy-efficient renovation

Target group: Construction cost specialist, technical process supervisor

Objective: Cost experts gain insight into methods to determine the net present value of energy savings and learn to include the result in a feasibility study or in a comparison of variants. They also become familiar with integral project budgeting approaches. They learn to perform a TCO analysis and to communicate the results transparently.

Using an example project, they learn about living cost-effective renovation measures and gain insight into a design method that is aimed at low total costs of ownership.

Duration: 4 half-day sessions

Alternative course: Renovating with guaranteed building performance

Alternative for the Dutch speaking part of Belgium: Initiation to use the DUBO Limburg tool for HOA renovation, TCO tool of University College Ghent

6.3.4 The basics of affordable highly energy-efficient renovation

Target group: all stakeholders involved in design decisions.

Objective: This course is an introduction to the scientific method for cost-efficiently achieving the highest levels of comfort and healthy indoor climate: passive building.

The course zooms in on cost-effective design principles and the building physics challenges in (high-performance) energy renovation. Also covered is the PHPP - the software for realistic prediction of energy needs and for comparing scenarios. This tool is a tried and tested tool for renovating with guaranteed energy performance. The course also covers the quality assurance and passive house certification system for projects and suitable building components and semi-finished products.

Duration: 2 half-days

Alternative course: Renovating with guaranteed building performance

Specifically for energy advisors and building physics experts:

- Passive House Designer Course, e.g. Passive House Design & Construction;
- Passive House Trades Person course, e.g. Cursus Energieneutraal bouwen en renoveren and course on Energy Balance with PHPP/DesignPH, e.g. Cursus Rekenen met de nZEB-tool.
- Course Energy Balance with DesignPH; e.g. Cursus Energiebalans met DesignPH.

6.3.5 Structural inspection in accordance with NEN 2767

Target group: Building survey specialist

Objective: To enable building inspectors to carry out a full condition measurement in accordance with NEN 2767

Duration: *(not clear to the author at the time of writing)*

Alternative for the Dutch speaking part of Belgium:

- Training and exams at Vlisog.be (“Vlaams Initiatief Systematisch Onderhoud van Gebouwen” - Flemish initiative for the systemic maintenance of buildings)
- Practical training condition assessments for existing buildings (Praktijk conditiemeting van gebouwen volgens NEN 2767 - de technische installaties) (Buildwise)

6.3.6 Value creation and communication with occupants

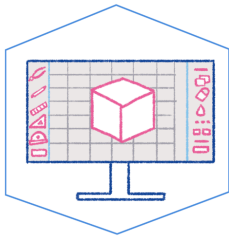
Target group: Architect, energy advisor, resident specialist, technical process supervisor and other building professionals

Objective: Effective communication in an integral complex and ambitious design and construction process with HOA-residents. In this course, participants will learn how to organise and facilitate effective communication during the various phases of an integral building/renovation project. Along the way, participants will learn about and apply adequate forms of communication and consultation. With these skills, professionals can become that one indispensable link in a smooth cooperation process with design and construction parties on the one hand and (HOA) residents on the other.

Duration: 1-2 days

Alternative for the Dutch speaking part of Belgium: Basisopleiding voor eerstelijnsrenovatieadviseurs (BE-REEL!)

Deepening phase



In the deepening phase, experts elaborate on the preferred scenario in full detail. To do this, they first determine the functional requirements. From this, they derive the technical specifications, which they then calculate for the design at hand and adjust until the functional requirements are met. They also initiate the necessary permit and financing applications. When calculating the resulting monthly costs, the experts take into account the available resources, the form of financing and subsidies and determine the optimal approach (based on

the resulting housing costs and client wishes). Decisions on this will look ahead to the entire project cycle through operation and maintenance and even the demolition phase.

The choice of form of tendering and contracting is also prepared with an emphasis on an integral project approach. On the basis of the functional design brief, a V&V plan is drawn up that will ensure that the ambitions are maintained throughout all project phases.

Stakeholders involved in this phase, include:

- General members of HOAs, of resident sustainability committee, of Association's Board;
- Social process supervisor;
- Technical process supervisor;
- HOA (Homeowners Association) manager;
- Architect/construction engineer;
- Building physics experts on energy/acoustic/fire issue;
- Financial advisor;
- Building cost specialist;
- Asbestos specialist;
- Ecologist;
- Structural engineer;
- Installation advisor;
- Legal expert;
- Quality coordinator.

6.4 Courses supporting the deepening phase

6.4.1 Quality assurance in renovations with building performance guarantee

Target group: Architect, building physics energy expert, technical process supervisor, commissioning specialist, installation advisor, quality coordinator, management and team leader of IHRS

Objective: Basis of quality and risk management in highly energy efficient projects. Achieving the next level in project organisation and quality management. This course provides valuable guidance on how to keep a grip on ambitions, costs and quality from project inception to completion.

Participants learn to define customer requirements specifications based on customer wishes. These will guide all project decisions and quality control during all steps of the project. It is therefore important to set up a balanced set of functional requirements and performance indicators. On that basis a V&V plan can be drafted. This is a quality management plan for crucial control moments throughout the project, i.e. not only after the design and implementation processes, but also during commissioning and monitoring after commissioning. Useful methods to properly embed this quality assurance procedure in the collaboration process will be shared. Proper contract formulation is essential here. Practical quality assurance systems such as passive house certification are also covered and the role of external quality control will become clear.

In addition the course will go into the administrative organisation that needs to be set up and how to manage the system adequately.

Furthermore, this course enables participants to draw up a risk profile for a project and to create a risk action plan based on this profile.

Duration: 6 half-day sessions

6.4.2 Passive house design & construction

Target group: Architects, energy advisors, installation advisors, quality assurance officers, project leaders

Objective: The Passive House Design and Construction course gives designers and decision-makers in the building and installation sector the necessary baggage to create high-quality energetic renovation designs and to ensure quality in implementation.

The course provides the scientific basis of passive house design principles. In addition to the deepening theoretical basis of a correct design in terms of building physics, participants learn about the practical implementation of the passive house principles.

Duration: 10 days plus 3 days homework and exam

See also: Passive House Design & Construction

6.4.3 Calculating with the PHPP software package

Target group: Architects, building physics energy experts, technical process supervisors, commissioning specialists, installation advisors, quality coordinators

Objective: Get a grip on the energy performance of your designs, be able to give informed advice on energy measures. PHPP is a globally valued tool for calculating the energy balance of building and renovation projects.

The course provides training in the application of PHPP. Also, it will cover sources for useful information in this regard. With some practice, participants will thus succeed in calculating complex buildings properly.

Duration: 4 half-day sessions

See also: Cursus Rekenen met de nZEB-tool.

6.4.4 Energy balance with DesignPH

Target group: Architects, building physics energy experts

Objective: To learn to perform fast and reliable energy analysis of designs. DesignPH is a graphical interface for easy and reliable input of data about buildings into PHPP software. Using DesignPH, a building can be entered as an energetic 3D model in Sketchup. Subsequently, you can import this model into PHPP. DesignPH will offer an impression of the building's energy performance even during import into Sketchup. This facilitates optimising the energy balance of a design at an early stage. The course Energy Balance with DesignPH provides an easy introduction to working with this tool.

