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Innovative financing systems

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Innovative Financing Systems

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1. Introduction to innovative financing systems

The purpose of this report is to analyse the various forms of financing for renewable energy projects in the Baltic region, related to the spatial planning process. Financing is often seen as a major problem for the establishment of renewable energy plants. This is often due to the fact that the economy of the renewable energy plants can be uncertain, and to a very high degree depends on the current payment and support schemes. Fortunately, there are a number of support options, both in the form of direct aid, in the form of loans or special-purpose support schemes.

There are many support options such as direct grants, loans, support schemes in detail, not least because there are many different schemes in the project partner countries. Instead, reference should be made to the main types of financial schemes, and to the main targeted and funding options, available for in all project partner countries.[1]

Support options are great, but, despite the many support options, there are still difficulties in financing and implementing renewable energy projects. The purpose is to illuminate and develop innovative financing opportunities that can solve the problems that renewable energy projects are facing.

Based on experience, there are many different financial reasons why renewable energy projects cannot be implemented. This may be due to the fact that funding cannot be obtained for the preliminary activities, for feasibility study or for regulatory approval.

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[1] ***Covenant of Mayors for Climate & Energy*** continuously prepares an overview of a number of support options »Financing opportunities for Sustainable Energy & Climate Action Plans«, see the address: https://www.eumayors.eu/support/funding.html. ***European Investment Bank*** (EIB), working with lending, blending (mixed financing) and advising. It should be noted that part of the support activities (the blending activities) are intended to unlock financing from other sources, particularly from the EU budget by mixing EIB-loans with other support schemes to form a full financing package; EIB is related to ***European Investment Advisory Hub***, providing targeted support to identify, prepare and develop investment projects across the EU for all types of project promoters, public authorities and private companies. ***Nordic Investment Bank*** (NIB) with a relative board mission, namely to finance projects that improve the productivity and benefit of the environment of the Nordic and Baltic countries. ***Nordic Environmental Finance Corporation*** (NEFCO). This investment fund is available for financing projects in Eastern Europe, with focus on Armenia, Belarus, Estonia, Georgia, Latvia, Lithuania, Moldova, Poland, Russia and Ukraine; the financing is targeted at small and medium-sized projects (SMPs) with demonstration value.

The reason may be uncertainty about technical and there by financial performance, for uncertainty on yearly wind production on a particular site, for instance. The reason may be the uncertainty of market conditions, such as fluctuating market prices. It may also be due to uncertainty about the support schemes; for instance: Can investment support still be achieved, although there are 3-4 years from the start of project plans to the project completion? Can project owner count on unchanged support for the operating cost over the life time of the project, or how many supporting years can a project owner count on? Renewable energy plants could be a risky investment as a result of market fluctuations but also as a result of ongoing changes in subsidy system.

1.1. Innovative financing systems

The development of many different issues is needed in order to increase investment in renewable energy. International Renewable Energy Agency (Irena) mentions five areas where a special effort is needed, namely (1) advance renewable energy projects, (2) involvement for local financial institutions, (3) the mitigation of risks to attract private investors, (4) mobilization of investment through standardized project documentation and (5) the creation of facilities to scaling up renewable energy investment.[2]

The development of innovative financing systems may contribute to all the mentioned areas, and especially to the mitigation of the risks. Innovative financing system may consist of special investment models. However, innovative financing systems are - in this context - seen as types of financing systems, where risky renewable energy investments are made possible - or bankable - through ***blended funding***. This may be illustrated by Figure 1 on next page.

The figure illustrates the four main factors that affect the risk in a given renewable energy project. The four factors have a particular impact on a project being bankable, which means that the project can be financed with low or lower risk. The first factor is the ***support scheme***, which can reduce the financial risk, but can also be unpredictable as a result of things like fast changes in subsidy schemes due to changed political priorities.

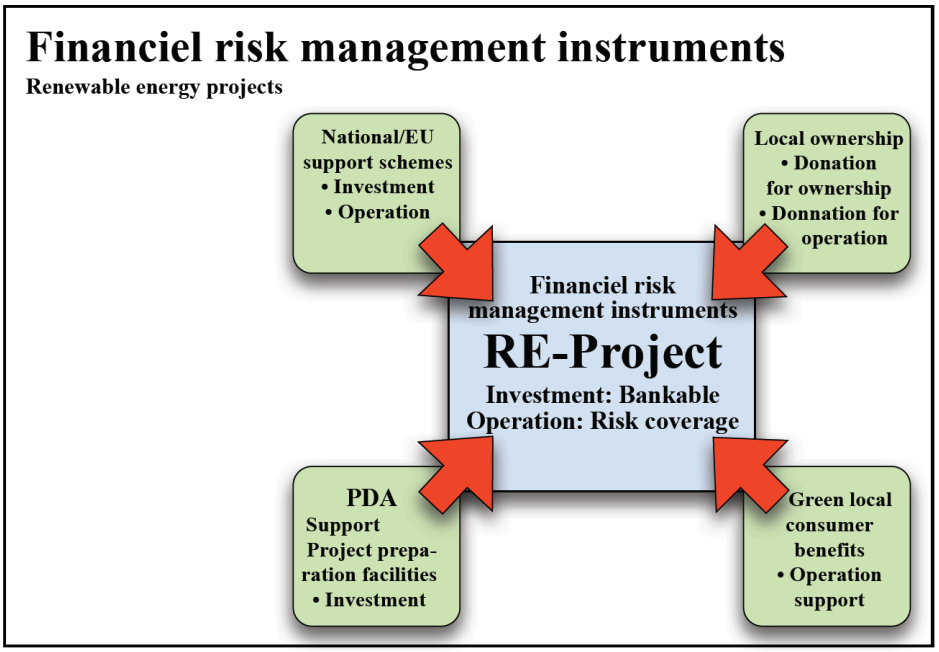
The next is project ***preparation facilities,*** where the main purpose is to secure well-prepared projects - also known as project design assistance (PDA). Well-finished projects are obviously a good idea, but the costs can be relatively high and therefore cause financing difficulties.

The next two factors are linked to local energy ownership. Renewable energy and the energy project resource base are typically linked to the local or regional site, and the-

[2] IRENA (International Renewable Energy Agency): Unlocking Renewable Energy Investment: The Role of Risk Mitigation and structured Finance; Irene 2016, p. 15.

refore immediately provide an obvious basis for local ownership. Local ownership can also be of great importance for local involvement in the often-elongated process from the start of the project to its implementation.

Figure 1: **Financial risk mitigation instruments: (1) Support schemes, (2) Project preparation facilities, (3) Local involvement/donation, (4) Green (local) consumer support.**



Local ownership can - in addition to ensuring local involvement - also form the basis for, for example, ***local donations and funding,*** which can reduce investment and operation risks and ensure that a given project can be funded.

There is a number of discussions in the EU about local energy communities.[3] An element of local energy communities is the local green supply and perhaps also tax advantages that in some cases can also be achieved. The ***green local consumer,*** tax benefits, proximity to the consumer will undoubtedly also be able to support renewable energy projects financially, and therefore be seen as an instrument for financial risk management.

Small renewable energy projects may in some cases be financed directly by the owners. However, we are facing a very far-reaching investment of renewable energy plants and facilities. This increases the need for more comprehensive projects and lar-

3 Cf. »Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe«, Commission for the Environment, Climate Change and Energy; European Union 2018.

ger investments, as most types of renewable energy projects have become more and more expensive, meaning investments must be correspondingly larger and require a more demanding planning process.

In some cases, small renewable energy projects may be financed directly by the owners. However, we are facing a very far-reaching conversion of the whole energy system. This increases the need for larger projects and larger investments. Because most types of renewable energy projects have become larger and complicated, investments per project have also become correspondingly more risky

In today's terms, most renewable energy projects cannot be financed directly by the project owners - the investment sum is too large. This applies to most upscaled renewable energy projects. The projects must therefore be bankable. This can be achieved through a ***blended funding*** based on the four elements, shown in the figure 1 (p. 5): The use of support schemes, together with project preparation facilities, aimed at local involvement and donation and support from local green consumers.

1.2. The main issues of the report

This report deals with opportunities for innovation financing for renewable energy plants. The topic is addressed through the following three topics:

- ***Financing:*** An overview on the current financing possibilities for renewable energy projects with a particular focus on the typical process sequence in the establishment of renewable energy plants.
- ***Guidelines:*** Guidelines for innovative financing systems for renewable energy projects. Studies of innovative investment models are summarized in the guideline.
- ***Models:*** Models for better interaction between financing systems and the spatial planning practice.

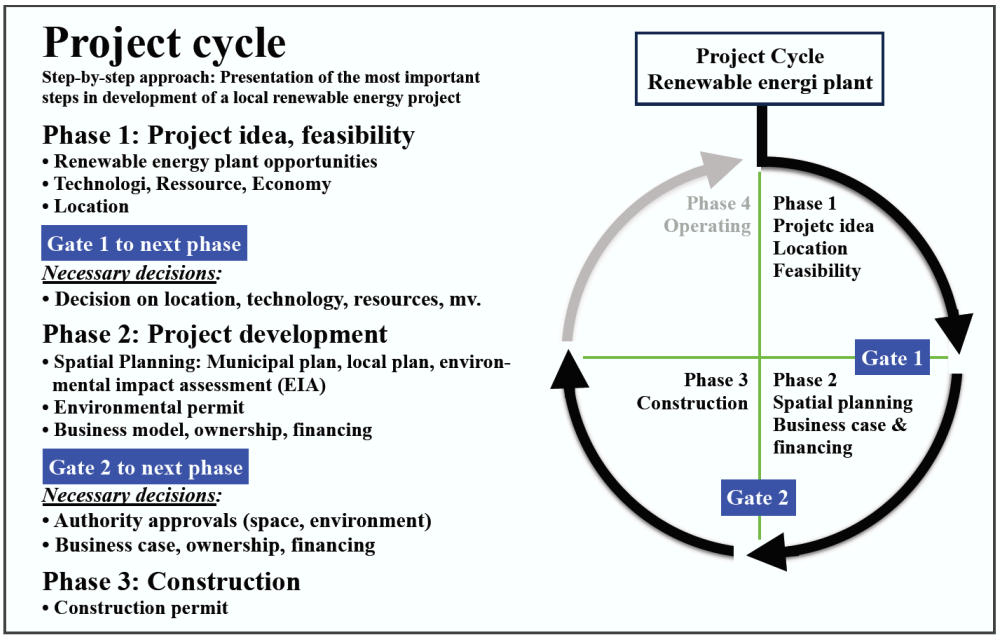
Typically, it is a long process from the first ideas of a renewable energy plant up to the realization or to the construction of the plant. This process can be described by means of ***a project cycle process.***[4] Establishment of renewable energy project cycles can be divided into three basic phases (See the detailed content for Appendix): [1] The first phase - The feasibility phase. [2] The project development phase - the second phase. [3] The construction phase - the third phase. There are needs for financing in the all the phases of a project cycle. The financing needs differs from phase to phase. It is often overlooked in connection with the establishment of renewable energy projects.

