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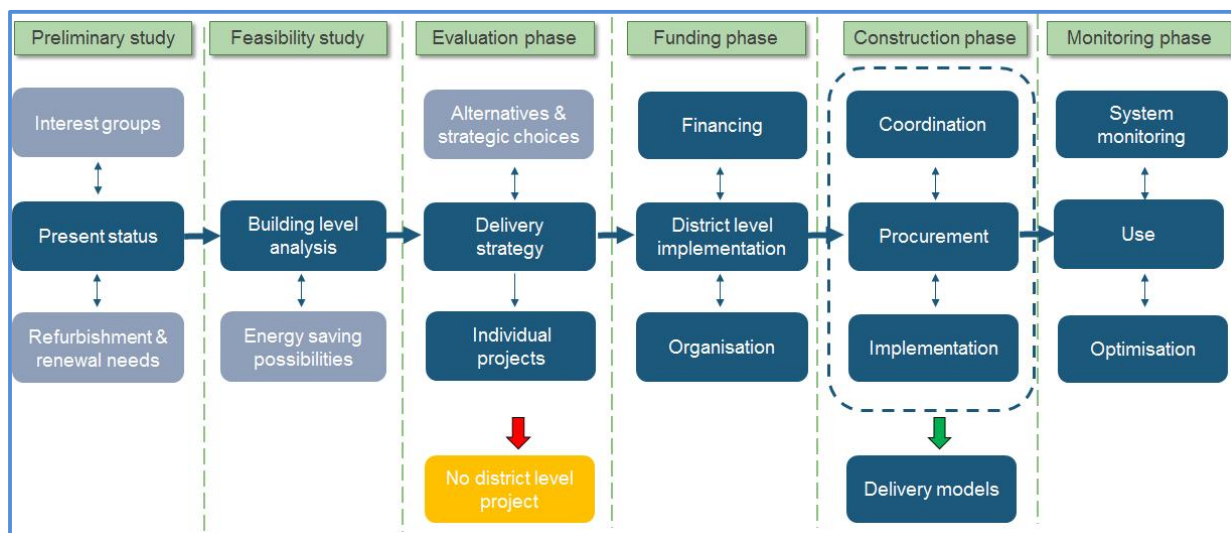
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D1.2 – New processes for refurbishment projects at district level



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MODER



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The partners in the project are:

- Sweco Finland Ltd. (Finland)
- VTT Technical Research Centre of Finland Ltd.(Finland)
- Fraunhofer Gesellschaft zur Forderung der Angewandten Forschung EV - Fraunhofer Institute for Building Physics IBP (Germany)
- Siemens AG (Germany)
- REM PRO SIA (Latvia)
- Stichting W/E Adviseurs Duurzaam Bouwen - W/E Consultants Sustainable Building (The Netherlands)
- Ertex Solartechnik GmbH (Austria)
- Gradbeni Institut, ZRMK DOO – GI ZRMK (Slovenia)
- FinnEnergia Oy (Finland).
- Lokalna Energetska Agencija Gorenške Javni Zavod - LEAG (Slovenia)

1 Introduction

1.1 Summary

The main objective of MODER is to integrate building refurbishment design and district or neighbourhood level energy system design with help of new tools, processes and business models supporting integrated practices. This encourages refurbishment processes which are scalable from a financial perspective during design and contracting. The aim is to find a technical and financial optimum for district level for nearly zero energy refurbishment at district level.

The key problem and barrier in a district level process is the number of clients and differences in targets of the different clients. The work package Definition of strategies for district level refurbishment considers different key factors that combine the interests of various stakeholders as a basis for preliminary process and delivery models. The models aim at including the extent of the various targets. As the targets among residents and other stakeholders differ from individual level to different modes of ownership, the motivation of clients in district level refurbishment project requires common targets for successful inclusion into a large project delivery.

The basic approach for refurbishment at district level is a five-step procedure resulting in the Monitoring phase (Fig. 1):

- Preliminary study: Present status of a district with refurbishment and renewal needs
- Feasibility study: Building level energy analysis (preparation of individual building refurbishment plans)
- Evaluation phase: Delivery strategy - district level or individual projects
- Funding phase: Securing required financing for the project
- Construction phase: Procurement for design and construction
- Monitoring phase: Commissioning and key performance indicators