Duration: 1 day

See also: Cursus Energiebalans met DesignPH

6.4.5 Course on Chain cooperation and continuous improvement

Target group: Architect, technical process supervisor, installation advisor

Objective: Participants learn how to optimise the value chain and processes within and outside an organisation. This can be reached by efficient integral chain cooperation, by setting up and optimising Value Streams (within the organisation) and Extended Value Streams (in the chain). This can be applied to the areas of costs, quality, energy performance, resident comfort, indoor climate, sustainability and job satisfaction. Participants gain insight into the methodology of 'Value Stream Mapping'. They learn to apply it to the

work processes related to energy saving renovation projects. Participants also learn about the crucial communication moments and their place within the renovation process. Tips for setting up a clear communication structure within the renovation process are part of this course.

Duration: 2 half-day sessions

See also: Ketensamenwerking renovatie

6.4.6 Deepening course Energy-efficient balanced ventilation design

Target group: Installation advisors, installers, energy advisors

Objective: In this course, participants learn about the cascade ventilation methodology. This is a proven and scientifically developed method of balanced ventilation and forms the basis for a simple energy-efficient ventilation concept with high air quality in all seasons. With it, professionals achieve high indoor air quality in the living areas; reduce the risk of dry air and limit energy losses due to unnecessary air changes. Participants learn how to properly design a balanced ventilation system to suit future use.

Duration: 1 half-day session

6.5 Transaction phase

At this stage, the renovation provider enters the scene. Together with the design/build team, they develop the technical specifications into a final execution design with a corresponding financing plan. Supported by the design team, the renovation provider ensures a technically and financially feasible plan that meets the expectations of the HOA.

Stakeholders involved in this phase, include:

- General members of HOAs, of resident sustainability committee, of Association's Board;
- Renovation provider (director, project manager, technical draftsman, work planner, calculator, communications officer);
- Social process supervisor;
- Technical process supervisor;
- Management of IHRS;
- Architect/construction engineer;
- Building physics experts on energy/acoustic/fire issue;
- Financial advisor;
- Building cost specialist;
- Structural engineer;
- Installation expert;
- Quality coordinator;
- Asbestos specialist;
- Maintenance specialist;
- Commissioning specialist;
- Monitoring specialist.

6.6 Courses supporting the transaction phase

6.6.1 Quality assurance in renovations with building performance guarantee

See: 6.4.1

6.6.2 Passive House Trades person course

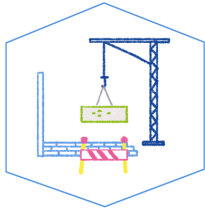
Target group: employees renovation provider, installation advisor, installer, maintenance specialist, commissioning specialist, monitoring specialist, building cost specialist, structural engineer

Objective: Making executing parties aware of the interdependence of energy-related aspects in buildings. Understanding interdisciplinary dependencies, especially in execution. Learning the importance of high-quality construction execution. Recognise risks in implementation and become familiar with solutions. Topics include:

- Building physics in highly insulated buildings;
- Airtight construction;
- Thermal insulation;
- Construction without thermal bridges;
- Energy-producing frames, windows, doors;
- Balanced ventilation in new construction and renovation;
- Heat generation and distribution in a highly energy-efficient building;
- Energy generation and sustainable energy supply.

Duration: 4 days

6.7 Construction phase



In the construction phase, it is important to organise good communication and cooperation between the executing parties involved, set up and manage a good planning and organise good quality control. Resources such as people, machines and materials need to be organised as effectively and efficiently as possible to avoid quality problems and/or failure costs. This requires team building, smart planning, good communication (tools) and sharp quality control at critical

aspects and moments. No matter how good a renovation design is, if it is not realised as intended, this can have drastic consequences for the final performance and costs in the aftercare phase.

Stakeholders involved in this phase, include:

- General members of HOAs, of resident sustainability committee, of Association's Board;
- Renovation provider (director, project manager, technical draftsman, work planner, calculator, communications officer, staff member assembly team);
- Social process supervisor;
- Management of IHRS;
- Building physics experts on energy/acoustic/fire issue;
- Structural engineer;
- Installation expert, staff member assembly team;
- Quality coordinator;
- Commissioning specialist;
- Monitoring specialist.

6.8 Courses supporting the construction phase

6.8.1 Course on Communication in the construction process

Target group: Employees renovation provider, implementation process supervisor

Objective: In this course, participants will learn how to organise effective communication during the construction/renovation project. This training will address the set-up of a formal communication structure for an integral renovation project, covering both internal, and external communication. Participants will also learn whom best to involve in which communication/consultation form and how to structure it. In addition, participants work on increasing the effectiveness of their personal communication skills. For instance, participants learn to critically reflect, evaluate and communicate at a meta-level.

Duration: 4 days

See also: Cursus Communicatie in het bouwproces.

6.8.2 Quality assurance in renovations with building performance guarantee

See: 6.4.1

6.8.3 Passive House Trades person course

See: 6.6.2

6.9 After-care phase



Assuming a successful construction phase, costs and performance in this phase are still influenced mainly by the way the building is used, including user behaviour, and the monitoring and optimisation of the various building elements (such as installations) so that the intended performance is achieved. In this phase, project evaluation takes place and the integration of lessons learned for the purpose of process optimisation of the IHRS organisation.

Stakeholders involved in this phase, include:

- General members of HOAs, of resident sustainability committee, of Association's Board;
- Renovation provider (director, project manager, technical draftsman, work planner, calculator, communications officer, staff member assembly team);
- Social process supervisor;
- Technical process supervisor;
- Management of IHRS;
- Building physics experts on energy/acoustic/fire issue;
- Building cost specialist;
- Structural engineer;
- Architect/construction engineer;
- Installation expert, staff member assembly team;
- Quality coordinator;
- Commissioning specialist;
- Monitoring specialist;
- Maintenance specialist.

6.10 Courses supporting the aftercare phase

6.10.1 Course on Chain cooperation and continuous improvement

See:6.10.1

6.10.2 Quality assurance in renovations with building performance guarantee

See: 6.4.1

7 CONCLUSION

According to this survey, no trainings need to be developed from scratch. Several courses need enhancement, further elaboration and a broader roll-out for regional accessibility:

- MAIN Course: Renovating with guaranteed building performance
- The importance of good management in a Homeowners Association
- Dealing with complex decisions
- How to future-proof HOA apartment complexes
- Acquisition interviews for cost-controlled renovation of Homeowners Association properties
- TCO estimation and feasibility study in highly energy-efficient renovation
- Structural inspection in accordance with NEN 2767
- Value creation and communication with occupants
- Quality assurance in renovations with building performance guarantee
- Course on Chain cooperation and continuous improvement
- Course on Communication in the construction process

Aim is to established and provide these enhanced courses within the Condoreno-programme.