[4] See for instance Project Cycle Management, European Commission; Devlopment DG, March 2004.

If there is insufficient funding in the initial phases, the result can very easily be a poorly worked out project implying a number of negative technical and economic consequences - not to mention the consequences it may have for the citizen support for the project or for new similar projects. Many experiences with renewable energy plants show this particular connection.

These experiences are the reason why the following sections on financing options is divided into two parts: ***The first part*** deals with financing possibilities, covering both the project phase 1 and 2, while ***the second part*** deals with financing possibilities in phase 3. The idea can be described in more detail with this project cycle overview:

Figure 2: **The project cycle - the different activities and different financing needs in renewable projects from the idea to the realization.**



The figure shows which decisions must be made at each of the phases in order to establish the project. Of course, a project can be divided into even more sub-points than the above mentioned three steps.

For example: In the first phases decisions must be made on technology and resources - sun, wind, biomass, geothermal energy. It is also necessary to determine one (or perhaps alternative) locations for the facility. If this is not clear, then the spatial planning cannot be started in the subsequent step - in the phase 2. Of course, these decisions - technology, resource, location - have to be developed in a local collaboration process. Either based on local initiatives, based co-creation between authorities and citizens, or based on collaborative activities of a project-developer.

2. Current financing possibilities [1] - Phase 1 and 2

The financing need in ***the first phases*** is linked to the development of the project - the feasibility stage, i.e. from the start, the initial stages - ideas, over the next stage on the further project development, the preparation of regulatory approvals, up to the situation, where the final decision on the establishment of the facility can be taken by the parties involved.

The ***second*** financing need occurs after the decision to establish the plant, i.e. the actual construction financing, which will typically correspond to 95-96% of the total construction cost. The report should therefore address the following topics:

- ***The initial financing:*** The feasibility study in the initial stages. The empirical material is based on Danish project experiences, describing which activities and financing must be achieved before one can decide on the establishment of a project.
- ***The final financing -*** Investment and construction of the plant. Once all approvals are in place and the business case is identified, the next financing task is the financing of the construction costs. The empirical analysis is based on a number of different types of renewable energy plants (wind, district heating, biomass, etc.)

The initial financing requirement will typically be smaller (typically 4-5% of the total construction cost); but coverage of this needs is vital for the development and implementation of the projects. The initial financing may contain a considerable risk in the cases, where the construction projects are not implemented and the costs mentioned cannot be covered as a part of the total construction cost of a given project.

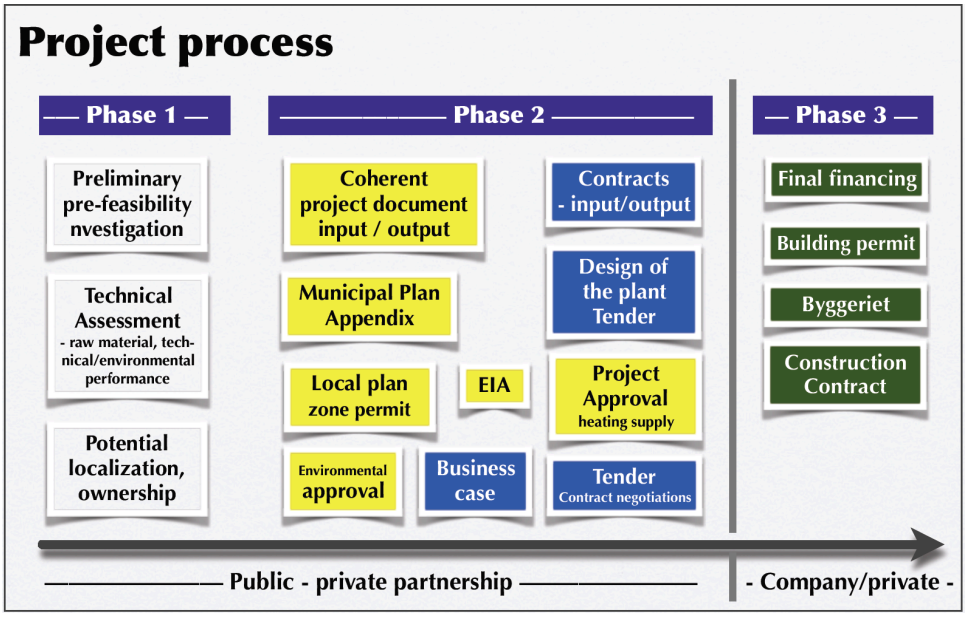
These initial financing needs can be clarified by dividing the entire construction process into three phases, as illustrated in the figure below. These three phases describe the total construction activities from the start to the construction of the plant. [5]

In practice, a plant's process can be divided into several more phases than the three above described project cycle phases. Here, a division into three phases is chosen and defined in such a way that they each present a completed process or step.

Phase 1 results in a more or less completed project idea, which is then developed in more detail through optimizations of the plant idea, and in connection with the authority approvals in Phase 2. The prerequisite for Phase 3 (the actual construction) is that

[5] Description of the project process is divided into three phases. Other and more detailed phase division may be envisaged. Reference can be made to the division of the whole process into 7 phases in: »Roadmap for the Integrated Design Process. Part One: Summary Guide, Green Building Roundtable«, Canada; May 2007. See also the following report, where the division into the three steps is applied in practice: »Solrød Biogas - Conception, project development and realisation«; Solrød Kommune; December 2014.

Figure 3: **The project cycle is divided into three phases, indicating the most important activities during each of the phases.**



the necessary approvals have been obtained in Phase 2. The three phases can briefly be described as follows:

Phase 1: The initial phase, which is typically about assessments of plant opportunities (for instance in shape of pre-feasibility analysis), assessments of interest to the plant, possibly with proposals for ownership and location of the plant.

If interest is generally present, this first phase could be brief. However, it can also take much longer, depending on how quickly the ideas are developed and matured. This phase is generally not very time-consuming or organizationally demanding.

Phase 2: The project development phase, which is the phase in which the project is to be developed further, including regulatory approvals, ownership, corporate formation, etc. This phase contains, in particular, three elements:

[a] Development of the plant concept and ensuring the plant's raw materials or or performance;

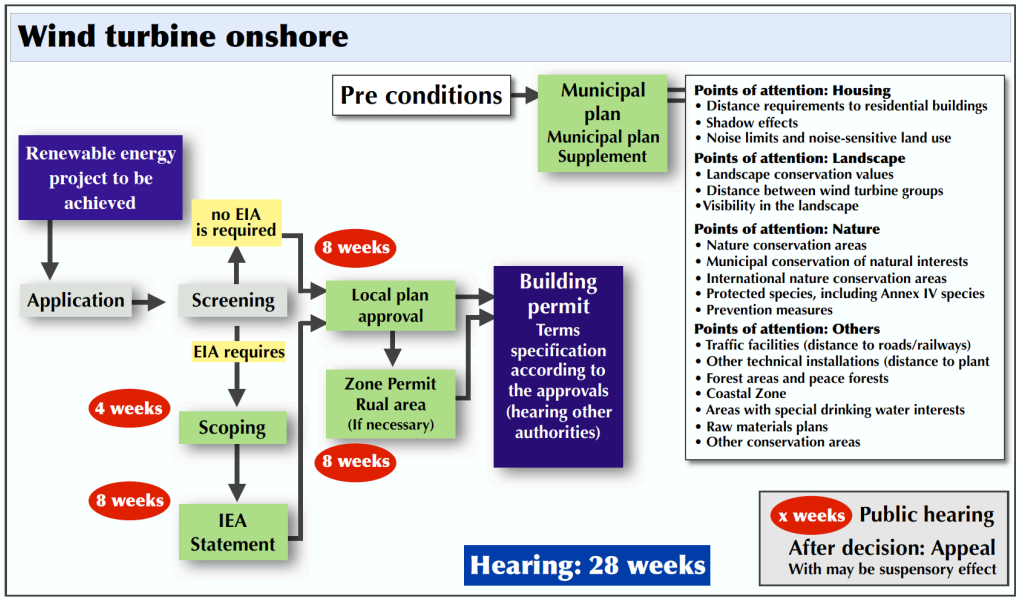
[b] Regulatory approvals, which contains a number of elements, each of which can function as a "show - especially the spatial planning and all the different elements of the spatial planning."; as well as.

[c] The development of the business model, the establishment of contracts, the formal formation of companies and other matters of importance to the next phase.

Phase 2 is an elongated phase, which can very easily extend for 2-4 years, depending on how complex the plant is, and on how many different spatial and environmental approvals to be obtained, but also depending on how extensive the preparations are for the subsequent phase - the construction phase.

However, the long-time course for phase 2 is particularly related to the complexity of the spatial planning approvals, which could be illustrated by with the regulatory framework for approval of windmills in figure 4 below:

Figure 4: **The regulatory framework for windpower (and other energy facilities) in Denmark - the regulatory framework is EU-based.**



The total public hearing process can take up to 28 weeks for windmills and up to 48 weeks for district boilers, combined heat/power, waste incineration plants, gasifiers, etc. The hearing and consultation periods alone ca be one-two years. The overall approval process is rarely shorter be than 3-6 years, depending on the type of technology and the lengths of each of the different the approval processes.[6]

After the approvals come to the implementation:

Phase 3: The deadline for the provision of the funding base, followed by the construction phase: This phase consists partly of concluding final contracts (building

6 See the report with similar experiences as the Danish experiences in: »Creating space for renewables«; Transnational report on state of play in spatial planning for renewable energy in the participating regions; Roskilde University; BEA-APP; November 2018.

contracts, supplier and customer contracts, etc.); partly in applying for and obtaining a construction permit, and the construction of the building itself.

The construction phase - the phase 3 - is normal the shortest phase in the whole process - if it is well organized - as it is structured through concluded contracts, regulatory framework and other agreements.