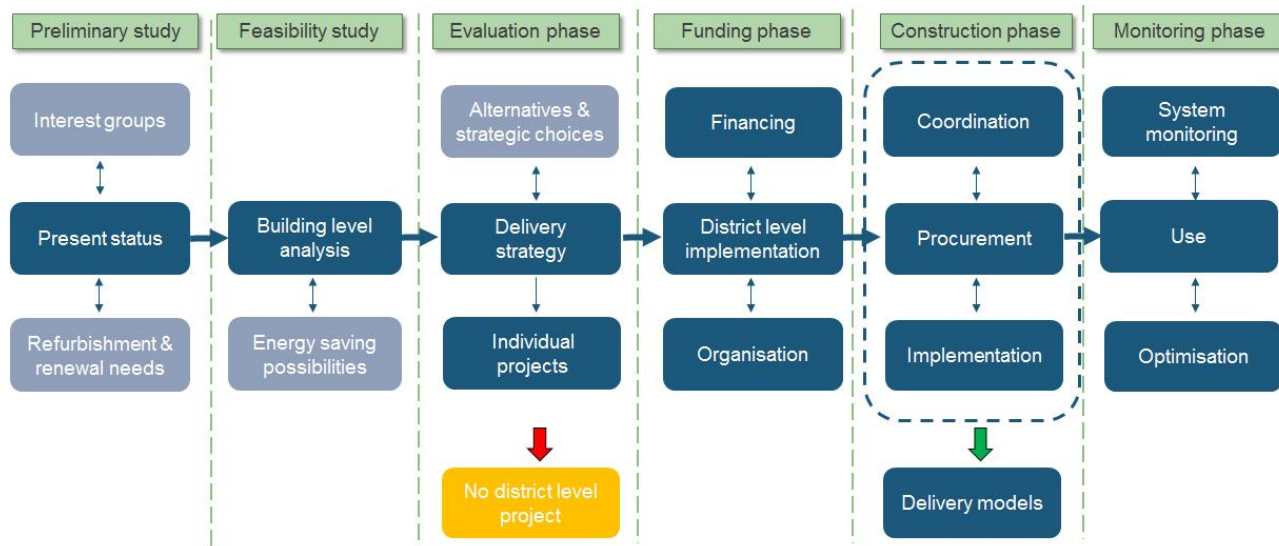


Fig. 1. Refurbishment at district level: Steps to project delivery stage

There is not just one delivery model that fits all district refurbishment cases. The project recognised four different process and delivery models taking into consideration individual needs and targets of building owners and users. The selection of a proper model depends on the case at hand and the common targets of the clients.

1.2 Purpose and target group

The purpose of the work was to identify necessary stakeholders to be involved and logics for motivation of stakeholders to collaborative efforts for district level refurbishment. The work package 1.2 defined preliminary strategies and scenarios for district level refurbishment and corresponding models for procurement, services and delivery processes. Two internal workshops were organised to collect viewpoints and summarise (9.2.2016 with participants from the Sweco team and 26.4.2016 with participants from Sweco, VTT and FinnEnergiä). Finally the draft was discussed together with the whole consortium.

1.3 Contribution of partners

The author of the deliverable 1.2 is Sweco.

1.4 Relation to other tasks/deliverables

The Deliverable 2.1 contributes directly to work packages 4 (Design methods) and 5 (Processes and business models).

1.5 Terminology and definitions

Alliance - Alliance contracting model

AMG - Alliance Management Group

D&B – Design & Build

DDU - District Development and Use plan

DECA - District Energy Concept Advisor

KPI - Key Performance Indicators

LCA - Life Cycle Assessment

LCC - Life Cycle Costs

NGO - Non-Governmental Organisation

PMG – Alliance Project Management Group

PPP - Public - Private - Partnership or Private - Private – Partnership

SPV - Special Purpose Vehicle

2 Strategies for district level refurbishment

The strategies for district level refurbishment are motivation of stakeholders for joining into a project, including a project *Activator* in the process to increase interest in the project at an early phase, and a district development and use plan to include common needs and expectations into working document for further development of the refurbishment process.

2.1 Motivation of stakeholders

The key problems and barriers in a district level process are poor involvement of the stakeholders, number of stakeholders and differences in their needs and expectations and therefore lack of common goals. A challenge is also to collect different key factors that combine the interests of various stakeholders. Process and delivery models for district level refurbishment aim at including the extent of the various interests. As the interests differ from individual level to different modes of ownership, the motivation of clients in a district level refurbishment project requires common issues for successful inclusion into a large project delivery.

The key groups included in a district level project at an early phase are:

- Local authorities, municipality, district council
- Private, commercial and public building owners
- Different businesses in the district
- Finance sector and investors
- District residents, other users, local interest groups, NGO's (non-governmental organisations)

Table 1 gives an example on the motivation topics of different groups assessed in two Moder workshops. Results from recent studies [IEA 51, Lahti et al. 2010] on district level development gave the initial list of topics.

Table 1. Motivation of stakeholders



MOTIVATION FOR DISTRICT LEVEL REFURBISHMENT

Attractiveness to new people and business Satisfied users, owners and business actors Cost efficient and reliable infrastructure: electricity, heat, cool, water and waste management, ICT-infrastructures, transportation Green brand Services Low emission neighbourhood	Business potential Energy and maintenance cost Satisfied building users Predictable, stable business environment Turnover Attractiveness and urban comfort Indoor and outdoor air quality Safe environment	Business potential Management costs Profitability Value development Reference projects Portfolio diversification Green brand Long-term facility users	Predictable environment Growth potential Attractiveness to new people and business Green brand Profitability Cost efficient and reliable infrastructure: electricity, heat, cool, water management, waste management, ICT-infrastructures, transportation Long-term value development	Unpolluted fresh air Safe environment Lively neighbourhood Cosy and comfortable environment Attractiveness Cost efficient and reliable infrastructure: electricity, heat, cool, and water and waste management, ICT-infrastructures, transportation, safe walking and cycling conditions Green, low emission neighbourhood Good reputation of district Transparent
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			scheduling and PM
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The contents of motivation topics are mostly descriptive and seldom measurable. The district development and use plan will translate the contents into project targets.

2.2 Project Activator and project Coordinator

Refurbishment at district level involves a number of stakeholders. At a very early phase, the primary stakeholders are private, commercial and public building owners, businesses, service providers, district residents, other users, local interest groups, NGO's (non-governmental organisations). The number of stakeholders grows as the project goes on, e.g. with municipal organisations and authorities, energy providers, design and consulting companies, contractors, material, component and systems suppliers. There may be large differences also in the activity of the different stakeholders.

A new player, project *Activator*, can combine the different needs and expectations of stakeholders into basis of the district development. A project *Activator* can be a company, municipal organisation or a person specialised on district development problematics. The role of an *Activator* is to activate and motivate the stakeholders and draft contents and targets for the district development.

Project *Activator's* position is at the very early phase of the project development in the preliminary studies for possibilities and challenges of the project. Requirements for an *Activator* role are, e.g., good social skills and skills in public relations. Working with private citizens in a residential area requires more social skills than required in a typical refurbishment project. An *Activator* is specifically important in motivation of different stakeholders.

To initiate a district level project requires also deep understanding of district development challenges. Therefore, there are two different requirements for an *Activator*; the *Activator* needs good social skills and technical and process understanding.

Process management for a district level refurbishment requires a *Coordinator* also at an early phase of the project. An *Activator* with necessary technical and process skills can serve as a *Coordinator* at the early phase of the development. In the design and implementation phase, the *Coordinator's* role depends on the chosen delivery method. The coordinating work requires a strong district level commitment to involve all relevant stakeholders. The *Coordinator* must possess leadership, communication, moderation, presentation and reporting skills.