Appendix 1: Overview of the IHRS- roadmap



Task

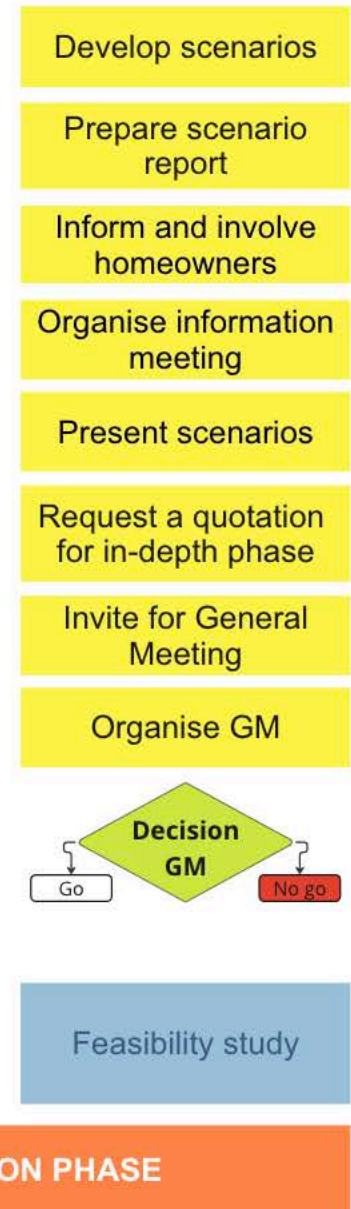
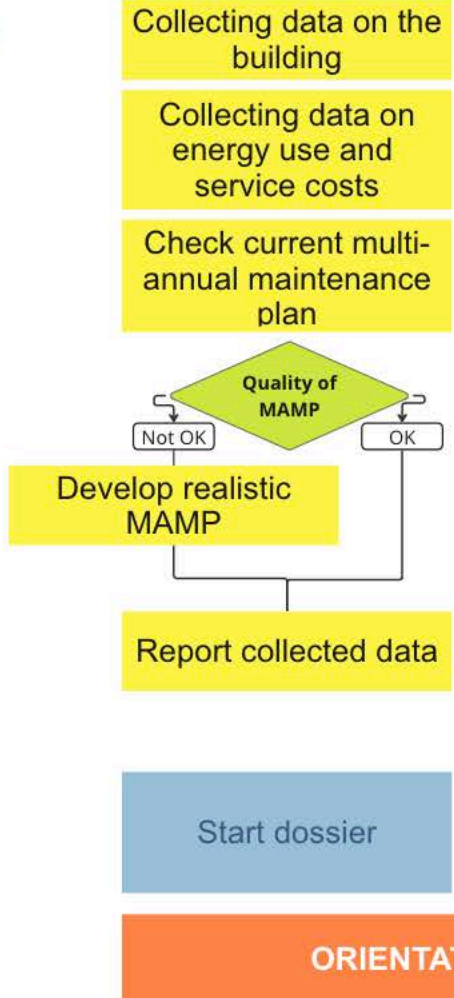
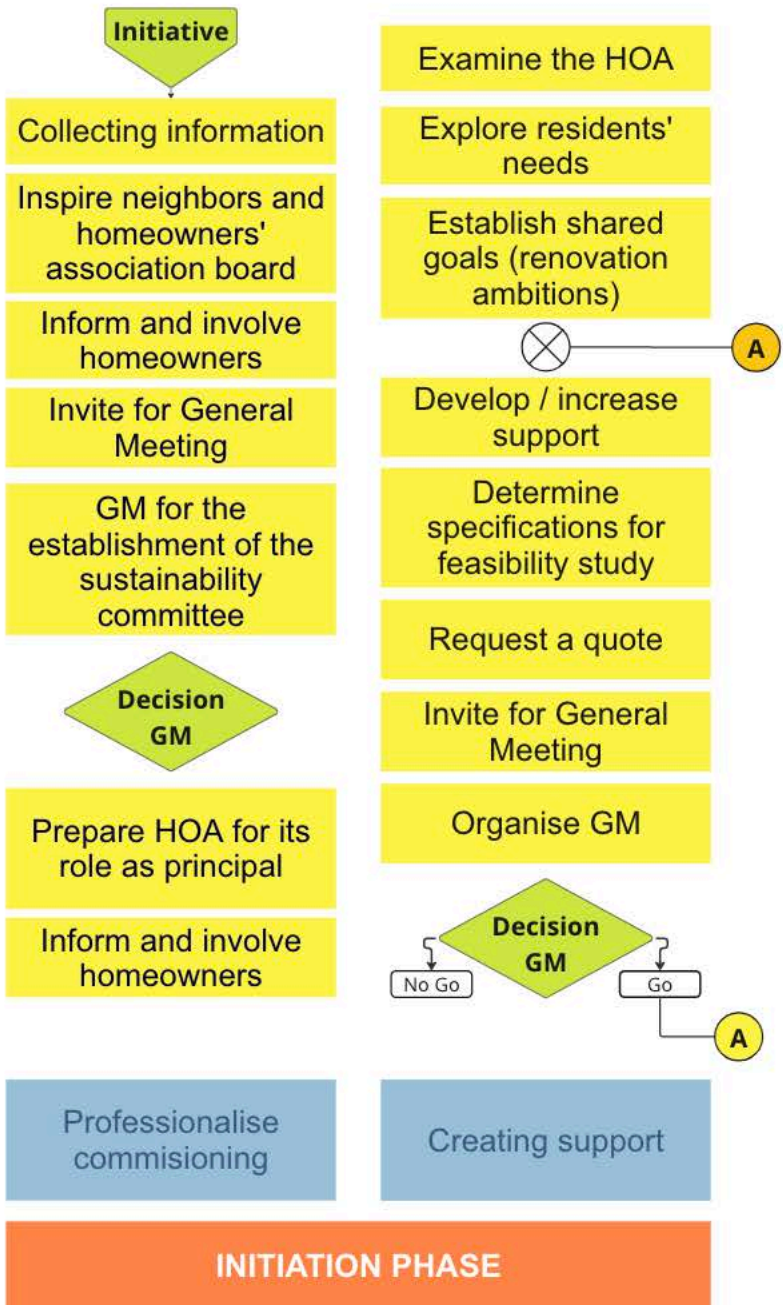
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Process step