2.1. The costs of the initial phases - Phase 1 and Phase 2

There is a big difference between the costs to be covered in Phases 1 and 2. There are also differences in costs between the different energy technologies. Below in Table 1 the expected costs for the three phases for the following renewable energy plants are illustrated: Biogas, a large district heating plant, a small district heating plant and a wind turbine project.

Table 1: **Percentage distribution of the costs for phase 1, 2 and 3 for various renewable energy projects: biogas (7 MW), large district heating plant (5-50 MW), small district heating plant (less than 1 MW) and wind turbine (3 MW), based on Danish experiences.** [7]

	Biogas 120.000 tons	**District heat** Large plant	**District heat** Small plant	**Windmills** 3 MW mølle
Phase 1 - %:	**0.2%**	**0.1%**	**0.4%**	**0.2%**
Phase 2 - %:	**4.5%**	**1.3%**	**4.4%**	**4.5%**
Phase 3 - %:	**95.3%**	**98.6%**	**95.2%**	**95.8%**
Hereof tech/legal:	0.9%	10.2%	9.9%	5.1%
Hereof plants:	94.4%	88.4%	85.3%	90.7%
Total - %:	100.0%	100.0%	100.0%	100.0%
Total costs:	**11.7 mio. €**	**24.3 mio. €**	**1.2 mio. €**	**3.8 mio. €**

The main pattern - as mentioned - is that by far the largest expenses are contained in phase 3, namely between 95-98% of the total expenses, while phase 1 and phase 2 together amount to between 1.4 - 4.8%. The table also shows that the greater the total construction cost, the lower the percentage of expenditure in phase 1 and 2.

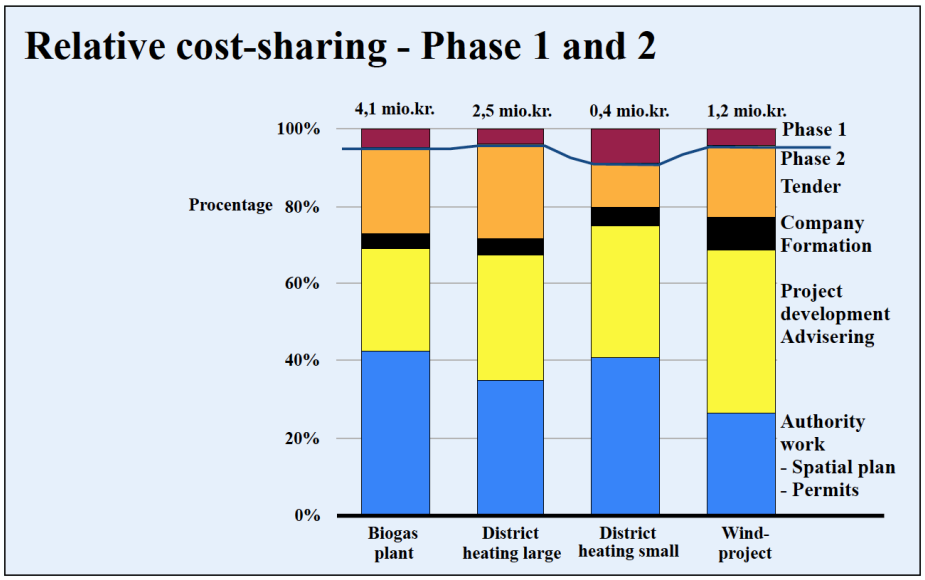
This is due to the fact that a number of the expenses in phases 1 and 2 do not depend on the size of the investment sum, but are more fixed and activity-based expenses. For example, the EIA (environmental impact assessment) expenditure is not twice as large for the large district heating plant in comparison with the biogas plant.

7 The figures in this graph are based on a summary of a number of Danish budget and accounting statements from a number of plants. Budgets and costs can be seen differently in the project's other partner countries; but the expectation is that the main pattern is the same.

2.2. Activities in the initial phases - Phase 1 and Phase 2

Although the costs in Phases 1 and 2 are relatively small, they play a crucial role in the involvement of the local community, in the development of the project, both in terms of technical and economic optimization, and in terms of company formation and tender documentation. If a project is to be a part of local energy ownership, it is necessary to obtain the sufficient funding. The main items for Phase 1 and Phase 2 of the project types examined are shown in figure 4 below.

Figure 5: **The project cycle: The two first phases, indicating the most important activities during each of the phases.**



The figure shows that project development and regulatory approvals - among others the spatial planning activities - are the most important expense items for all the project types examined. These types of expenses are at the same time characterized by the fact that the activities take a considerable amount of time, not least the authority approvals, which also present organizational challenges during the project development phase, as the elongated process requires continuous organizational efforts.

The expenses in Phase 1 and Phase 2 are ***key expenses,*** and therefore create a special financing need. These are relatively small funds that must be available over a longer period. If the facility is built, the expenses in phases 1 and 2 could be paid as part of the total investment costs. However, it is not possible to know in advance whether the efforts in Phase 1 and Phase 2 will result in the construction of a facility.

There are a number of examples where the initial activities in Phase 1, together with the somewhat larger expenses in Phase 2, have not led to the construction of the proposed plant. This implies that the money spent in the two initial phases has been wasted.

Thus, there is a significant risk associated with the expenditure in phases 1 and 2. A consequence may be that the project developer saves some of the costs for a full development of the renewable energy project, which may result in the non-optimal solution and non-optimal involvement of stakeholders in the intended renewable energy project.

2.3. Financing for the initial phases of the project cycle

There are three main requirements for financing in the initial phase. Firstly, the funding must be arranged in such a way that the greatest possible local involvement is obtained in order to strengthen the project and the implementation of the project.

Secondly, the funding available must be sufficient to cover all relevant aspects in the initial phase, concerning technical, economic, legal and tax issues and ownership.

Thirdly, the funding must be provided in such a way that all or part of the used the funds is remitted, if the project cannot be implemented. The following includes the information prepared by the project partners in connection with a number of specific projects (see appendix 3).

The information is collected through a questionnaire, which highlights the project cycle (phase 1-2-3) of the specific projects. This information - together with other sources and information - is the background for the following description of the various types of financing of the initial phase (phase 1 and 2):

[1] PDA schemes (Project Development Assistance):

The first option to be mentioned is the project support assistance which is already part of EU's support schemes. These schemes are directly geared to the situation where the initial expenses in Phase 1 and Phase 2 can be covered without guaranteeing that the plant will be built.

The Project Development Assistance or the PDA scheme contains a subsidy element if the plant is built, but also a repayment requirement if the plant is not built. The principle is the following: The system provides 90% support for up to a twentieth share of total investment. The PDA-schemes is directly used in the Horizon programs and of the European Investment Bank (EIB).

The scheme reduces the financial risk, although it doesn't completely eliminate it. In the event of the construction project failing to do so, the investment in Phases 1 and 2 will have to be repaid, unless a detailed assessment of the cause proves special circumstances, after which exemption from repayment is made.

There are four different EU funding systems, which are useful as PDA schemes - directly or indirectly. A brief purpose description from the four support schemes can illuminate the use and the thinking behind the PDA: [8]

ELENA: European Local Energy Assistance (ELENA) provides grants for technical assistance focused on the implementation of energy efficiency, distribution of renewable energy and urban transport projects and programmes. The grant can be used to finance costs related to feasibility and market studies, programme structuring, business plans, energy audits and financial structuring, as well as to the preparation of tendering procedures, contractual arrangements and project implementation units.

ELENA supports programmes above EUR 30 million over a period of around 2-4 years, and can cover up to 90% of technical assistance/project development costs. Smaller projects can be supported when they are integrated into larger investment programmes. The supported countries are the EU-28 plus 13 other neighbouring countries.

Horizon 2020 Project Development Assistance: The support is for the hiring of experts and the preparation of bankable projects. Horizon 2020 is a technical assistance facility. The PDA will support needed for project development and leading to launch of concrete investments, which is the final aim and deliverable of the PDA- project.

European Energy Efficiency Fund (eeef -TA. Technical Assistance Facility) supports projects in the sector of energy efficiency and partly small-scale renewable energy.

eeef-TA aims to bridge the gap between sustainable energy plans and real investments by supporting the beneficiary by way of allocating consultant services to the planned investment programmes (for example for feasibility studies, energy audits and evaluating the economic viability of investments, legal project support). It also covers direct staff costs of the TA beneficiaries if required. Should the investment programme not to be financed by eeef, the reimbursement of services previously paid by eeef is mandatory.

Jaspers: Joint Assistance to support Projects in European Regions (Jaspers) helps cities and regions absorb European funds through support to help prepare high

[8] See the internet address: https://www.eumayors.eu/support/funding.html. The brief subsequent description of the four support programmes can be downloaded from the Internet at the above address. It should be pointed out that the descriptions of the four programmes are based on the current situation. The programs will or may be modified for the future investment periods.

quality projects. Jaspers offers free of charge assistance for local authorities and promoters for any stage of the project cycle from the early stages of project conception through to the final application for EU funding.

These descriptions of EU project development assistance help to emphasize that it is very necessary to pay attention to the initial project cycle. There are a number of other options for establishing this type of support schemes. Some of these are mentioned below:

[2] Public-private cooperation as PDA schemes:

Another possibility to cover the expenses in phases 1 and 2 could take place through private-public cooperation, where the risk-sharing is arranged in such a way that it becomes sufficiently attractive for the private parties to enter into the project development, for instance through collaboration with public (municipal or communal) utilities companies. Cooperation could also include private utilities. This option is due to the fact that the funds for phases 1 and 2 of the project cycle are seen as a (risky) investment for project company. In the situation that the construction project fails, the investment in phases 1 and 2 will be amortized by the partnership or by the utility as a loss on general commercial terms.

[3] Regional/municipal development programme and company

A third option could be that a Region, its municipalities, the municipal utilities or local private utilities set up a joint development programme. The type of support programmes is found in many of the partner countries of this project. The development program may perhaps be strengthened institutional by establishing a dedicated development company.

It is here assumed that the economic benefit of a joint regional/municipal development activities will be able to cover costs from Phase 1 and Phase 2 for projects, which is not implemented, i.e. not reaching phase 3, meaning that the investments made in phase 1 and 2 must be written off. A community-based development company could therefore allocate funds to Phases 1 and 2 for specific projects, and cover any expenses in case the projects in question cannot be implemented.

[4] Build-Operate-Transfer local ownership

An increasingly common situation in the project partner countries is that the investments - the entire project cycle - are financed by external companies, for example in the light of existing national subsidy schemes. This is may imply a reduced local involvement in the renewable energy project, and in a number of cases will be a direct

obstacle to the implementation of the project, for projects on collective heat supply on renewable energy, for example, as they require local commitment.