In Finland, the Peltosaari project for district development in the city of Riihimäki utilised successfully an *Activator* for motivation of residents. The main tools for the *Activator* were continuous discussion with the residents and establishing a local district 'parliament' for information exchange between the residents and the city and different experts, researchers and other stakeholders.

The Peltosaari parliament included different working groups such as residents' group, housing co-operative group, group for the elderly, enterprise group, facility manager group, and a specific group for new ideas for the development. The working groups have organised seminars and other educational events for the residents and other stakeholders.

2.3 District development and use plan DDU

Refurbishment at district level involves a number of stakeholders such as building owners, designers and consulting companies, contractors, material, component and systems suppliers, and multiple functions such as housing, services, work places and roles such as district residents and other users of a district.

Earlier studies [IEA EBC Annex 51] show that in general there are two important groups in neighbourhood planning and revitalization initiatives; municipal administration departments and investors and owners, including both public and private organisations. Municipalities have strategies for reduction of energy use and related emissions. There are common programs where the municipalities have committed to these targets.

The projects in the Annex 51 are typically top – down projects reflecting the municipal role in the development. Stakeholders such as resident organisations and utilities play a less dominant role in the project initiation. Unfortunately, a strong municipal role in district level development typically means that the requirements set for a project are given and participatory measures are only supporting acceptance of the given targets and suggested implementation measures. Although a number of municipalities have committed to climate targets, there is only a few examples that a strong municipal role would result to other new projects than just one example in a city.

MODER aims at district level development growing from the owners' and users' needs and expectations. A municipality as a building owner is an equal partner in the process; however, a municipality can utilise tools that support the development, e.g. general and master planning, transport system design, etc. Transparent decision-making is one of the key processes.

Possibility to follow and monitor the processes is important for project stakeholders. A platform for information, communication and decision-making helps for following the process and participating in the decision-making. A set of key performance indicators can help the stakeholders to follow the process, project planning and implementation. A quality agreement and control procedure can help to achieve the commonly accepted targets. A quality agreement is a necessity in contracts for implementation.

Basic information for a District Development and Use plan (DDU) is an important task for the Activator. This plan includes the commonly accepted targets derived from motivation of the initial stakeholders. The *Activator* can develop the outcome from motivation processes into strategic development targets for the project. In most cases, the preparation of the DDU requires co-operation with the relevant local authorities. The overall aims of DDU are:

- Concentration on the most important and widely accepted goals
- Incentives for public (municipality) and private sector co-operation
- Definition of key performance indicators (KPI)
- Quality agreement and quality control for implementation and success monitoring
- Establish a platform for information, communication and decision-making
- Risk and benefits sharing
- Preliminary time span for the development
- Utilisation of examples from already implemented projects in the country or preferably from countries with similar climate conditions and building traditions
- Preliminary project plan for the district
- Preliminary energy plan for the district

A key component of the development strategy is establishing a management structure to implement measures from the DDU plan over the long term. The project *Coordinator* (or *Activator*)

is responsible for the strategic development targets. The *Coordinator* is solely responsible for the development processes. The *Coordinator* must have insight in different expertise in order to bring them together and must be able to work on a broader and strategic basis compared to an *Activator*.

3 Project phases

3.1 Benefits and challenges in a district level project

In general, all construction projects include the following phases:

- Preliminary and feasibility studies
- Project initiation
- Design
- Investment decision
- Construction decision
- Construction works
- Closing of the project (monitoring phase)

The closing of the project includes a guarantee period and adjustment of HVAC controls. Also in specific cases a follow-up period may be included to verify the performance of the systems.

District level projects have a similar project phasing hierarchy as simple one-project delivery models. The decision-making in district level projects may require contractors, cost and energy specialists to be included in the project already at a very early phase in order to assess the set targets and provide early stage solutions. In a multi-client project, also legal services may be needed at an early phase.

District level projects can offer substantial benefits compared to building level projects by, e.g.:

- Implementation of more advanced energy systems, decreasing whole district energy consumption
- Inclusion of distributed renewable energy systems more economically compared to single buildings
- Supporting social balance - whole neighborhood develops: Local stakeholders' participation support neighborhood development
- Possibility to improve energy infrastructure, improvements not restricted to single buildings
- Possibility for cost savings due to procurement logistics and synergies in design (same solutions for same type of buildings)

Multi-client project may also become very complicated. District level project may have a long delivery cycle. Identified challenges are, e.g.:

- More difficult communications: Several stakeholders may result in long initial and design phases
- Long delivery cycle: District level project are long-term developments. It may be difficult to estimate construction costs several years ahead. There also may be changes of stakeholders during the process (e.g., by property trade). The longer the delivery cycle is the more can also changes in economy and political climate impact on the project.

- Different needs: Stakeholders might wish for different solutions than the ones fitting the project scope
- Lack of experience: Lack of design and project management experience for large, multi-stakeholder projects
- Cost risks: Higher risk with bankruptcy compared to building level projects
- Implementation risk: Fewer alternatives for contractors with enough capacity.

The positive results relate to whole area development by including all stakeholders into the process, possibilities to develop advanced local area energy systems and refurbishment cost savings due to larger number of buildings. Refurbishing districts by taking sustainability and different stakeholders into account allow for people being more aware of how the image, value and brand of their neighbourhood, working areas and social meeting places develop.

The challenges of district level projects relate to risks: There is less experience available regarding the management of large district level refurbishment projects with a number stakeholders and clients. Right information and proper communication between the stakeholders is crucial for cost control and scheduling and for risk management and reliable decision-making.

3.2 District level project phases

The process and delivery development bases on a six-step approach including both building and district level analysis. Adding to the five steps which consider the delivery, a final *Monitoring* phase is included in order to ensure the functionality of both building and district level systems. The decision making phases and the contents of them are presented in Figure 1.