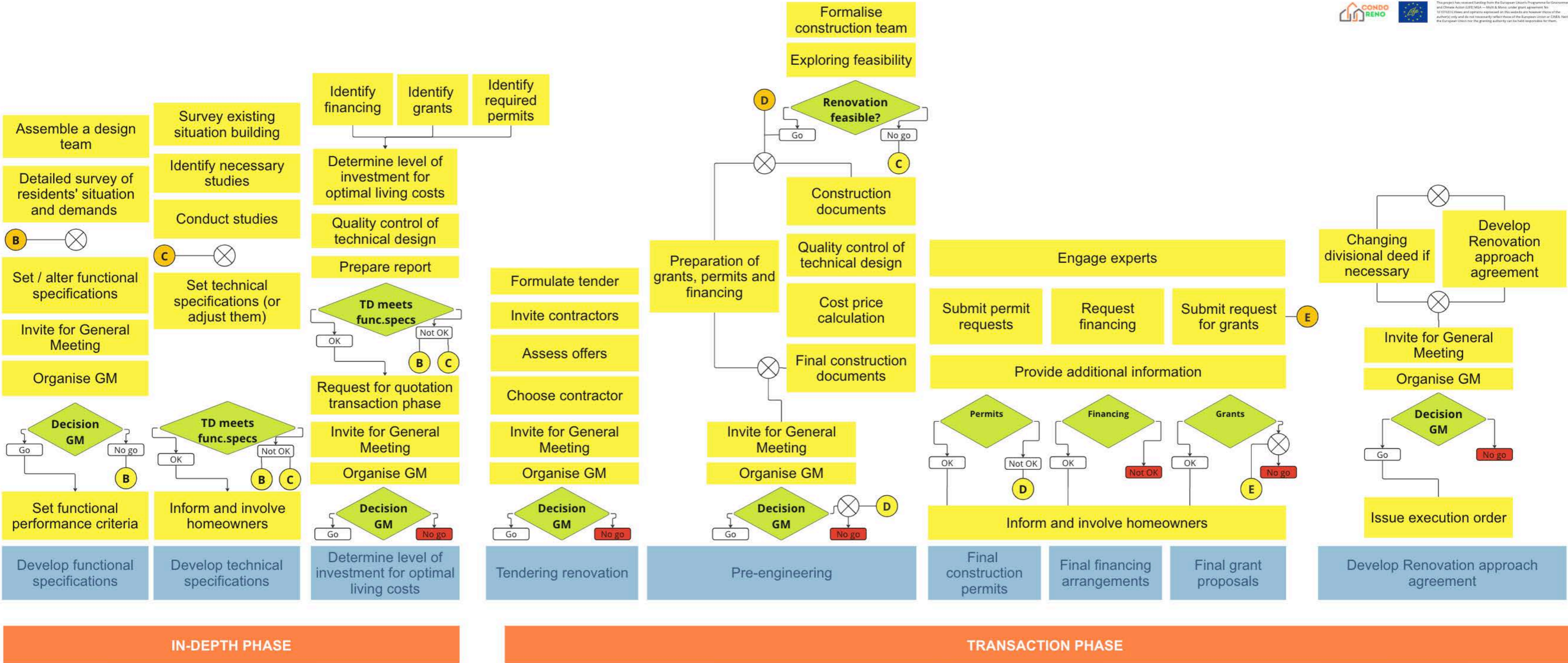
PHASE



Awareness
example projects
Information HOAs
Inspiration HOAs
District approach
(SMPs)



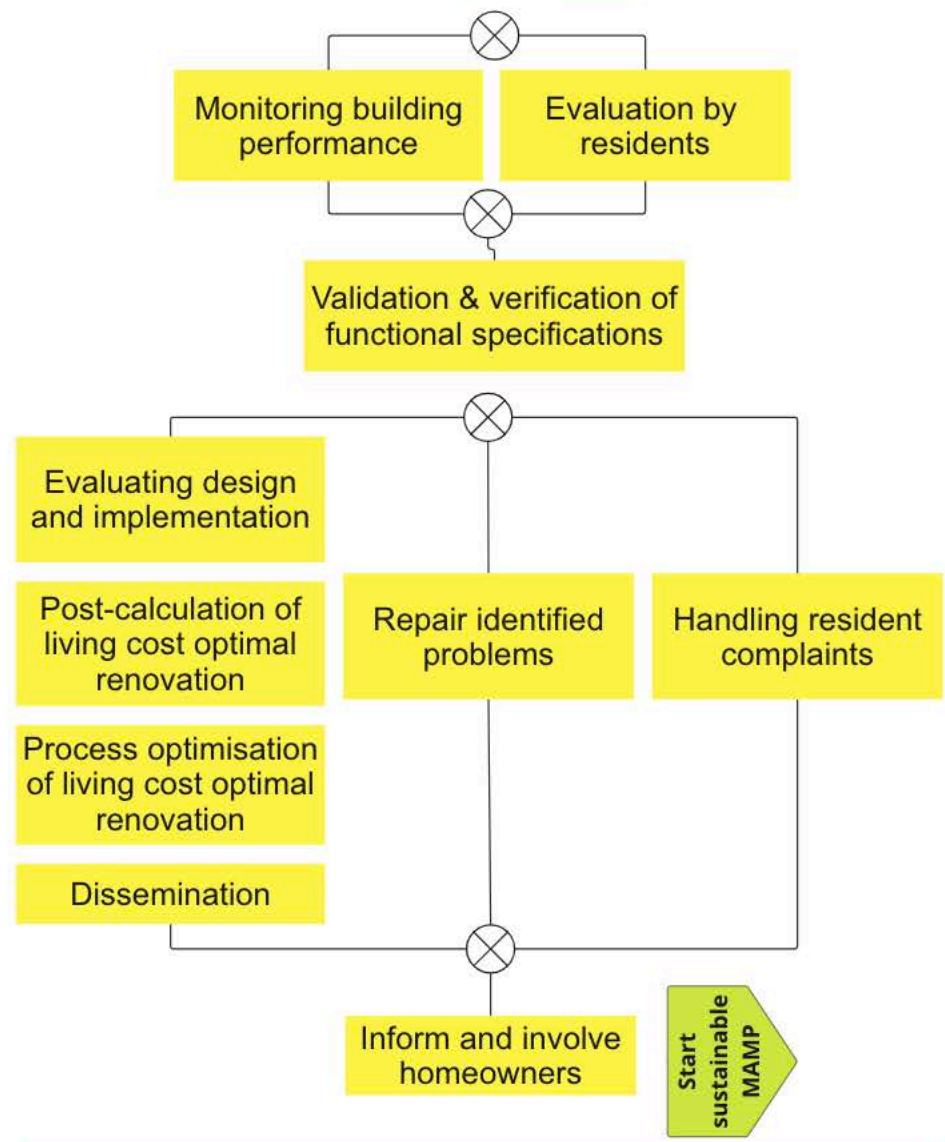
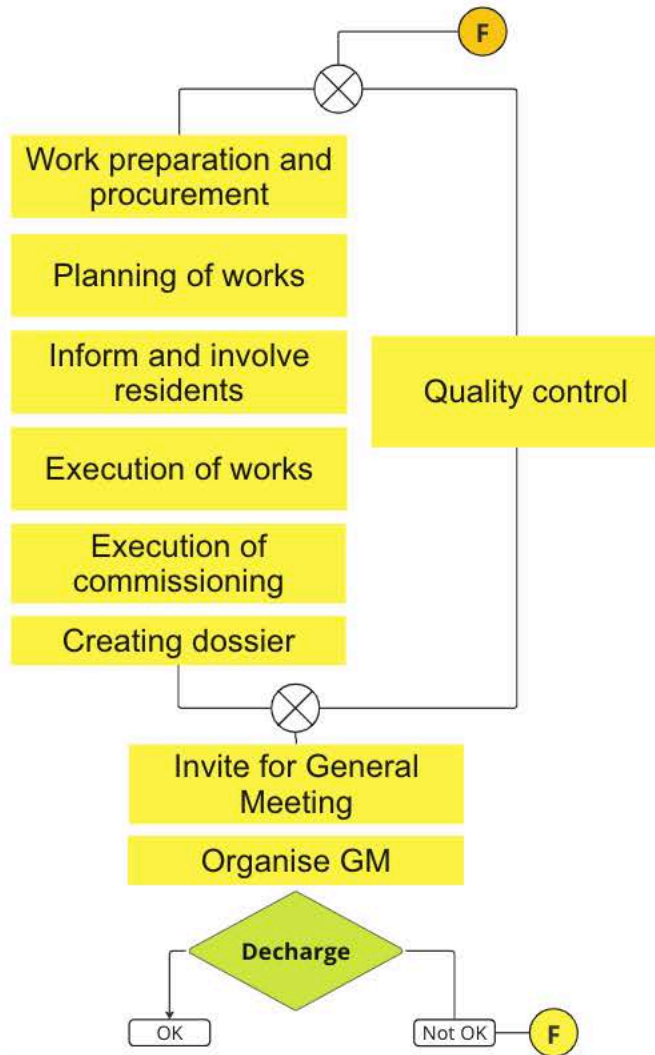
PREPARATION