One possible solution to the question of ensuring local ownership could be to apply the principle of successively locally transferred ownership, for instance through the system known as BOT - Build-Operate-Transfer or similar thinking. In the situation where the construction project fails, the investment in Phase 1 and Phase 2 must be covered by the external company and be considered as a calculated risk for the company in question.

[5] State or regional Guarantee fund as a PDA scheme

A fifth possibility is that an actual guarantee fund be established which covers the costs from the first and second phase of the project cycle. The type of schemes exists to varying degrees in the project partner countries.

Here, reference should be made to the Danish wind turbine guarantee scheme, [9] which is a loan scheme providing »… guarantee to local wind turbine companies or other local initiative groups for loans that are included in the financing of feasibility studies, including for examination of locations, technical and economic assessments and preparation of applications to authorities, to set up one or more wind turbine…«. A number of specific conditions are attached to the guarantee provision, which are intended to ensure local development and local ownership of the wind turbine project.

[6] Interreg and research & development programmes as PDA scheme

There are several options for support programmes: A first possibility is that parts of the necessary expenses in the initial project cycle (Phases 1 and 2) are covered by one of the programmes mentioned in note 1. Another option would be to incorporate parts of the initial project cycle into national environmental technology and energy technology development programs or in an interreg program (North Sea Region, Baltic Sea Region, South Baltic, Øresund-Kattegat-Skagerak, Deutschland-Danmark, etc.)

In general, it is be necessary to adapt the project purpose to the purposes that are prioritized within the Interreg development programmes. These support programmes are based on direct grants and will not normally be investment-related grants. In the situation that the construction project is not carried out on the basis of the initial phase 1 and 2 activity, the activities may have contributed to greater knowledge of the local renewable energy opportunities among the partner countries in the Interreg-project.

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9 Cf. Executive Order on the Promotion of Renewable Energy [Bekendtgørelse af lov om fremme af vedvarende energi. LBK nr 1288 af 27/10/2016, § 21. (Guarantee fund to support financing of local wind turbine company pre-studies, etc.).

It should be noted that some of the programs listed and their support options are subject to restrictions, limiting the direct aid to individual businesses (State aid Directive); but these programs can - through case studies and initial screenings of opportunities - contribute to the first steps of an investment program or project investment.

2.4. Summary - financing the first two steps in the project cycle

In conclusion, it should be noted that the financing of the initial project cycle - and the opportunities indicated above - is particularly important if a local commitment is to be created in the transition to renewable energy, previous experience has shown this. The significance of the initial project cycle - phase 1 and phase 2 - can be summarized in the following points:

- ***Financial risk management:*** Thorough and in-depth preliminary investigations and optimization of a project's technology, economy and legal basis may, in particular, contribute to the bankability of the project. An initial project cycle is - as previously shown, an important element in a project's risk assessment and in reduction of risk.
- ***Local involvement:*** A number of the funding forms outlined above will ensure a higher degree of local involvement. The activities in Phase 1 and 2 are thus not just about financial risk management, but also about ensuring local involvement and support for renewable energy projects. It is also important for subsequent financing.
- ***Structured decision-making:*** Adequate funds are an important prerequisite for the participants in the process to take justified decision step by step. Phases 1 and 2 are not about large sums of money, but about an ***elongated process.*** Typically, phase 1 and 2 will take 2-5 years depending on the type of project; while the building process - Phase 3 - in many cases may take half a year to a year. Sufficient funding for Phase 1 and 2 will unconditionally be a prerequisite for increasing investments in renewable energy sources.

A detailed description of a general project cycle for renewable energy projects has been given in the appendix. The concrete projects cycle may look different; but it is expected that the description will in general be relevant for most renewable energy projects (se appendix 1).

3. Current financing possibilities [2] - Phase 3

As stated above, the PDA scheme can to a large extent develop and anchor renewable energy projects locally. But what happens in the third phase - the real investment phase? Does it develop local ownership develop? This depends very much on the previous project cycle (Phase 1 and 2) and on the funding available.

3.1. Local ownership

As an introduction to the development of a local ownership, reference must be made to input from the European Committee of the Regions. The document mentions a number of key findings. The document from the Committee states among other things: [10] ».... energy is important for the economy of local communities, because it is factored into the production costs of local industry and services and is reflected in households' purchasing power ...«.

This justifies the need to gain control of energy production. The Regional Committee stated further in the document that ».... the regional and administrative entities can only assume (even partial) control of energy systems through ***re-municipalisation, decentralisation*** of services or ***participatory governance*** in the form of partnerships or energy cooperatives which prove their value by promoting public initiatives in the field of energy« (ibid. - my highlight).

How should the local energy community system be implemented? There are ».... many possible organisational structures for community energy initiatives, such as partnerships with local authorities (including public-private partnerships, or PPPs), cooperatives, community foundations, limited liability companies, non-profit customer-owned enterprises, housing associations or municipal ownership...« (ibid.).

There is a strong focus on ownership, and where the model for such ownership could be ***energy cooperative***; but what are the prerequisites? The committee's conclusions and recommendations call for more »... stable policies on renewable energy and the energy transition, with guaranteed financial support mechanisms for renewable energy, so that local energy ownership can be placed on a more secure footing...« (ibid. - my highlight).

The themes are thus re-municipalization, decentralization and participatory governance with the organization of energy production in energy cooperatives, all in the light of

[10] Cf. Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe, European Committee of the Regions; 131st plenary session, 5-6 December 2018, Key findings, partly quotes from no. 2, 3, 4, 5 and 6 and from conclusions and recommendations.

a local energy ownership. The question is then whether it is possible to secure the necessary funding in this way?

The question is here: What is the relationship between ownership and financing? Are there certain forms of financing that promote local ownership and others that exclude it? There is no general answer to this; it must be investigated in concrete terms.

3.2. Financing options in Phase 3

Table 1 (see page 11) shows that phase 3 - the specific construction investment - contains the largest amount investment, namely 95-98% of the total investment cost for the project with a relatively little difference between the different types of project.

General expierince of investment: Appendix 2 shows which investors are the source of funding for renewable energy projects worldwide in 2015/2016. The overview shows that the private investment sources are completely dominant (66%). Financing from private financial intermediaries covers 25%; the public financial intermediaries account for 7%, while the last portion comes from public sources by 2%.

The private investment sources, covering the mentioned 66% are distributed as follows: 43% project developer, 12% corporate actors while households account for 11%. 54% of the investments are loan-financed, while 43% are financed through own funds (equity).

In the case of a large-scale implementation of renewable energy sources, one must expect the same pattern - some of the facilities being loan-financed, while others are financed through their own funds.

The focus is on the different funding systems and their possible harmony or disharmony with the idea of local energy communities and energy ownership: is shown here

- ***Private household investments:*** Typical financing of individual energy plants, e.g. building's integrated facilities. Private household investments contribute directly to the development of local ownership. Although there are smaller individual facilities, they could support the development of the local energy community through direct relationship between renewable energy production and supply.
- ***Loan capital with municipal guarantee***: There is four Nordic municipality lenders, namely: Kommuninvest, Kommunalbanken, KommuneKredit and MuniFin. They issue debt in the capital markets, and lend the proceeds to municipalities and other regional and local government (RLG) bodies. These municipal lenders have a narrow not-profit public policy mandate. They represent a form of financing that can support local energy communities on a larger scale.

- ***Loan capital from mortgage banks and regular banks.*** The general impression is that there is only limited funding accessible from these sources, because the renewable energy plants typically do not meet the financial actors' requirements for key figures, risk hedging and documentation. Perhaps the financing interest can be increased, if phase 1 and 2 of a given project are carried out with greater thoroughness and documentation.

- ***International investment banks.*** Here, there are two banks that are of special interest, namely European Investment Bank (EIB); this bank is owned by and representing the interests of the European Union Member States, working closely to implement EU policy. The other bank is Nordic Investment Bank (NIB), working as an international financial institution of the Nordic and Baltic countries. Due to their political goals, these two banks are expected to be able to offer financing in such a form that can support local energy communities on a larger scale.

It should be noted that the EIB has previously been mentioned (section 2.3) in relation to Phase 1 and 2, because they also work with Project Development Assistance (PDA). The majority of EIB financing is through loans, but they also offer guarantees, microfinance, equity investment, etc. EIB supports projects that make a significant contribution to growth, employment, regional cohesion and environmental sustainability in Europe and beyond.

NIB provides loans and guarantees to private and public companies, governments, municipalities and financial institutions. The financing is based on sound banking principles: All projects financed by the bank should strengthen competitiveness, and/or enhance the environment.

Energy is single largest focus sector in the Bank's lending activities. The following additional investment opportunities should be mentioned:

- ***Risk capital from local or regional utilities:*** It is expected that utilities that so far have used fossil energy sources (coal, natural gas, lignite, oil, etc.) might have an interest - for ideal reasons or business reasons - in moving into the renewable energy areas.

If the companies have a regional affiliation, they are expected to represent a large-scale type of financing that can support local energy communities. A Danish example is the natural gas company Nature Energy, which has now built a large number of biogas plants around in the country as part of a renewable energy transition.

- ***Risk capital from private equity funds.*** There are examples of private equity funds investing for shorter or longer periods in renewable energy companies, for instance in wind turbine companies. The time horizon for this type of private equity fund is

often short. The capital funds usually invest in companies for resale (and profit) within a few years. The type of funding is not suitable for developing local ownership and local energy communities.

There may be other forms of financing that can contribute to the creation of renewable energy plants; for example, pension companies, financing through the Public-Private partnership.

3.3. Summary - financing the third step in the project cycle

This section has introduced the concept of local energy communities and the idea of local energy ownership in order to assess the financing of the capital investments. The concept of local energy communities and the idea of local energy ownership are focused on re-municipalization, decentralization and participatory governance.

The ***first condition*** for the development of local ownership is that there is sufficient funding in the initial part of the project cycle, i.e. phase 1 and 2. It is in these phases that the foundation is created for re-municipalization and decentralization through local involvement.

The ***second condition*** is whether there is financing opportunities in harmony with the idea of local energy ownership. This is the case for a number of different types of investment: Private household investment, loan capital with municipal guarantee, international investment banks (EIB and NIB), and also, possibly, risk capital from local or regional utilities.