In addition to the contents of the phases in Figure 1, a juridical plan should be created in order to support the speed of the project delivery.

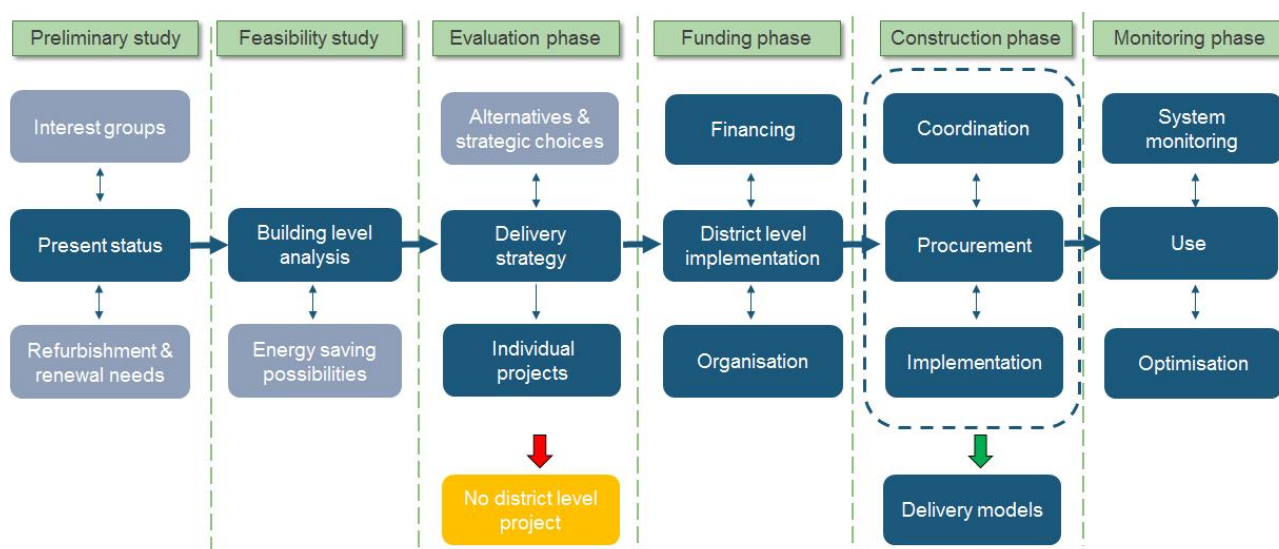


Figure 1: Project phases

3.3 Preliminary and feasibility studies

The whole process aiming at a district level energy refurbishment project can be launched by building owners, the municipality or active residents, non-governmental organisations or other active stakeholders in the district. The initiation process for a district level development is the first step in the process managed by the *Activator* invited by the active stakeholders.

The goal of the preliminary study is to create a basis for decision making for the different stakeholders. The basis is documented into the District Development and Use Plan (DDU). The *Activator* is responsible for initiating the setting of goals and documenting them into the DDU during the preliminary study. DDU includes preliminary plans for refurbishment and energy, and schedule and long term effects of the district development.

A feasibility study results into strategic targets based on preliminary study added to DDU. *Project Coordinator* is responsible for further development the strategic development targets. The *Coordinator* is solely responsible for the development processes. The *Coordinator* must have insight in different expertise in order to bring them together and must be able to work on a broader and strategic basis compared to the *Activator*.

The preliminary and feasibility studies should motivate the different stakeholders to take part in the district project. The feasibility study supports decision-making for participation with possible funding models, long-term costs and estimates future value development. The municipality can participate and support the preliminary and feasibility studies and bring different authorities' experience into the DDU especially if the municipality has committed to emission reduction targets.

The results of the preliminary and feasibility studies can result in shorter time for processing required municipal decisions. The procedure clearly changes the district development process in a way that takes the decision-making closer to the stakeholders.

3.3.1 Preliminary Study

The initiation includes a preliminary study on the possibilities of a district level refurbishment with interviews and statistical data regarding the district, and collection of information on technical condition and energy performance of the buildings. Preliminary study is also the first step in the stakeholder motivation process. Motivation of the stakeholders starts by presenting the preliminary targets derived from the preliminary study. The content of the preliminary study varies by case.

The preliminary study includes, e.g.:

- Interviews with various stakeholders
- Definition of the refurbishment area
- Building typology
- Building ownership
- Energy performance of buildings
- Energy systems in the district and energy provider views to development
- Refurbishment and renewal needs
- District valuation and brand
- General and master plans: possibilities for additional floors and expansions
- Building permit requirements
- Strategies of local building owners and developers
- Municipality' role and requirements
- Collection of reference projects
- Preliminary DDU

3.3.2 Feasibility Study

The feasibility study concentrates on developing the preliminary targets into reasoning of a district level project. Energy and refurbishment experts can provide supporting data for decision-making. The Activator can assess the possibilities for energy saving and renewable energy utilization, e.g., using the *District Energy Concept Advisor DECA* for analysis. The aim is also to establish a platform for information, communication of the results and decision-making. Through a common acceptance the stakeholders can make the decision on proceeding the process and introduce a project *Coordinator* into the process. The Coordinator is responsible for strategic targets and refurbishment plan for evaluation phase.

The feasibility phase includes, e.g.:

- Renewable energy potentials
- Potentials for decreasing energy consumption and improving efficiency
- Energy efficiency refurbishment and / or renewable energy project
- Potential investors
- Business potential for users and owners
- Preliminary LCC: existing stock compared to potential
- Preliminary LCA: potential emission reduction
- Potential value increase
- Potential valuation and brand improvement
- Preliminary financial plan
- Draft DDU (with preliminary juridical plan)

The *Coordinator* can start the discussions with a planning architect or a landscape architect in order to start investigating whether the planned scope fulfils set requirements by municipalities and applicable legislation.

The Feasibility study results in publishing the draft DDU and the draft of the first juridical plan.