IN-DEPTH PHASE

TRANSACTION PHASE

DESIGN

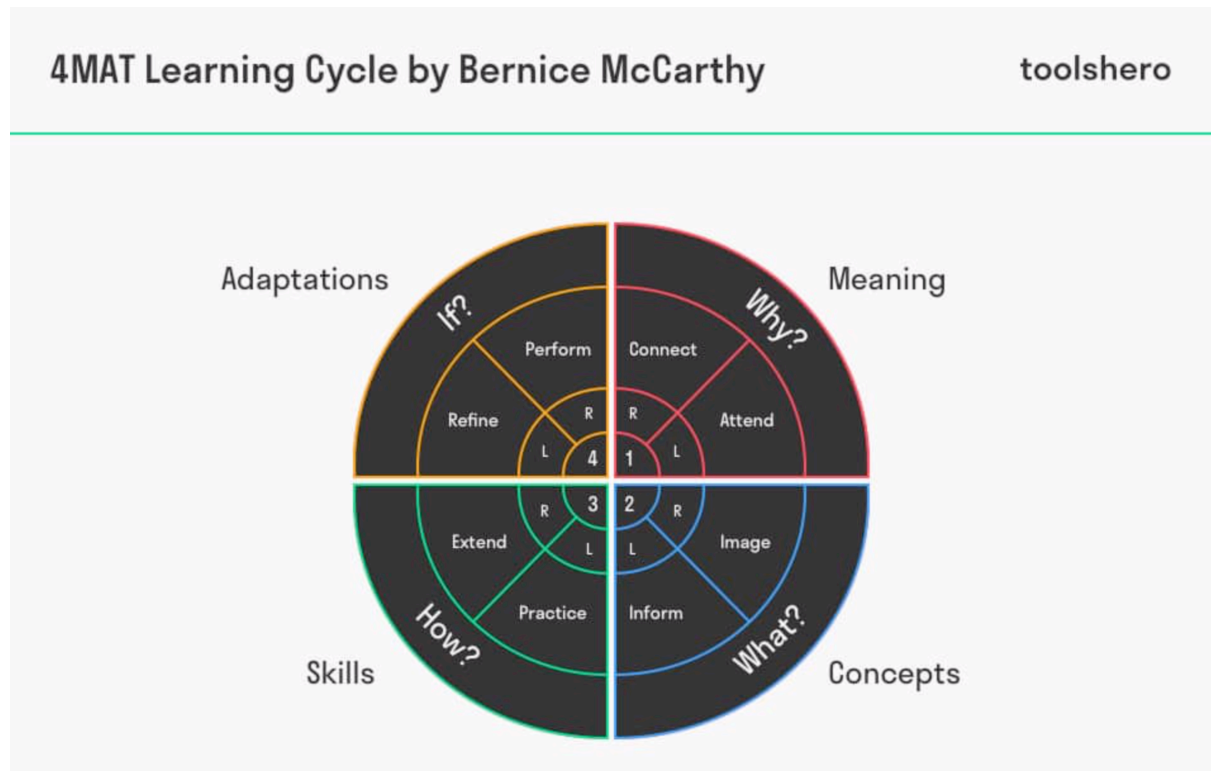


Appendix 2: Description of the roles

Role	Description
Municipality	Local policy officer, involved in policy implementation with mandate of feedback to policymakers
HOA members/residents	Apartment owners with apartment rights including voting rights at the general meeting. This group is meant to include representation of tenants.
Sustainability Commission	HOA committee consisting of intrinsically motivated residents involved in the renovation
Social process supervisor	A social process supervisor supports the activities of the sustainability committee on behalf of the HOA. He directs the process and his role as an outsider allows him to ensure a safe atmosphere during residents' meetings. He provides support to the HOA during all phases, is attentive to the social aspects during the decision-making process by the HOA members and can mediate and advise in communication if necessary. He monitors the completion of the correct steps in the process of a HOA from initiative to after completion of the renovation.
HOA board	Elected board of HOA-members
Homeowners Association manager	HOA manager, in charge of administrative and organizational tasks.
IHRS-ambassador	An advisor who knows, supports and shares the mission of the IHRS. IHRS ambassadors can have a significant impact on the resident initiative by getting HOA members/residents and related parties interested in an IHRS renovation.
IHRS-acquirer	The IHRS acquirer explains the IHRS model to potential clients and performs the initial test of whether a project qualifies for an IHRS integrated approach (often as part of the scenario sketch). This role suits consultants to HOA renovations who subscribe to the IHRS mission and methodology and integrate it into their working method.
Technical process supervisor	The technical process supervisor is the spider in the web the deepening phase and the transaction phase. During these phases, the process supervisor is responsible for all support activities to make the process run smoothly during the designing process. He supervises the design process and ensures that the steps are taken as scheduled (in sequence and predictable) so that the process is completed on time and within budget. The technical process supervisor represents the IHRS/ design team to the client and other stakeholders, prepares presentations regarding the technical decision making process of the client. He is responsible for the implementation of quality assurance and functions as a point of contact for all parties involved in these phases. He also handles internal project evaluation.
Quality coordinator	The quality coordinator is involved in quality assurance during design and execution of IHRS renovations and has the task of supervising and controlling process and the quality of engineering and implementation. The quality coordinator delegates quality-related issues to suitably qualified experts. He also facilitates the technical and process-related trainings for the integral renovations.
Financial advisor	Expert in finance, developing financing schemes.
Building cost specialist	Expert who monitors construction costs in the different phases (orientation phase to transaction phase and aftercare phase).
Ecologist	Advisor flora and fauna surveys