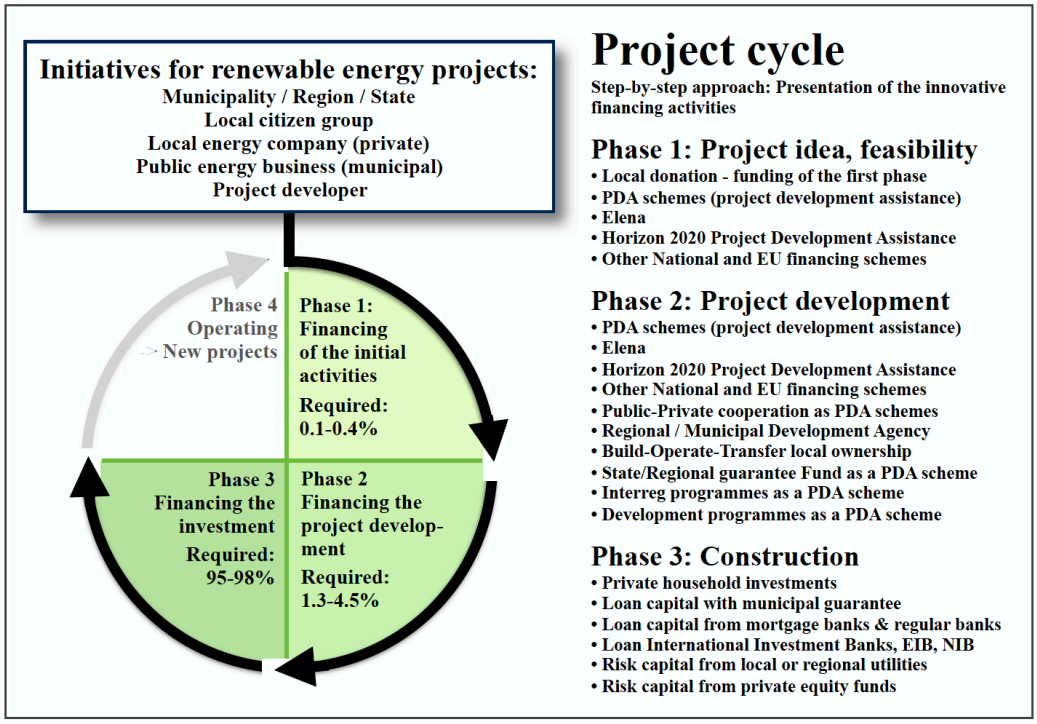
This is a general picture. It is, of course, necessary to examine the financing conditions for the specific project under specific national and regional framework conditions.

4. Guidelines for innovative financing systems

There is a close relationship between the project cycle and the need and form for funding. It has been demonstrated above. There are a number of different support schemes the project partner countries. A summary of the most relevant are found in appendix 3. The best way to summarize the various viewpoints and discussions will be to show how different innovative finance approaches can help to reduce conflicts and problems in the development and implementation of renewable energy projects.

The close relationship between the project cycle and the need for financial support can be illustrated with the following figure:

Figure 6: **The steps in the project cycle and relation to different financial possibilities.**



The figure illustrates that there will be many different types of initiatives that lead to the establishment of renewable energy plants. It can be authorities (as consumer or as producer), it can be local citizen groups, energy companies, project developers, and many other types of initiatives. It is necessary to be aware that initiatives can come from many different stakeholders.

Renewable energy projects can have widely different origins or sources. In many EU cities and municipalities, a great deal of work has been done to develop coherent climate action plans or sustainable energy action plans, etc., not least in connection with the ***Covenant of Mayors***. These plans serve as a framework and inspiration, and may reinforce individual projects and efforts.

There are three topics that should mention before the formulation of guidelines for innovative financing:

- ***Focus:*** In the following focus on some of the views presented by the European Committee of the Regions with their focus on re-municipalisation, decentralisation and participatory governance in the form of partnerships or energy cooperatives (see section 3.1).
- ***Innovation:*** Innovative financing is not seen as a way to increase financial subsidies for uneconomic projects; but is seen as a matter of using the financial instruments to create more economically sustainable renewable energy projects.
- ***Spatial planning:*** Experience has shown that many renewable energy projects take too long, often end up in conflict situations, where spatial planning processes often play a negative role.

The spatial planning process is often very complicated and consists of many different elements. In some of the partner countries, there is also shared authority in the spatial planning process (municipality and state). [11] Spatial planning requires a long time, and The spatial plan planning requires long time, and often the time spent is not foreseeable. [12]

4.1. Guideline for financing in Phase 1: Project idea, feasibility

Starting point the project cycle. The approach is as follows: First, the most important activities in that phase are described, followed with proposals to finance these activities.

In the first phase of the development of a renewable energy project the following three activities run throughout the whole phase:

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[11] See the BEA-APP report »Creating space for renewables«, Roskilde University, 2017, in general and in more detail for the planning system in Finland (p.19), Denmark (p. 20) and the Lithuania (p. 24).

[12] At the first transnational dialogue meeting in the BEA-APP project, which took place in Roskilde, Mai 2017, the timeline for a biogas plant and for a wind farm project was documented: (1) Solrød Biogas: Planning started in 2008 and biogas plant was producing in the end of 2915. The spatial planning toke place in the period 2010-2014 - ***5 years in all for the spatial planning***. See: Site visit Solrød Biogas A/S. Introduction and background materials and Timeline Solrød Biogas A/S 2008-2015. BEA-APP Transnational Dialogue Meeting; Roskilde, May 2017. (2) Wind farm project Turebylille: The project was started in 2005 with a Regional Spatial Plan and the wind farm started producing in the last month of 2016. The detailed spatial planning toke place in the period 2010-2016 - ***7 years in all for the spatial planning***. See: Site visit Turebylille Wind farm. Background materials. BEA-APP Transnational Dialogue Meeting;

- Renewable energy plant opportunities - ideas for renewable energy plant
- Technical and financial assessment - feasibility studies.
- Location or sites for the renewable energy plant

Renewable energy plant opportunities: Active citizen involvement is very important and depends on the participation of a number of other parties, namely authorities, potential owners of the proposed facility. Citizen involvement is much more than citizen meetings. Most importantly, it is organized in such a form where as many citizens as possible have the opportunity to provide input into the process.

[1] Financing guideline for active citizen involvement - phase 1:

The economy of citizen involvement is often underestimated. Money is needed for citizen meeting, newsletters, website, printed material, distribution of material, etc. Experience shows that expenditure can easily run up to € 90,000-100,000 for a regular project. Project owners may be inclined to perceive these expenses as useless because they do not directly contribute to the project.

Citizen involvement is an ongoing process throughout the entire period. If funds are not accessible, the process will not take place. The various forms of PDA funding or PDA-like funding would be ideal to meet this need.

However, often »fast money« is needed. If there is an immediate need for funding for citizen involvement, it is not possible to wait for grants from this type of application (national or EU funding). An alternative could be the following:

- Donation from a large company in the area, e.g. tied to their CSR policy (Company Social Responsibility), green profile, etc. The local donations can help support the local anchorage of the project.
- Donation from the municipality, for instance business promotions fund, environmental improvement funds, climate action funds, etc.
- Financing from own pocket - the potential plant owner.

[2] Financing guideline technical and financial assessment - phase 1

For active citizens as well as for potential project owners, it is important to get an overview of the project's finances - perhaps not in detail, but sufficient information to assess the financial consequences and opportunities. Expert assistance is needed.

The various forms of PDA funding or PDA-like funding are ideal to meet this needs. It will allow calculations to optimize the planned energy facility before proceeding to the spatial planning. If funds are not available for this type of activity, alternatives could be the following:

- Visit similar facilities for information on technology and economy of for instance a wind power plant, biogas plant, solar heating plant, district heating plant, etc. This type of visit is very important for the local involvement processes: »To see what you can get« - It is the typical experience.
- Advice from the various associations - wind, solar, biogas, district heating - In most cases the different national associations can provide useful information.
- Advice from knowledge institutions, related to the chosen technology.

Of course, the best thing is to have the financial means for calculating the economy of a renewable energy project before moving on. It is an obvious shortcoming that can result in projects that must be abandoned later. [13]

[3] Financing guideline for location of the renewable energy plant

Many of the renewable energy plants will be located outside urban areas - apart from building integrated energy plants (solar). Maybe the municipality has a climate or energy plan, which can be a good starting point for the specific location in the rural area? Perhaps the local authorities have worked out a comprehensive solution - a comprehensive view of the energy supply, planning of renewable energy systems in the rural area? Perhaps the municipality has conducted an initial screening of suitable areas, etc. for various renewable energy plants? This type of activity can help to create a constructive dialogue and debate about different options and solutions.

The discussion of localization is a very important part of citizen involvement. It requires a great deal of openness and insight into a number of localization factors. The various forms of PDA funding or PDA-like funding is still ideal to meet the financing needs for these activities. If these funds are not available, then there are the following options:

- The municipality is asked for advice and guidance. The project initiator or project working group asks the municipality for advice (not decision) on different locations. The viewpoint is further discussed with active citizens as well as with po-

[13] In connection with one of our case study in the project - Smart heating system - we have prepared a calculation tool for calculating the expected expenses for each individual citizen when establishing a district heating system. The costing system provides a specific calculation for each citizen about his expected expenses (and savings). The system has been used at a number of citizen meetings, and has been a great success in creating transparency and overview for the individual citizen. See the two BEA-APP reports »Calculation Tool. Prices and savings in new district heating systems« Roskilde University, March 2019; and: The case study Smart Heating Systems. Surplus heat for Havdrup and Kirke Skensved. Case study in BEA-APP; Roskilde University 2018. The development of this tool is part of the BEA-APP project, and therefore an example of how an Interreg project can contribute to PDA-like funding.

tential project owners to get ideas about possible placements that can proceed in the subsequent process. Any additional expenses are paid out of own pocket.

- Donations from local stakeholders, which makes it possible to hire experts for the optimal assessment of location and alternative locations of a given renewable energy plant.

An important element of the innovative financing is sufficient funding accessible in the initial stages of the project. It provides better projects and projects that are much better anchored locally.

Summary: Everyone knows how important it is for local citizens to be involved in the establishment of renewable energy systems. But it will not happen if sufficient funds are not available.

The problem is as follows: Those who grant the funding have no assurance that the project will be completed. This decision comes only much later - after the end of Phase 2. It is a situation that is shared between potential donor and potential project owners.