3.4 Evaluation phase and project initiation

The stakeholders can make decision on district level refurbishment after a thorough evaluation of the data produced in the preliminary and feasibility study phases. The stakeholders can establish an expert group for evaluation of information achieved. Evaluation phase finalises the DDU by assessing different project financing schemes. The decision can also stop the process or lead to individual refurbishment project with no or only little co-operation between the building owners.

The project is initiated when the different stakeholders contractually decide to move forward with the project and decide to invest. The DDU sets the long and short term goals regarding the project. The stakeholders need to select the delivery model in the Evaluation phase.

New expert roles will complement the development group. A group of experts led by *Head principle designer* refines the targets set in the DDU into concepts. The group includes *Energy advisor(s)* to assess the goals and to develop solutions based on the DDU.

Based on the DDU, a *Project Plan* is created by the development group and accepted by the stakeholders. Nevertheless, the DDU will continue to function as a principal strategy and framework for the whole district development.

The evaluation phase requires City or district council participation for acceptance of the measures. The progress of the project requires a juridical plan. The main juridical or contractual challenges should be identified and solved or mitigated.

3.5 Funding phase

The Funding phase is initiated by the *Project Coordinator* with the authorisation of the stakeholders included in the project. The goal is to make a cost estimate for the project and ensure that the project receives required funding for design and construction. The phase results in making the investment decision.

The funding phase can be roughly divided into three financing phases:

1. Technical design process
2. Construction works
3. Follow-up and monitoring

Each of the above enlisted phases can be financed with different means. Deeper analyses of the suitable financial models are needed.

3.6 Construction phase

The construction phase starts immediately after the investment decision has been made by the stakeholders and investors. The first steps include commissioning of design group(s) and contractors. Depending on the delivery model chosen for the project, the early work provides the necessary technical documentation for contract price estimates. The delivery model defines how far the design details need to be made and how much liabilities are transferred to the contractor.

The funding phase can overlap the construction phase if the project delivery model or the project size allows it.

The construction phase includes following key parts to be completed:

- Technical design (level of detail depending on delivery model)
- Legal contracts between parties signed (including energy systems provider)
- Budget update
- Schedule update
- Construction *Steering committee* defined
- Cost specialist included in project, if not included earlier

During the construction phase, the roles of the contractor, energy specialist and designers are emphasized. The level of detailing is defined by the delivery model: the divided Design&Build model includes design by the contractor(s) chosen, while the Alliance and PPP models include the design as a group work by all parties included in the delivery.

The importance of clear budget follow-up should be emphasized both in the follow-up and in the contracts made with the sub-contractors. The construction phase consists of the following key parts:

- Budget follow-up
- Schedule follow-up
- Technical design, detailing
- Construction
- Follow-up and monitoring

The construction phase requires the funding and juridical parts to be in order. Although the technical design efficiently describes the targets of the construction phase, the DDU still functions as the principal target document.

The delivery models affect at which stage the construction works can be initiated. The delivery models are further presented in their own topics.

3.7 Monitoring phase

Monitoring phase includes commissioning of all technical systems. KPI's are used for evaluation of performance and project success.

4 Delivery models for refurbishment at district level

The project delivery model should be defined either by the *Activator* or by the *Project Coordinator* as early as possible in the project. The amount of stakeholders, diversity of buildings and users, and size of the project affects the functionality of different delivery models.

Four different delivery models are presented. Some consist of more common models already in use (e.g. the Public-Private-Partnership or Private-Private-Partnership, PPP) while new ones were created by combining more traditional models. The project phases in a district level project were schemed. Initially, different solutions were thought out, including different project phases for a large district project.

The project delivery models can be categorized in different ways. In this document the contract based categorisation is reviewed. Nevertheless, categorising delivery models based on billing (in other words, how monies are transferred) is viewed as an important aspect and should be studied separately. On a principal level, the funds are primarily delivered downwards in the figures during the construction phase.

4.1 Public-Private-Partnership and Private-Private-Partnership models

The Public-Private-Partnership or Private-Private-Partnership (PPP) model is reviewed. In a project where the project members may consist of several interest groups. However, the public partner might not be included. In this case the delivery model is a Private-Private-Partnership. The delivery model consists of the stakeholders establishing a company that takes responsibility of the project. This Special Purpose Vehicle (SPV) takes responsibility of the project fundraising and finances, the technical design and the responsibility for the construction time supervision.

The SPV can either order the technical design from a third party or invite contractors immediately to the project for one or several turnkey deliveries. The SPV can act as the energy producing company after the project. In this case, the stakeholders have the ownership over the energy producer.

The model makes it possible to include life-cycle service contracts with different contractors resulting in a longer period perspective. The DDU document would define the principal strategy for the contract and service.

The SPV acting as the energy company would provide energy services and shorten loans during the Monitoring Phase. In a life-cycle project the key sub-projects are carried out according to the contracts made with the key-contractors. The stakeholders need to communicate only with the SPV.

Finances and decision making during the construction process is presented in the Fig. 2 and 3.

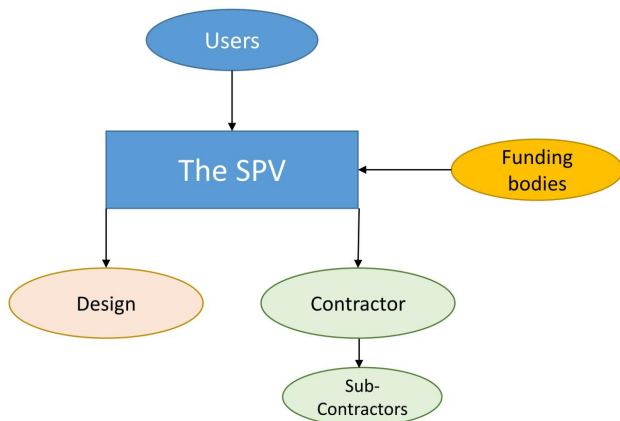


Figure 2: Project delivery model: PPP

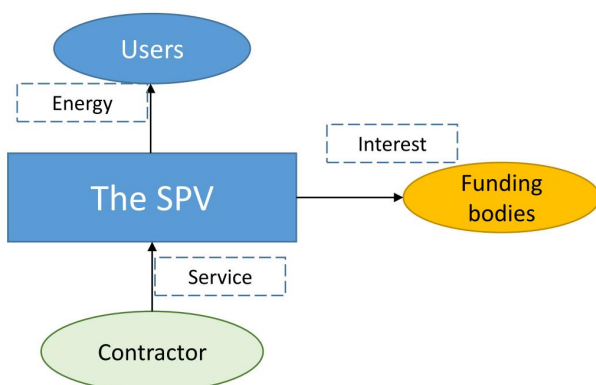


Figure 3: Project delivery model: PPP. Provision of services during the use phase