Role	Description
Asbestos specialist	Consultant asbestos survey and removal plan
Maintenance specialist	Maintenance optimization consultant
Resident Specialist	Resident Survey Advisor, an expert on resident communication and concerns and responsible for requesting information, including through surveys, and processing it. This consultant provides input on the specific residents' needs and thus lays the foundation for the functional requirements.
Legal expert	Legal expert, e.g. notary who can draft/amend subdivision deed.
Architect/construction engineer	Architect/construction engineer
Building survey specialist	Specialist for surveying the existing situation and present defects
Expert building physics on energy	Expert highly energy-efficient EnerPHit renovation, PHPP and heat flow calculations, correct construction detailing, knowledge of integral installation concepts.
Building physics expert on acoustics	Expert in the field of acoustic building physics
Fire prevention specialist	Expert in the field of fire safety in buildings
Structural engineer	Structural engineer
Installation advisor	Installation consultant with knowledge and experience of integral installation concepts, energy efficient ventilation, heating and comfort in highly energy efficient buildings.
Direction of renovation provider	Renovation provider/director
Technical draftsman	Technical draftsman
Project manager	Project manager
Work planner	Work planner
Construction Cost Estimator	Construction Cost Estimator
Construction worker	Construction worker for the assembly team (carpenter, mason)
Installer	Installer
Installer	Construction worker for the assembly team (installer)
Communications officer	Communications officer for the contractor. Supports the construction parties in planning and communication with residents and other stakeholders.
Implementation Process Supervisor	The implementation process supervisor represents the IHRS and represents/advocates the interests of the HOA's during the implementation of the renovation. His contributions take place in the construction phase and aftercare phase. Then he oversees supervision and support activities to ensure the process runs optimally. The process supervisor is the contact person for the IHRS to the client and to the other stakeholders, and in that context he organizes meetings and presentations. He supports the renovation provider in the implementation of quality assurance and is the point of contact for all parties involved in these phases.
Commissioning specialist	Specialist for adjusting installations after integral renovations.
Monitoring specialist	Monitoring specialist, responsible for setting up an appropriate monitoring system, carrying out measurements and evaluating and formatting measurement data. Also responsible for ensuring the privacy of residents.

Appendix 3: 4MAT- model of learning styles



Source: www.toolshero.com

4MAT is a method developed by Mc Carty for effective teaching based on Kolb's learning styles¹⁰.

Read the model clockwise, starting with (top right) 'connect'. R and L stand for right and left modes of the brain.

Each block (chunk) of knowledge/insight is composed of the following (main) steps:

- (1) Purpose ('little what'): Brief description of the chunk and what you want to achieve with it.
- (2) Why? (the imaginative learner): Create the connection with this part of the learning material (chunk) for the students by asking questions related to the chunk or naming situations in which this chunk can offer a solution. This way, learning is stimulated through personal meaning. Then from the experiences through discussion etc. to dialogue and reflection.
- (3) What? (the analytical learner): Create insight on what this (this chunk) contains. How does this work? How do you do this? (conceptualising, defining, shaping and acquiring knowledge). Factual and substantive treatment of this knowledge. Move learners from the concrete to the abstract. Subjective experiences are mixed with the abstraction theory is going to be covered. This lets the trainees form an image about the subject matter, which ensures that they reinforce the focus.
- (4) How (common sense learner) How to proceed? Collect data, hypothesise, tinker, experiment and take decisions. Participants actively engage with the knowledge gained by using worksheets, conducting experiments and using related technology in their own situation (practice). Learners can add something of their own to the learning material here (extension of knowledge).
- (5) What if? (dynamic learner): Providing an outlook. What can I do with it? What do you see when you have properly applied the knowledge you have learned? Analysis of what the

¹⁰ <https://www.toolshero.com/personal-development/4mat-learning-cycle-model/>

trainees have planned as an extension of what they have learned; a refinement from what they have learned for their own situation. Implementation by trainees of practical assignments. This step is all about identifying constraints, summarising, evaluating and executing.

Scripts

All chunks are scripted. That is a concise written-out text according to the 4Mat. The script contains per chunk the spoken text (concise), flipchart notes, games, videos, practical exercises, etc. The purpose of this is:

- Methodical set-up of the course: logical, structured and congruent;
- Qualitative set-up of the course: didactically successful (achieve goal);
- Possibility of constantly improving the script (better every day);
- Taking over a course evening by another trainer is a lot easier (no need to use your own material and texts...);
- Limiting hobbyism.

Materials required

Overview of the materials and equipment needed for the training: number of chairs, layout of the room, lighting, ventilation, heating, flipchart, audio, video, beamer, screen equipment, any prints for during the training, course folder, badges, food & beverage, etc. In short, everything for a successful training.

Trainers

Preference is given to two trainers per module. Depending on the required expertise but also complementary personalities for a better fit with the different trainees.

Testing uptake of the knowledge offered

Generally no exams, tests, proofs, etc. needs to be taken to demonstrate that the knowledge has been absorbed by the learners. The autonomy and responsibility for absorbing and mastering the knowledge lies entirely with the participants. If something is unclear or misunderstood, he/she can report it and it will be further explained (within or outside course time). The certificate issued at the end is a proof of participation; not proof of a recognised knowledge.

Good atmosphere

Students learn faster and better in a pleasant mood, atmosphere. First of all, a pleasant, working environment (light, heating, ventilation, no noise and disturbances) is an important starting point. In addition, ensuring a (socially) safe working atmosphere is a must. Also, humour is a welcome change for much-needed attention.

Of course, a well-kept and sufficient 'wet and dry' is an important fuel for the course.