4.2. Guideline for financing in Phase 2: Development of the project

After the completion of phase 1, the project is more or less well defined. The project is supported by active citizen in the local community. What's next:

- Project document: Development of project for the various applications
- The spatial planning: Municipal plan, local plan, environmental impact assessment of the plans. Environmental impact of the proposed project.
- Ownership, project design and tender.

The situation is the same as before. It is necessary to finance these activities without knowing, if the project will be completed. It depends on the final government approval and the final business case in phase 2 of the project.

[4] Financing guideline for project document - phase 2:

A number of applications must be prepared in phase 2. In order to prepare good applications describing all relevant aspects at the desired level, it would be advantageous to prepare a comprehensive project document containing the various information to be submitted in the different applications. The project document must - in aggregated form - contain information to be used in preparation of EIA (environmental impact assessment), municipal plan, local plan and possible environmental approval.

The comprehensive project document result in three benefits. The first benefit is time-saving to prepare such a unifying document. This makes it easier to handle the dialogue with the authorities and the dialogue with the active citizens. It also makes it easier to change the different applications if the prerequisites are changed during the process. The overall project document should be prepared in such a way that it is easy to detect the consequences of changes in the project.

For example, what would be the impact if the number wind turbines was cut to reduce noise? What will it mean for transport costs for a biogas plant if it is located elsewhere? What would be the consequences - economically and technically - if the areas to be connected to a future district heating system were changed, etc.?

The second benefit is: You will always come up with changed prerequisites or wishes for change. It is time-consuming if a consultant has to advise on the changes during the approval process, rather than appearing directly in the project document and its calculations. It will also open up more action-oriented dialogue between authority and project owner. The system has been very successfully developed within the biogas field in Sweden and Denmark.

The third benefit is: A comprehensive project description can be prepared, which can also form the basis for the plant design and tender for the construction project. The project document is a business for financial-technical consultancy. The preparation of this project document by consultancy could be financed in various ways:

- The most obvious financing will be the various forms of PDA funding or PDA-like funding schemes.
- Alternatively, it could be financed by regional/municipal development agency, or a public utilities company, whereby covering the risk alone is a public matter.
- Another alternative could be financing by public-private cooperation, where they jointly cover the risk associated with whether or not the project is being implemented.
- The fourth alternative could be financing by private company, project developer, etc., where the risk is entirely on the company's side.

The different forms of financing have a major impact on the extent to which one can obtain re-municipalisation, decentralisation and participatory governance in the form of partnerships or energy cooperatives as stated by European Committee of the Regions.

If only private financing is an option, it might be possibly to make an agreement on transferring the ownership over a period of time to local ownership (according to the principle: Build-Operate-Transfer local ownership).

[5] Financing guideline for spatial planning - phase 2:

These are mostly complex areas where it is difficult to predict the final cost of the project, especially as additional costs may arise in the course of the spatial planning process as a result of changes in conditions, prerequisites, complaints, etc. The spatial planning process can be described by the following figure which illustrates the spatial planning process for a number of energy plants: [14]

Figure 10. The spatial planning process - illustrated with the Danish organisation of the rules.

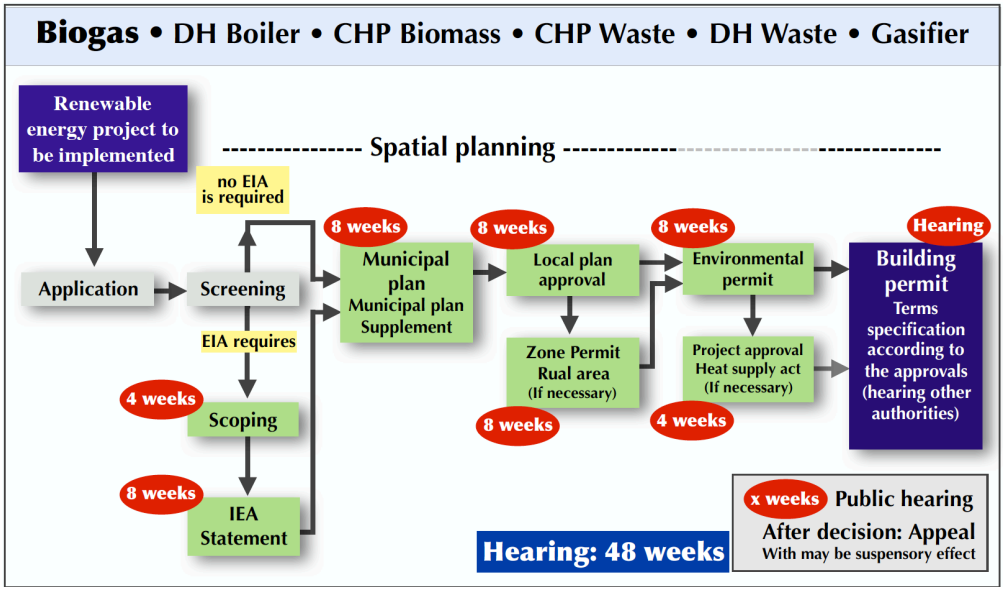


Figure 5 in this report (page 12) show that the spatial planning and permits accounts for 25-40% of the total expenditure in phases 1 and 2. It is a significant expenditure, which is mainly covered by the project applicant. Spending varies slightly from country to country among the project partner countries; but here are the main elements:

- The EIA (Environmental Impact Assessment) must be prepared and paid for by the applicant. It is often the largest single item in phase 2.
- The municipal plan prepared by the municipality. In the case of a supplement, the applicant may prepare it; but typically the municipality will prepare the supplement itself, and in some cases a bill will be sent to the applicant. The municipal plan / supplement to the municipal plan must be environmentally assessed.

[14] The figure is from the BEA-APP report: Transnational report on state of play in spatial planning for renewable energy in the participating regions: »Creating space for renewables«, Roskilde University, November 2018 (final version). There are major differences between partner countries in the organization of spatial planning; but the basic elements are the same as a result of main regulations, due to the EIA Directive (2014/52 / EU) and the IE Directive (2010/75 / EU).

- The local plan is prepared by the municipality. In some cases, the cost of this will end with the applicant. The applicant can prepare proposals for a local plan. The site plan must be environmentally assessed in accordance with the applicable rules of the EIA Directive.
- Environmental approval is prepared as a draft by the applicant and then finalized by the authority and in some cases with a bill to the applicant.

Applicants will typically not be able to prepare the relevant documents and contributions to documents themselves. Consultancy is needed. The expense of EIA is often what makes project applicants hesitate. It is one big expense (typically between 50,000 to 100,000 €) to be held at once. The financing options are, as above, based on:

- Financing through the various forms of PDA funding or PDA-like funding schemes; among others ELENA (European local Energy Assistance), Horizon 2020 PDA-scheme, and other types of PDA-like schemes, for instance Interreg-programmes.
- Public financing through regional/municipal development agency, or a public utilities company.
- Through public-private cooperation, including private donation to establish the local renewable energy project.
- Financed by private company, project developer, or similar.

The spatial planning could have a dual function: On the one hand, it contributes to incorporating relevant spatial and environmental considerations into the planning of a plant. On the other hand, it could be designed so that regulatory work also contributes to better and more advantageous projects, both economically, spatially, technically and environmentally.

[6] Financing guideline for ownership, project design, tender - phase 2:

This is the least complicated phase because the applicant is now in the situation that the project has obtained the necessary approvals. There will be relatively large costs - depending on the type of plant - for legal advice on company formation and planning and preparation of a tender.

You will typically be able to obtain pre-financing with reference to the approvals obtained. PDA funding or PDA funding will still be very relevant to cover the costs at this stage, but it is far from as crucial as in the previous stages.

In a normal situation, companies planning to build a new plant will easily be able to finance the plant and all the costs of setting up the plant if there is a market basis for production.

For renewable energy, the situation is different: The major challenge here is that the cost of switching to renewable energy is typically higher than the fossil energy supply. The renewable energy plant is dependent on either operating or investment support. Uncertainty about the support and its size, uncertainty about the future situation create difficulties in financing.

4.3. Guideline for financing in Phase 3: The bankable project

Now it is all about financing the large amount, that is a sum of 95% to 98% of the total capital investment. After a long process that has taken at least 3-5 years, the new potentiel project-owners are going to finance the plant. Typically, there are two different forms of financing, partly forms where you can obtain a full financing and forms where a larger or smaller deposit - typically 20% of the investment - is required.

If grants have been obtained for the implementation of the previous stages, this grant can be used as subordinated loan capital in the project. The main financing options are the following:

- Loan capital with municipal guarantee is the most obvious financing source for investment (among others Kommuninvest, Kommunalbanken, KommuneKredit a and MuniFin). These municipal lenders have a narrow not-profit public policy mandat. and will be able to greatly support local ownership. The entire construction sum can be financed; no deposit capital is needed. Of course, this requires that the project can obtain a municipal guarantee from the municipalities concerned
- The international investment bank - EIB (European Investment Bank) and NIB (Nordic Investment Bank). EIB offers many different opportunities, including offering loans, guarantees, equity investments and advisory services.
- Alternatives for securing local investment and ownership could be risk capital from local or regional utilities (electricity, heating, etc.). These companies might have an interest in moving into the renewable energy area.
- A fourth option is either loan capital from mortgage banks or regular banks and risk capital from private equity funds.

Funding for financially feasible renewable energy projects is generally not a problem; but what are the options if the projects are not quite feasible or contains a large risk factor? This should be briefly illustrated by looking at another financing options linked to partial self-supply.

4.4. Guideline for financing through local supply and local ownership

The starting point is the concept of »Local Energy Communities« and the following supply situation for a single house, or a number of houses. We assume that there is a direct supply of electricity to the houses from a wind turbine that supplies all houses with electricity, when the wind blows. We assume that the wind turbine produces around 30% of consumption of electricity.

In this situation, the houses are self-suppled with electricity when the wind blows. Electricity is purchased when the wind is not blowing, and excess electricity is sold to the grid if the wind turbine produces more than the houses are consuming.

The following is based on Lithuania with the lowest electricity prices and the lowest energy tax, and Denmark with the highest electricity prices and the highest energy tax. In Lithuania, household electricity prices in 2018 was € 11.0-cents per kWh, while Danish households' electricity prices was € 26.6-cents per kWh. [15]

With the self-supply, the transmission cost (the high network charge) is saved. In Lithuania 3.4 € cents per kWh are saved and in Denmark 5.4 € cents per kWh are saved.