The transfer of funds is straightforward: all funds are delivered through the SPV.

The PPP model allows the stakeholders to define at which point the contractor is invited into the project. The inclusion of the contractor(s) affect the costs, quality and schedule of the construction works. The later the contractor is invited into the project, the further the technical documentation must be finished. This may be a risk if the contractor views on design are no taken into account.

Comparing the PPP model to the alliance model, the risks are divided differently and the role of the contractor is different. In the PPP model the contractor functions as a construction works specialist (and cost specialist if necessary) and can be invited to the project during the solution phase. This results in the SPV carrying most of the risks regarding the project resulting, most probably, in lower design expenses during the earlier phases of the project.

The most of the risks in a PPP delivery are carried by the SPV and its owners. If the contractor is not a part of the design team one dimension of expertise is possibly lost at early phases. However, it should be emphasized that the costs of the project are affected by the success of project management.

Assessment (pros and cons) of the PPP model is below.

Pros

- Clear contractual arrangements
- Clear owner of energy company
- Clear division of risks and costs
- Invoicing distribution through the SPV
- Long contractual agreements
- Invitation of a contractor at a later phase reduces costs at early phases of the project
- Project scope required to be clearly defined in the DDU, in order to have long-term decision- making basis
- Municipality can be represented in SPV for transparency

Cons

- A lack of contractors' interest towards the project is a risk. It might be difficult to receive offers since a contractor might see more opportunities in dividing large projects into several smaller ones.
- Contractual arrangements need to be clear at an early stage
- Difficult to change scope after initiation
- Stakeholders need to own shares in SPV in order to have a possibility to impact on the development
- It may be more difficult to sell real estates during the process.

Since the stakeholders are represented through the SPV, the personal legal risks are smaller. Still, the representation of the users is completed through the board of the company which requires high requirements of transparency in the SPV.

4.2 Alliance-model

The alliance model includes the contractor in an early stage into the project. The suggested model for project phasing requires the contractor to be included early into the project due to the cost and production knowledge.

Project alliance [Lahdenperä 2009] is an approach where the key parties bear the risk jointly. Service providers are rewarded based on the success of the overall project, which encourages the actors to consider each other's views and to cooperate effectively. The integration of know-how creates a basis for innovation and performance excellence - especially in the case of projects that involve a great deal of uncertainty.

Project alliance is an operational model where project party selection takes place through elimination of candidates and a subsequent two-phase tendering process: The qualitative tender precedes the workshops that are part of evaluation, followed by submission of tender price data. The price is made up of unit prices and overhead rates while price and scope assessments common to all competitors are used selectively for comparison calculations.

In the project alliance model selected service providers, designers and builders develop the project and its designs in cooperation with the owner before the actual target cost is set. The revised tender price and target cost together with the predetermined allocations of cost overruns and underruns determine the rewards of service providers at different performance levels. The idea is to spur actors to invest especially in the pre-implementation development phase which is also promoted by the project's incentive system. An attempt should also be made to incorporate into the system the impact of the realisation of the key qualitative target areas.

Finances and decision making during the construction process is presented in the Fig. 4.

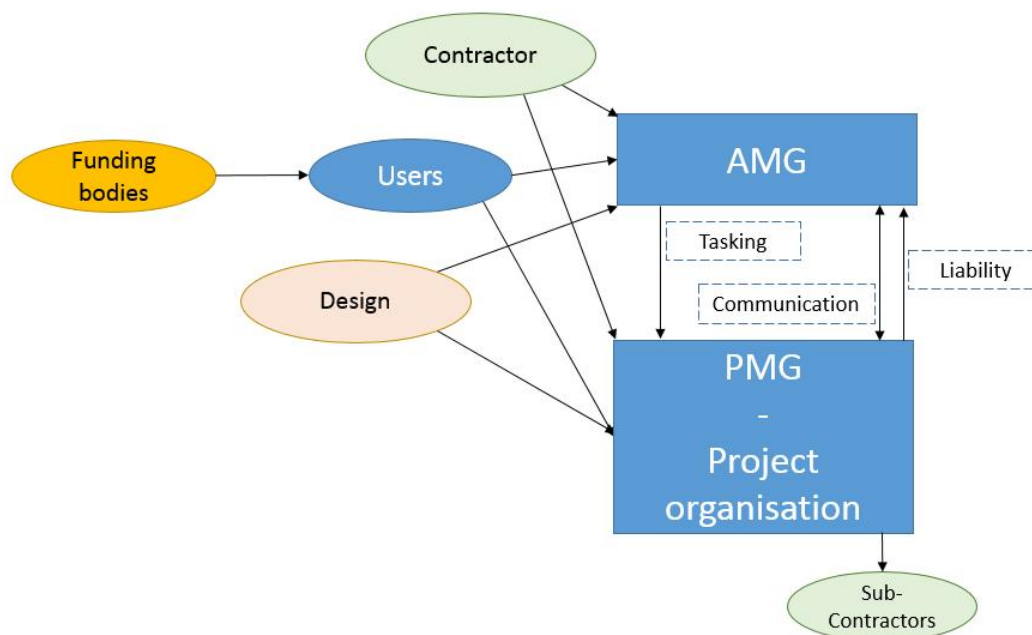


Figure 4: Project delivery model: Alliance [Lahdenperä 2009]