Task

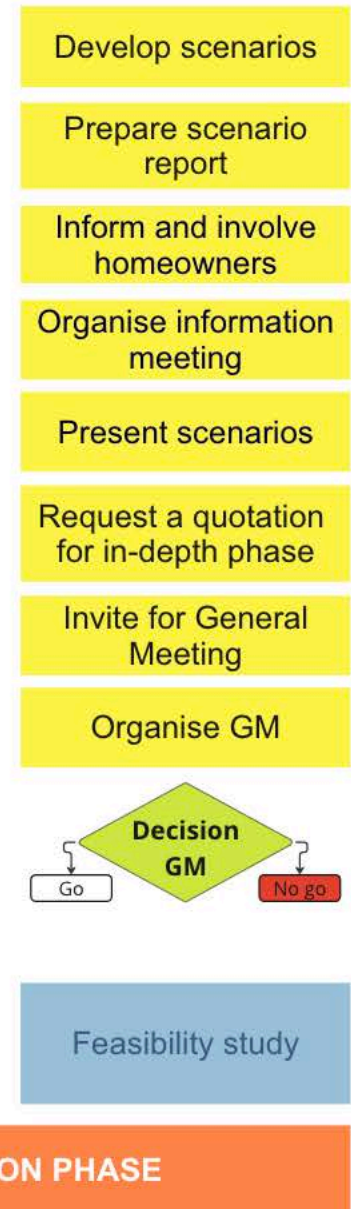
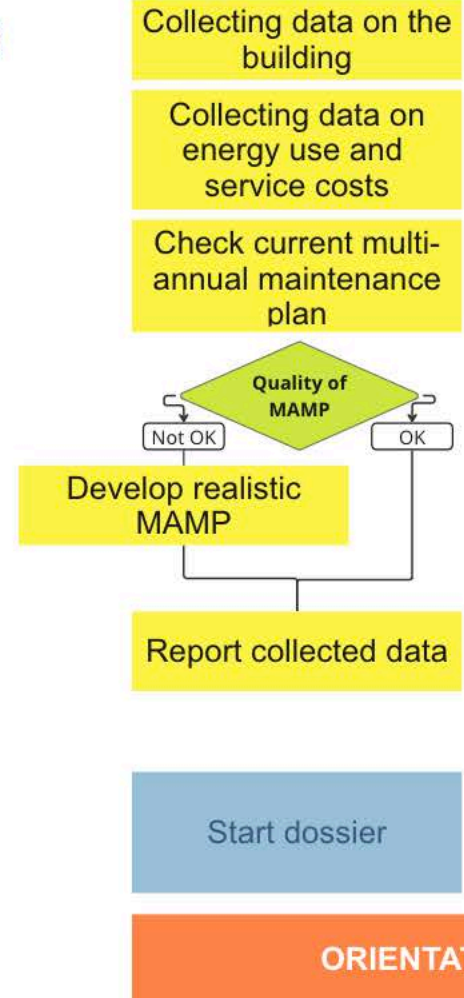
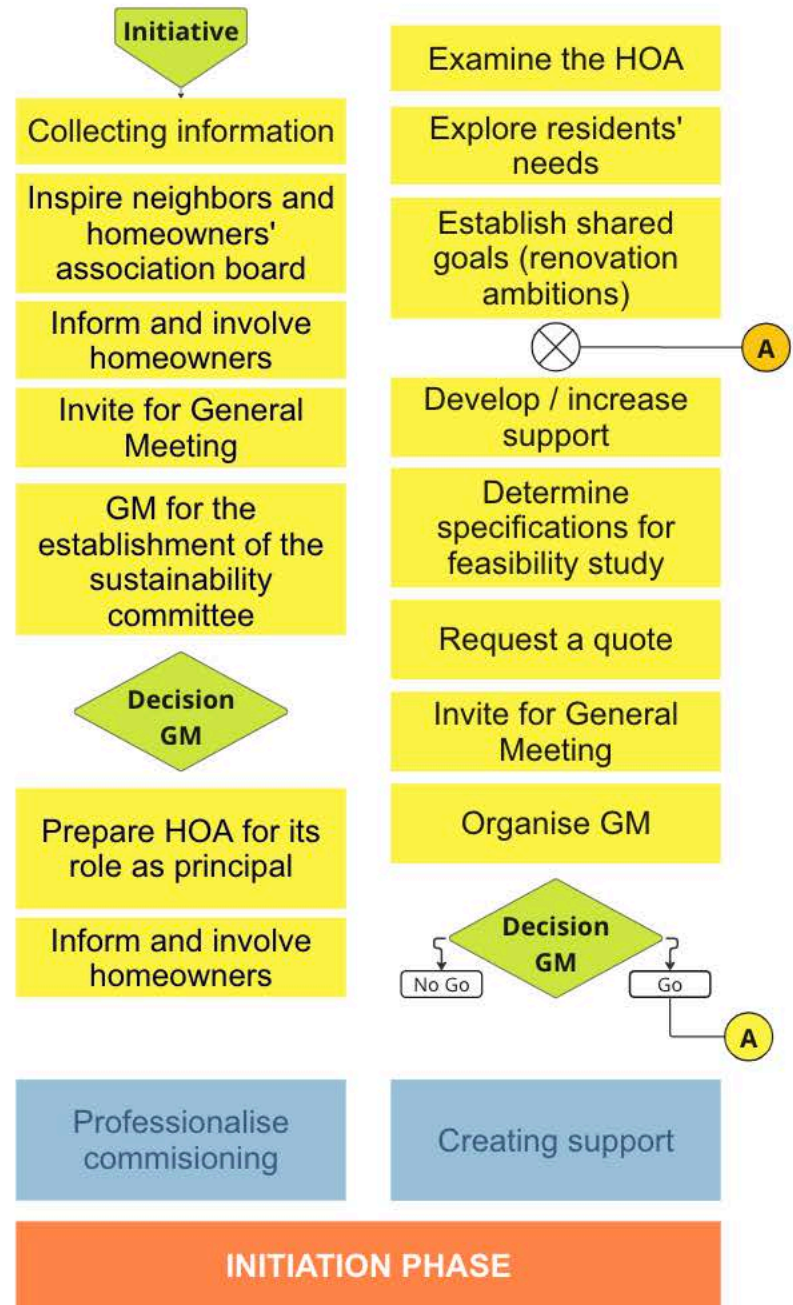
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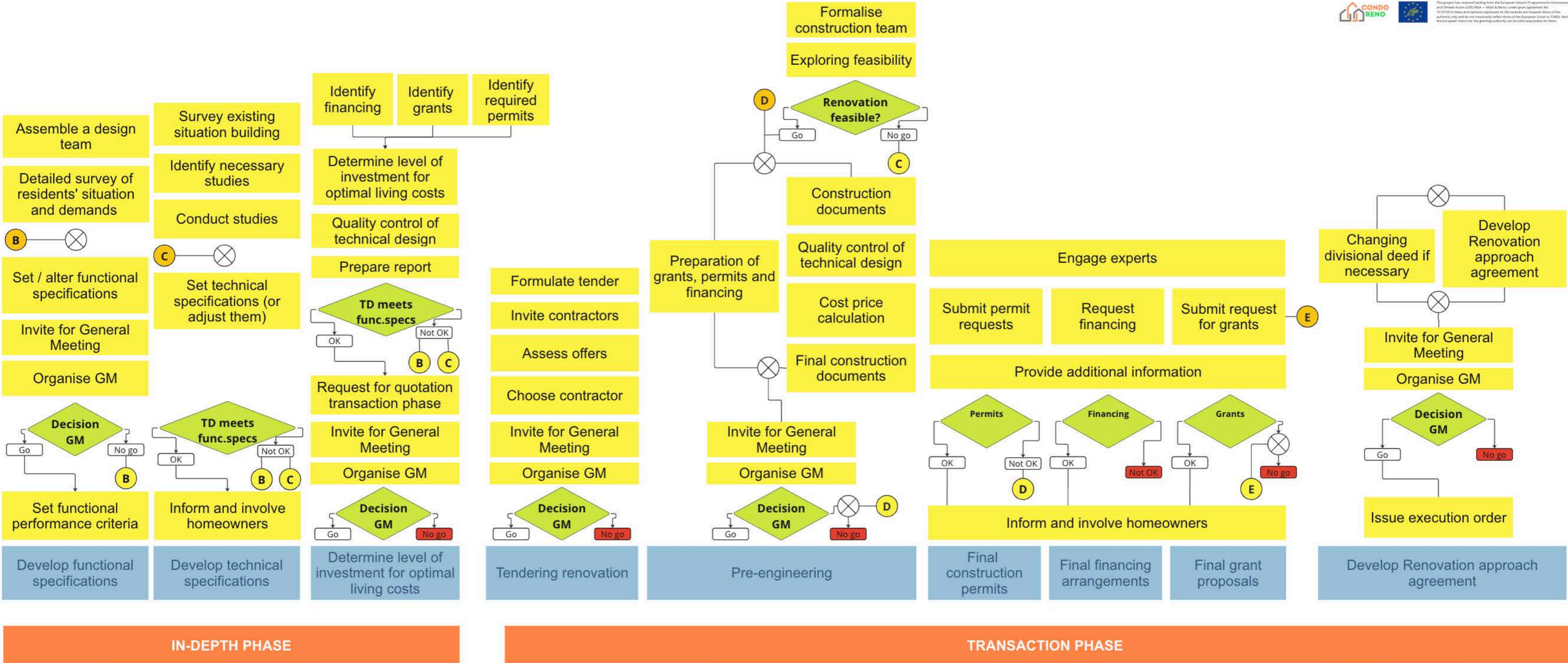
PHASE