It can also be argued that no energy tax should be paid for the self-supplied electricity. Energy tax do not have to be paid for self-supply in Denmark, but Lithuania's rules are less clear. However, we assume that no taxes should not be paid for the self-supply. This implies that the consumers may save 3.3 € cent per kWh in Lithuania and 21.2 € cent per kWh in Denmark for one kWh self-supplied renewable electricity.

Together the savings on transmission and taxes in Lithuania is € 6.7-cents per kWh and is € 26.6-cent per kWh in Denmark. The establishment of local energy communities following will following this prescription provide significant financial incentives to promote renewable energy in local communities. The other partner countries has transmission costs and taxes which are in between the two extremes in respectively Lithuania and Denmark.

4.5. Summary on guidelines for innovative financing

It is often said that it is difficult to find financing for renewable energy projects. It is hardly accurate. Rather, the problem is that it is difficult to develop bankable renewable energy projects for two reasons. Firstly, developing and establishing a renewable energy project is an elongated affair with an uncertain end-date. Secondly, there are a lack of attention to the financing needs of the initial and subsequent phases.

[15] Eurostat, Energy statistics 2018.

In section 2 and 3 were examined a number of financing options available in the project partner countries. In the Guidelines for Innovative Financing System in Section 4, the various financing options were directly linked to a three-part project cycle (phase 1 to 3) for renewable energy projects.

The view here is that innovative financing is not special investment schemes, but customized investment schemes that are adapted to each step of a project's typical timeline of 4-7 years.

The first two phases of the project cycle must be financed without certainty that the project can be implemented. It can only be decided at the end of phase 2. Only after the approval of the authorities and after the development of ownership and business case can the project owners be sure that the project can be financed and implemented.

The first phase: Financing possibilities are limited in the first phase of the project cycle. To ensure the involvement of active citizens in the development of the renewable energy project, funding for this type of activity is needed. Often is »fast money« needed, which may be secured through local donations from companies or from the municipality / region.

The second phase: The second phase includes a number of expenses that absolutely must be held. Here plays the so-called PDA funding model an important role. The PDA scheme or the project Development Assistance contains a subsidy element if the renewable energy project is implemented, but also a repayment requirement if the plant is not built, especially if the project owner is to blame for the lack of implementation. The standard scheme provides 90% support for up to a twentieth share of total investment.

PDA funding and PDA-like forms of financing are very suitable for Phase 2, because this phase is often very elongated with uncertainty about the future.

The third phase: As an introduction to the third phase, all regulatory approvals are in place and a number of prerequisites for the established energy plant are in place. At this stage, there are a number of financing possibilities with favourable depreciation and interest rates, including a number that directly support local ownership and local energy production.

5. Models for better interaction between spatial planning and financing

The renewable energy system has a number of properties that create special needs and challenges for spatial planning. Renewable energy is predominantly based on distributed energy sources. There is not one central energy source, but a number of energy sources of different sizes with different spatial requirements.

Fossil energy supply, for instance coal-fired power plant can easily be established in an urban area and typically near a port with a capacity of 1,000-2,000 MW. The renewable energy plants will - on the other hand - be much smaller and will require many more plants. A large windmill will typically have a capacity of 3 MW. The challenge for spatial planning is to create space for renewable energy plants.

It is a common experience that the establishment of renewable energy plants often ends up with a very long and uncertain process.

It is not only due to spatial planning, but in many cases spatial planning and especially its organization is responsible for the elongated process. There are several reasons for this. Spatial planning is very complex, both in terms of content and in its organization. In the following, two models must be presented which will contribute to a faster, better and more efficient process. The models are as follows:

- Model for improving interaction between project owner and spatial planning authorities. In a number of areas it is possible to improve this interaction.
- Model to improve spatial planning, with particular focus on organization of the spatial planning and its different tasks.

5.1. Model for improving interaction between project owner and spatial planning

One often hear the point of view that spatial planning is a restriction or rejection planning. The thinking here is as follows: The implementation of several renewable energy systems requires the involvement of active citizens to promote good and relevant energy solutions. The task of spatial planning is »governing through enabling«.[16]

[16] In the report »Innovations in Multi-level Governance for Energy Efficiency« the authors outlines three ways of governance, namely: Governing by authority (direct intervention). Governing by commission (rules) and Governing through enabling. EIA Information Papier December 2009. Governing through enabling is a key word for spatial planning if it should support a local, decentralized and participatory governance.

The task for the spatial planning process is to create opportunities. This will create a positive interaction between project owners, active citizens and the authorities.

The interaction starts in phase 1, but is especially developed in phase 2. Improving this interaction has two aspects. One aspect is about the project document mentioned earlier. The second aspects is about the delimitations or the clarification of the conditions that must be included in the spatial planning process.

Project document: The idea is that the potential project owner should prepare a comhensive project document containing the various information to be submitted in the different applications for the spatial planning. The project document must - in aggregated form - contain information to be used in preparation of EIA (environmental impact assessment), in input to municipal plan, local plan and possible environmental permit, etc.

The preparation of the coherent project document is expected to create three benefits: Time and labour saving for the project owner; create a more direct and action-oriented dialogue between authority and project owner; and form the basis for the subsequent processes, including preparation of tender material for the construction of the facility.

The delimitations or the clarification of the conditions: The different renewable energy technologies have different spatial requirements and effects. It would be very relevant according to the time spent in relation to spatial planning, including the EIA, if clear guidelines were drawn up on which elements should be included in the contribution to municipal plan, local plan and EIA. Work has begun, for example for wind turbines; but much could be done to simplify documentation and assessment criteria.

5.2. Model for improving interaction between spatial planning and financing.

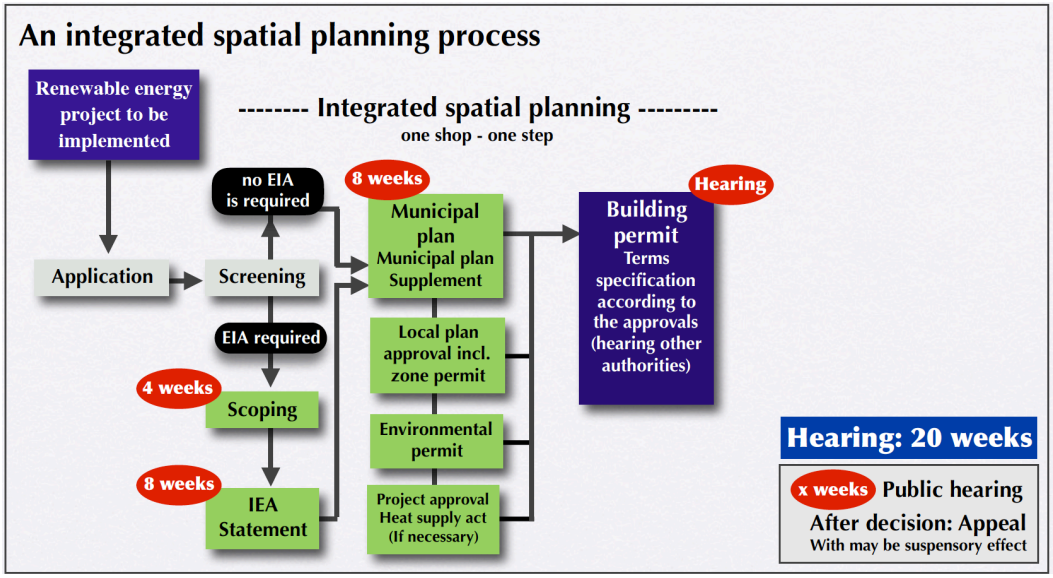
The main problem in the interaction between spatial planning and financing is the uncertainty. The spatial planning takes place in phase 2. This is also where the biggest issues are regarding the interaction.

Typically, there will be a double uncertainty: (1) How long will the spatial planning process last? Will there be new consultation responses, new requirements, additional hearings, etc.? Will it cost more? Of course, this is a financial problem for the potential project owner. (2) The second uncertainty concerns the certainty of obtaining a final approval. Will the project be finally approved - even if time is running out - or will the money spent in both Phase 1 and Phase 2 be wasted?

There is a need to develop a new model for spatial planning, which can be based on two elements. One element is 'one shop', which means only one authority or only one

level of authority. The second element is 'one step' or concurrency in the spatial planning process. The application of these principles could lead to the model below for a new spatial planning process as shown in figure 11.

Figure 11. A new spatial planning process: One shop and one step. Integrated spatial planning process.



The difference between this figure and the current spatial planning process (see Figure 10, p. 28) is as follows: There are only three public hearing sessions versus seven hearing sessions in the existing system (exclusive hearing of the building permit). The hearing period has been reduced to 20 weeks, compared with the existing 48 weeks.

Most importantly, however, there is only one main step to replace the current 4 main steps as a result of the integrated approach in the model for new spatial planning. The model only aims to organize the spatial planning in a more appropriate way. Instead of a series of steps with distinctly the same professional content, only one step is used.

However, there will also be a need to assess the appropriateness of the structure and content of the existing planning system; but it falls outside the scope here.

If there are 48 consultation weeks, a typical case processing time could very easily end up with a total of 3-4 years due to intermediate activities, while 20 consultation weeks could give a case processing time of about 1-1.5 years.

This change will create completely different conditions for financing the activities in Phase 2. Of course, an applicant must accept that an applied project may not be approved; but the decision falls significantly faster, which is crucial to the interaction between spatial planning and the financing or the willingness to finance renewable energy projects.

6. Conclusion

The use of renewable energy must be accelerated. Renewable energy facilities largely depend on both investment support and operating aid. It is necessary to reduce the risks of renewable energy plants from a financial risk management perspective. Renewable energy plants must be made more robust to changes in support regimes and changes in framework and market conditions.

An important key to this is the development of the project cycle and to create a more careful preparation of renewable energy facilities. This can be done by creating the financial basis especially for the initial parts of project cycle, namely for phase 1 (ideas and feasibility) and 2 (project development). It would also be an advantage if the spatial planning in phase 2 could be organized more optimally according to the principles of one shop - one step.

The side effects are obvious: By providing especially the financing for activities in phase 1 and 2 the result will be better and more through-work projects, greater involvement of stakeholders and better financial base for the main investment: A new renewable energy plants.