Alliance management group (AMG):

- Creates team spirit and operational vision and maintains them
- Creates principles of organisation and sets goals for project organisation
- Approves alliance and operational and cost goals
- Evaluates and accepts alliance's action plan and procedures
- Appoints and authorises alliance's project manager
- Appoints and accepts members of PMG
- Assists in the maintenance of interest group relationships
- Seeks out best resources of participating organisations
- Monitors outcome and corrects direction as necessary
- Defines and solves differences in views between participants³

Project management group (PMG):

- Responsible for delivery of agreed structure/system
- Approves and authorises rest of project organisation
- Manages project implementation on operative level
- Provides effective (work) supervision for rest of project organisation
- Monitors, forecasts and reports on implementation to AMG
- Undertakes necessary corrective measures³

Project Organisation

- Responsible for practical implementation and achieving of result
- Has a clear scope of liability by actors with respect to outcome
- Made up of actors appointed with interest of project in mind
- Operates as a united team forgetting the views of the background organisations

Assessment (pros and cons) of the alliance model is below.

Pros:

- Risks shared with the different stakeholders
- Common interest in completing the project successfully
- Smaller risk for lawsuits
- Shared responsibilities, project development in the hands of each stakeholder collectively
- Large initiation costs, since more project stakeholders are invited earlier to the project will bring cost savings in later phases of a project

Cons:

- Contractual agreements with different users must be completed early
- Sub-contractors not accepting the same risks as the main contractor

In an alliance projects, the contractor takes part in presenting the investment decision. This is not necessarily a negative issue, but must be well presented to the different users and investors when the main contractor is chosen to the project.

4.3 Divided Design & Build model

The design and build model includes both the design and construction being completed by one party or organisation. In a district level project the D&B model consists of one or several parties designing and building the whole project or the project being divided into several D&B sub-projects.

A steering committee consisting of stakeholders and investors with the decision-making power is responsible on project management. The contractor, designers and the *Project Coordinator* are also represented in the steering committee, but they have no votes.

The steering committee's aim is to have a common ground for the decision making for different D&B projects. In order to receive the full benefit of several projects and to have a discussion forum for the shared energy systems, the steering committee must be organised by the *Activator* as early as possible.

A district project is divided into several subprojects (Fig. 5, Project A and Project B).

During the project initiation process, a contractor or a cost specialist can review the budget. Contractors are responsible for design in sub-projects.

The Steering Committee evaluates the progress of different projects. The steering committee is responsible for preliminary design and budgets for tendering, managing the juridical aspects of the whole project and the budget for the whole project. Different stakeholders can agree to share the risks contractually but otherwise each sub-project is responsible for their own budgets.

The goals, principle requirements and size of the project need to be defined as clearly as possible in order to decrease schedule and cost risks related to undefined scope. The Activator and the Project Coordinator have great responsibility in setting clear targets for the project.

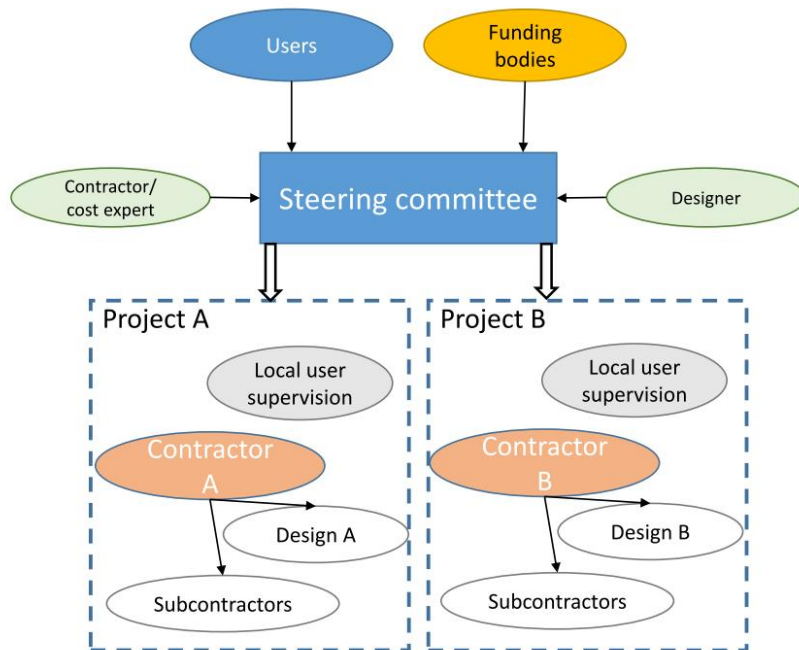


Figure 5: Project delivery model: Divided Design & Build

The steering committee must ensure that the project phases follow the DDU and project scope. The responsibilities between several D&B sub-projects must be clearly defined.

The Steering Committee is in a central role during the design and construction phases. The model is suitable for projects with many similar stakeholder groups. The contractor(s) of the different sub-projects carries a high responsibility. Difficulties may occur if the stakeholders are not satisfied with the proposed especially if the offers contain contradictions with the DDU.

The division of liabilities is also very clear and it is possible to reach a common goal by dividing the large project into smaller sub-projects with high similarity.

The model requires quite fast decision-making from the steering committee during the design phase, since the schedule is defined by the contractor. This means that the project size maybe should be restricted to ensure that the information is transferred to the stakeholders.

The transparency of the Steering Committee work should be emphasized, since key decisions should be made by its members.

the budgeting and scheduling is easier after the funding phase since the contractor(s) have the responsibility.

Assessment (pros and cons) of the Divided D&B model is below.