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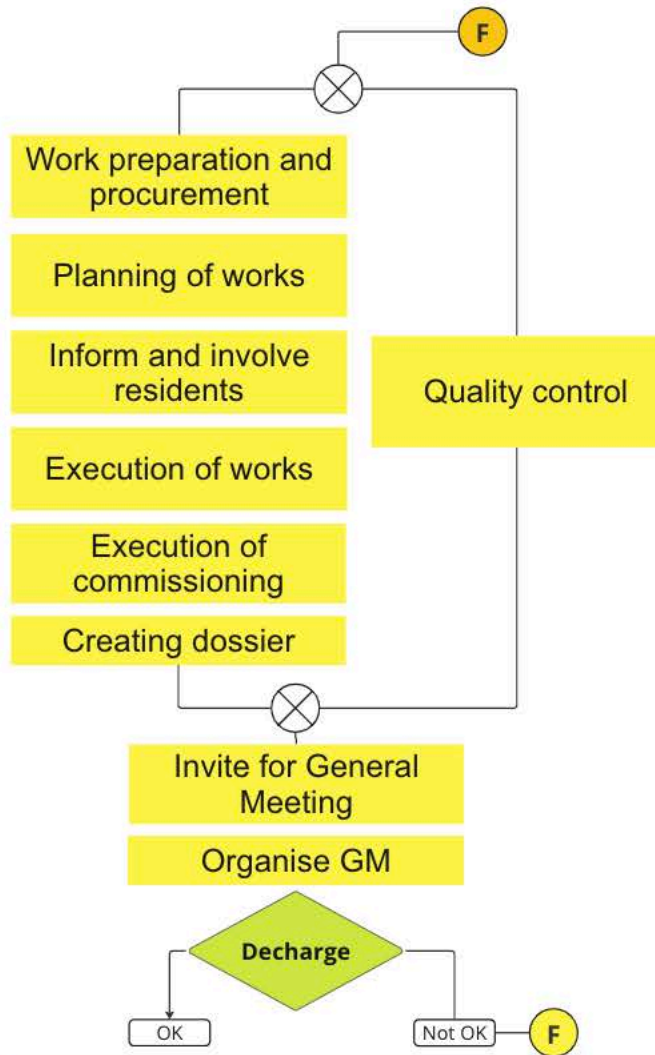
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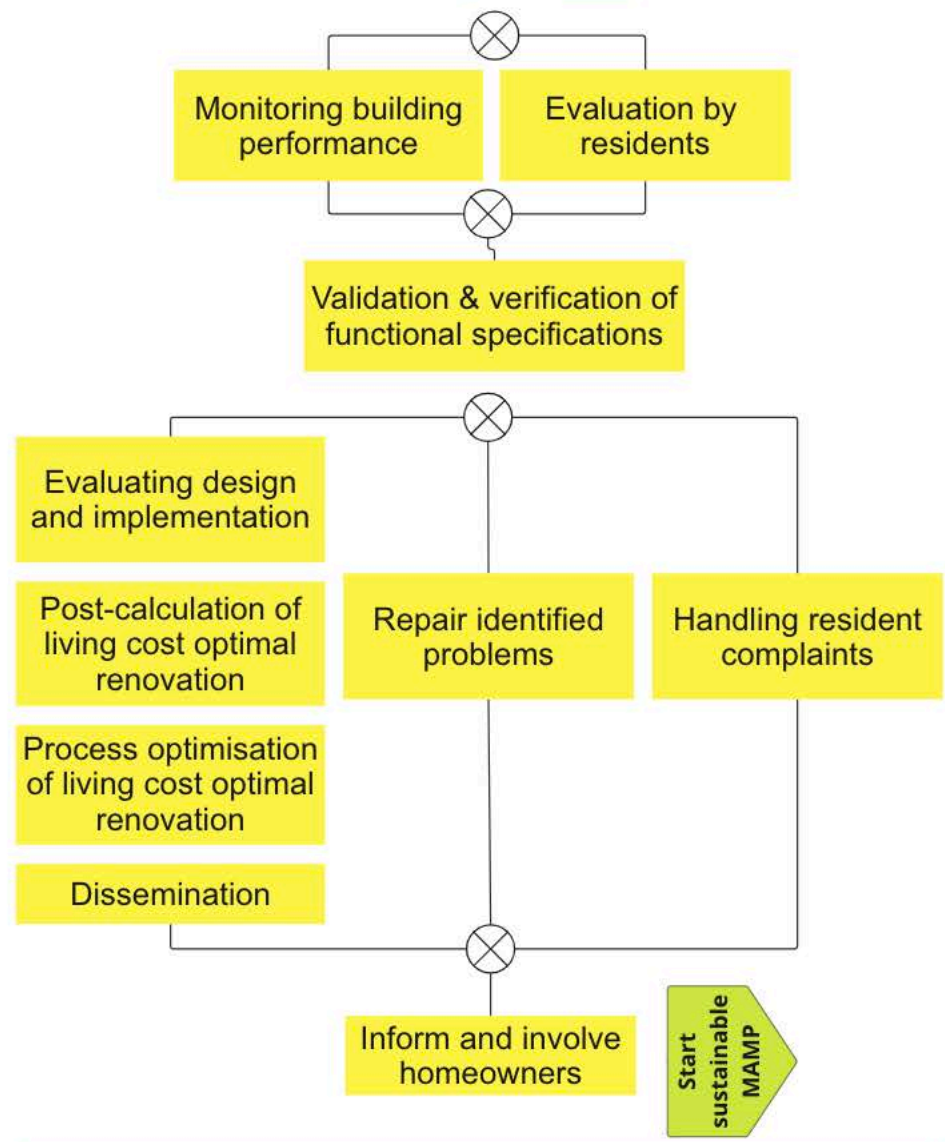
DESIGN



Executing renovation

CONSTRUCTION PHASE

IMPLEMENTATION



Aftercare

AFTERCARE PHASE

UTILISATION