Appendix 1: The general project cycle for RE projects

The purpose of these annexes is to create an overview of total expenses for the establishment of various renewable energy facilities. The information is based on reported experience, information from advisers, actual construction activities. The investment activities - like the construction process - are divided into three parts:

1) ***The first phase.*** Provides an answer to the question: Is the plant a possible or good idea.
2) ***The second phase (project development):*** This phase answers the question: Is the facility possible, will the authorities approve it? Are potential stakeholders involved? And answers to other issues that are crucial to the final decision to establish the facility.
3) ***The third phase (construction):*** Now the construction decision has been made, and a number of decisions and formalities have to be implemented, the contractor must be chosen, etc.

The planning, investment and construction process for most renewable energy plants is a very lengthy process, which means that it is necessary to have an organization (or donors) that can keep track of the individual elements of the process. The three phases mentioned can be specified as follows:

1) The initial phase - Phase 1 - feasibility phase, which typically includes:

- General concept development
- Assessment of technical and economic opportunities - pre-feasibility study
- Sketch for. stakeholders and ownership, etc. - initial assessment

Decision: Continue / discontinue development of the project.

2) The project development phase - Phase 2

This phase deals typically with activities that uncover the factual opportunities for the establishment of the plant. Here are a number of elements:

- ***Project document:*** Development and specification of the project (ongoing throughout the whole phase)
- ***Technical documentation***, experiment, etc. (for instance digestion experiments at biogas)
- ***Authority - application material for authority***
  - Applications (EIA, Environmental approvals)
  - Geotechnical investigations of the site
  - EIA
  - Municipal plan supplement - spatial planning
  - Local plan - spatial planning (including zone permit, permit for activities in rural areas)
  - Environmental approval
  - Project approval according to the heat supply law
  - Technical / legal advice (government-related)
- ***Development of contracts*** - draft contract for financial assessment of the project.
- ***Company formation*** - initial study, sketch
- ***Tender material*** - construction specifications of the desired plant

Decision: The plant is built / not built.

3) The construction and phase - Phase 3

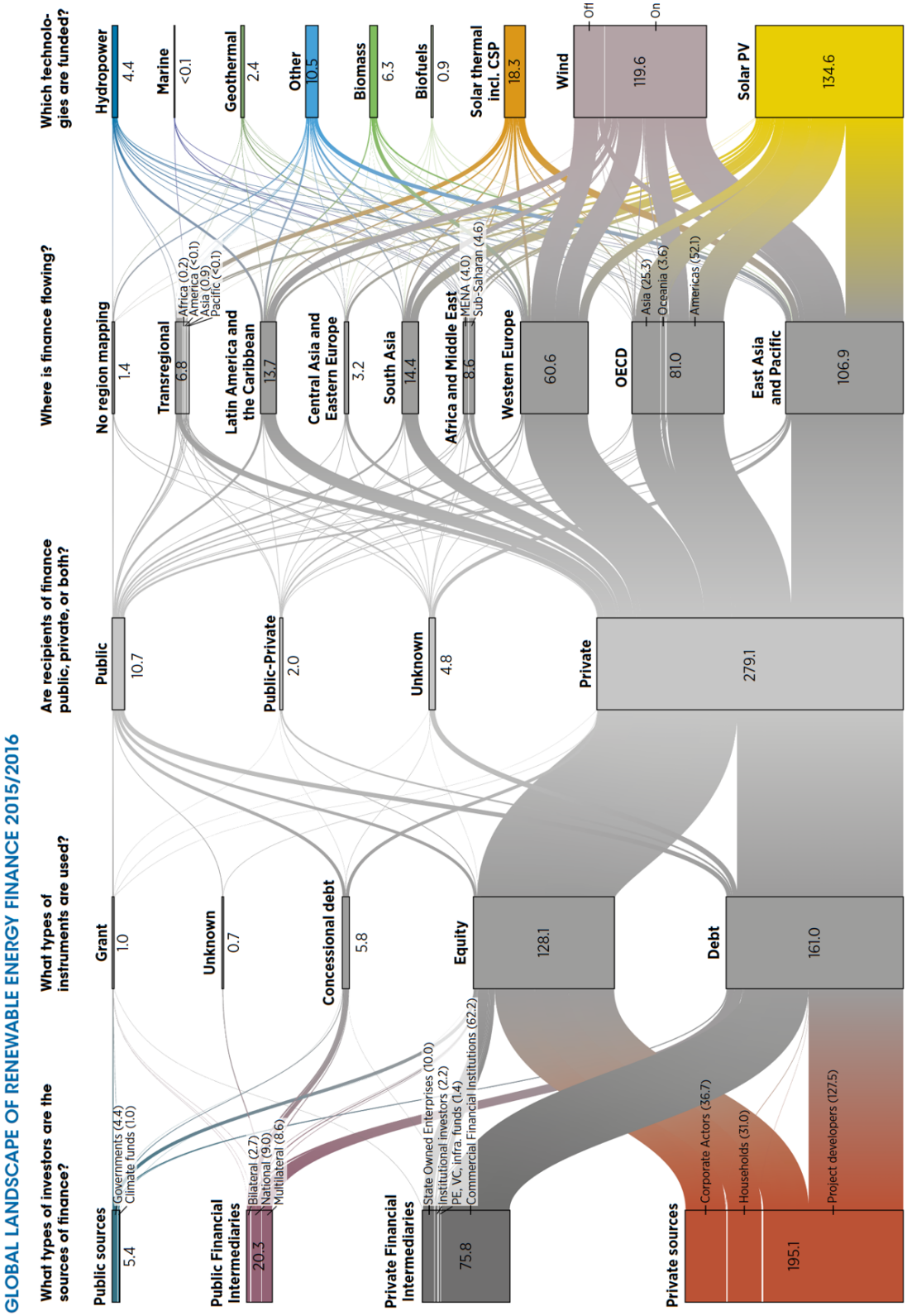
The phase is about building the plant and getting all the contracts in place, which is a prerequisite for construction and later operation of the plant:

- ***Legal / technical assistance*** for the preparation of contracts, etc.
- ***Contracts*** - development and subscription of contracts with suppliers and customers
- ***Financing*** - final financing agreement
- ***Construction contract*** - conclusion of contract with supplier / contractor about the facility.
- ***Building permit*** - preparation of specific material for use for the building permit.
- ***Construction costs*** for the plant, including building site, etc.

Phase 3 is defined as the phase that begins with a final decision to build the plant. However, there may be transitions between the second phase and the third phase. For example, after starting the third phase, it may be needed to return to some of the spatial planning issues in the second phase. In some cases, the final decision on the establishment of facilities will be taken after receipt of tenders for the construction; in other cases, it also requires final financing agreement, etc.

Appendix 2: Investing in RE projects - Global overview

IRENA: Global Landscape of Renewable Energy Finance 2018. Irena 2018.



Appendix 3: References

This reference list includes the documents that the project partner has prepared in connection with the collection of information on topics related to the innovative financing systems:

1. Materials prepared by the project partners:

Germany: Ministry of Energy, Infrastructure and State Development of the Federal Ministry for Economic Affairs and Energy: Installation of solar thermal system; biomass heating systems or heat pumps for private individuals and companies. In addition, the construction of new large heating plants using renewable energy and deep geothermal systems (PP1)

Sweden: Skåne Energy Agency/Biogas Syd / Region Blekinge and Energy Agency for Southeast Sweden: Biogas Ystad Österlen; Financial support schemes for wind power in Sweden; Financial support schemes for roof-top solar energy and solar energy parks in Sweden, Subsidies for PV / photovoltaic (PP2, 3 & 4)

Finland: Regional Council of Central Finland: Mustankorkea Ltd. biogas plant (Waste management company owned by three municipalities). (PP5).

Estonia: Tartu Regional Energy Agency: Reconstruction grant, Grant for the renovation of small buildings, Grant for the renovation of small buildings, Grant for preparation of the development plan for heating management; Grant for effective production and transmission of thermal energy; Grant for introducing gas buses using biomethane in organizing public regular service; Grant for promoting energy efficiency and use of renewable energy in nursery school buildings (PP6).

Lithuania: Lithuanian Energy Institute: Biomass district heating mixed funding. Option 1,2 and 3 in Phase 3 (PP 9).

Poland: Regional Office for Spatial Planning of Westpomeranian Voivodship: Investment support for production of RES in Westpomeranian Voivodship; Financial aid for the inhabitants of the Westpomeranian Region for purchase and assembly of the RES micro installation; Financial aid for entities for from the area of Westpomeranian Region for purchase and assembly of the RES micro installation. (P10).

Denmark: Roskilde University: Department of People and Technology: Investment and subsidy schemes for biogas plant (electricity production and upgrading of biogas to the natural gas grid); Investment and subsidy schemes for a smaller district heating system; Investment and subsidy schemes for district heating based on industrial surplus heating; Investment and subsidy schemes for a solar district heating system; Investment and subsidy schemes for small onshore and larger offshore windmill facility. (P11).

2. Documents:

Creating space for renewable; Transnational report on state of play in spatial planning for renewable energy in the participating regions; Roskilde University; BEA-APP; November 2018.

Deloitte: Afdækning af muligheder for at fremme investeringer i biogas. Status muligheder og betingelser i forbindelse med finansiering af biogasanlæg.
Analyzes of funding opportunities for biogas, prepared by Deloitte and Blue Planet Innovation for the Danish Energy Agency's Biogas Task Force; May 24, 2013.

Executive Order on the Promotion of Renewable Energy [Bekendtgørelse af lov om fremme af vedvarende energi. LBK nr. 1288 af 27/10/2016, § 21]. Guarantee fund to support financing of local wind turbine company pre-studies, etc.

Financing opportunities for Sustainable Energy & Climate Action Plans. Interactive funding guide. Covenant of Mayors for Climate & Energy. Available in all EU languages. See the website: https://www.eumayors.eu/support/funding.html.
»The interactive funding guide gathers information on the funding initiatives managed by the European Union, the Member States and key financial institutions such as the European Investment Bank. Next to these, the guide includes information about support services and innovative financing schemes« (from the website).

IRENA (International Renewable Energy Agency): Unlocking Renewable Energy Investment: The Role of Risk Mitigation and structured Finance; Irene 2016.

IRENA (International Renewable Energy Agency): Global Landscape of Renewable Energy Finance 2018. Irena 2018.

Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe, Commission for the Environment, Climate Change and Energy; European Union 2018.

Models of Local Energy Ownership and the Role of Local Energy Communities in Energy Transition in Europe, European Committee of the Regions; 131st plenary session, 5-6 December 2018

Roadmap for the Integrated Design Process. Part One: Summary Guide, Green Building Roundtable, Canada; May 2007.

Solrød Biogas - Conception, project development and realisation«; Solrød Municipality; December 2014.