Pros:

- Budgeting is straightforward for subprojects

- Scheduling is straightforward for subprojects
- Division of liabilities is clear
- cost of design phase included in construction phase

Cons:

- Steering committee needs to prepare tendering documents very well
- Cost transfer can become unclear: who will be invoiced by which contractor?
- Detailed definitions required in DDU
- Not possible to affect project costs after accepted offer from contractor(s)
- Fast decision-making required during design phase

4.4 Primary Project model

The Primary Project model consists of one large project party inviting smaller stakeholders to take part. The *Primary project owner* represents the large project. The costs are assessed with unit price based model. Other funding models are possible to use, but the unit based model allows for quick initiation but at the same time it requires fast decision-making from the invited stakeholders.

The motivation for the primary project owner can be:

- Economical (wanting to improve company image and property value through area development)
- Ethical (wanting to improve living conditions in vicinity)

The motivation for the invited stakeholders is:

- No costs for initiation, designers and contractors chosen by the main user
- Option to connect to energy delivery system as a group for possible cost savings
- Increased property value if whole area is developed

The primary project owner initiates the project and acts as the *Activator* for the invited stakeholders. The design process can proceed before sending the invitations for quicker process.

The funding is divided between the primary project owner and the invited stakeholders. Thus, the means taken for improving the buildings in the vicinity can be restricted to energy delivery and specific building parts. For example, the waste heat from the primary project owner's processes can be distributed to the buildings in the vicinity.

The process model is described in Fig. 6.

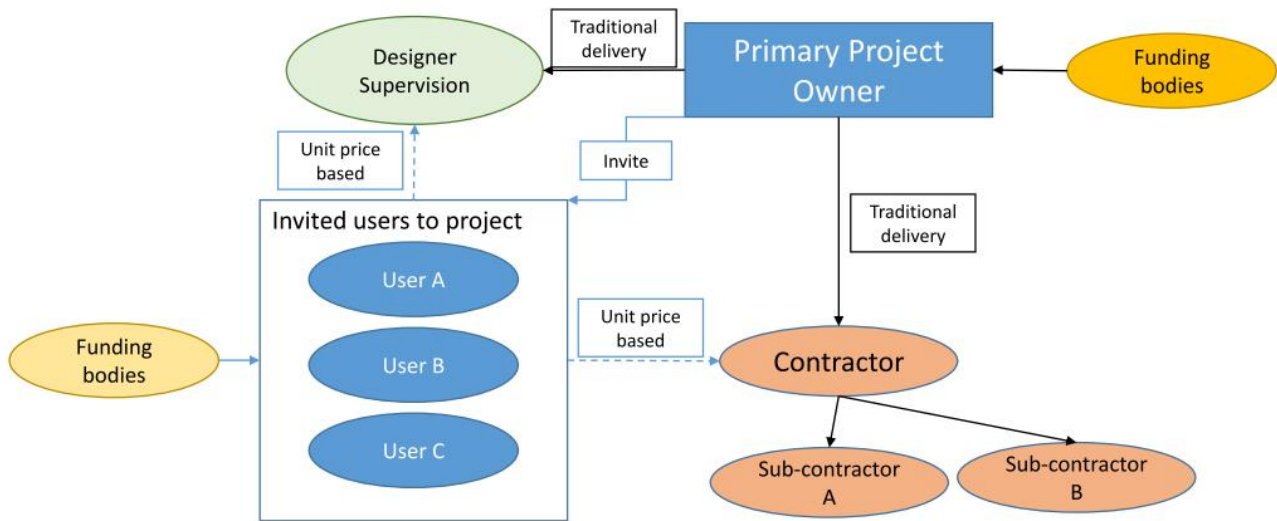


Figure 6: Delivery model: Primary Project model

The primary project owner is responsible the schedule for the project which other stakeholders follow. Good results can be achieved if several buildings are similar in shape and structure as the design and construction can be more efficient compared to several detached projects.

The Primary Project model functions well in projects where one partner decides to improve or renew its facilities. The project can receive larger positive publicity through district development.

The principle project owner's motivation to engage more users can include:

- Public relations: Positive publicity
- Positive response for project: Increased interest by municipalities
- Possible to decrease energy costs if excess heat is sold to grid or directly to users

Invited stakeholders' motivation to take part in large project can include:

- Possible discount through common procurement
- Initiation costs covered by main user
- Time savings
- Municipality contact through main user
- District development increases property value

Assessment (pros and cons) of the Primary Project model is below

The pros and cons regarding the Primary Project model are divided into two categories: The primary project owner and the invited stakeholders.

Primary project owner Pros:

- Added publicity increases project value and value of functions
- No budgeting or scheduling for invited users
- District development increases positive interest of municipalities

Primary project owner Cons:

- Negative brand if invited project fails
- Contractual issues with invited stakeholders time-consuming

Invited project owner Pros:



- Initiation fast, primary user has made the project plan
- Construction phase cost-efficient in case of repetitive structures
- Increased interest of municipality: Increased services and property values

Invited project owner Cons:

- Fast decision-making required
- Unit price not necessarily the most cost efficient
- Municipality more interested of Primary Project owner

5 Conclusion

The key problem and barrier in a district level process is the number of clients and differences in targets of the different clients. The work package Definition of strategies for district level refurbishment considers different key factors that combine the interests of various stakeholders as a basis for preliminary process and delivery models. The models aim at including the extent of the various targets. As the targets among residents and other stakeholders differ from individual level to different modes of ownership, the motivation of clients in district level refurbishment project requires common targets for successful inclusion into a large project delivery.

The document summarises the possible process models for a district level development. The selection of basic models bases on suitability for a large multi-client project. The analysed existing models are Alliance model and Public-Private-Partnership or Private-Private-Partnership. Alliance model seems more realistic due to common decision-making including all relevant stakeholders. Both models enable large scale optimisation of actions.

Two new models Divided Design & Build and Primary Project models fit to cases where building owners want to possess more power concerning actions on their buildings. However, the models can benefit from common procurement procedures but the optimisation of actions may require more effort at the early phase of project.

6 References

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