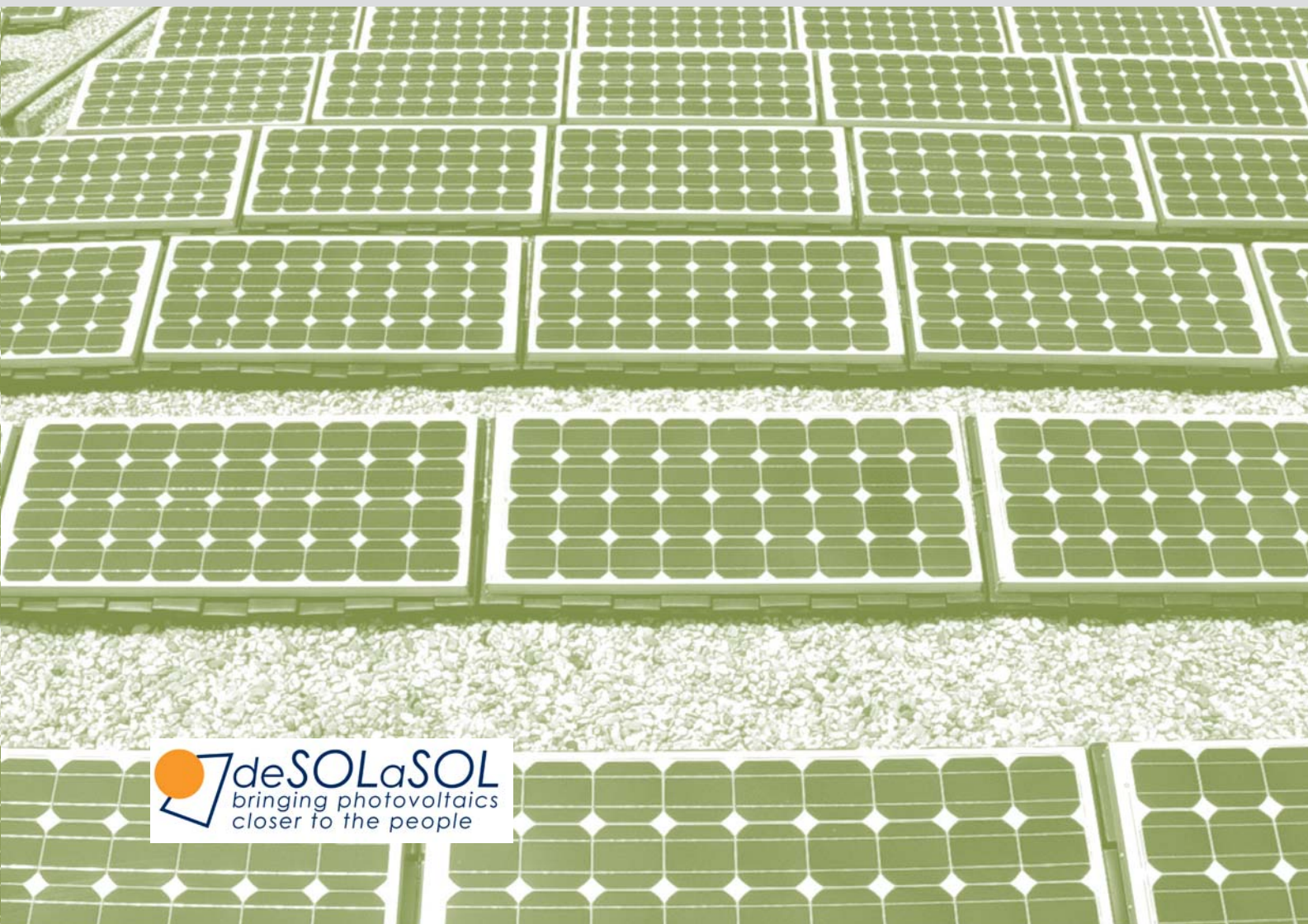
HANDBOOK AND GOOD PRACTICES FOR JOINTLY OWNED PV PLANTS IN GERMANY, FRANCE, PORTUGAL AND SPAIN



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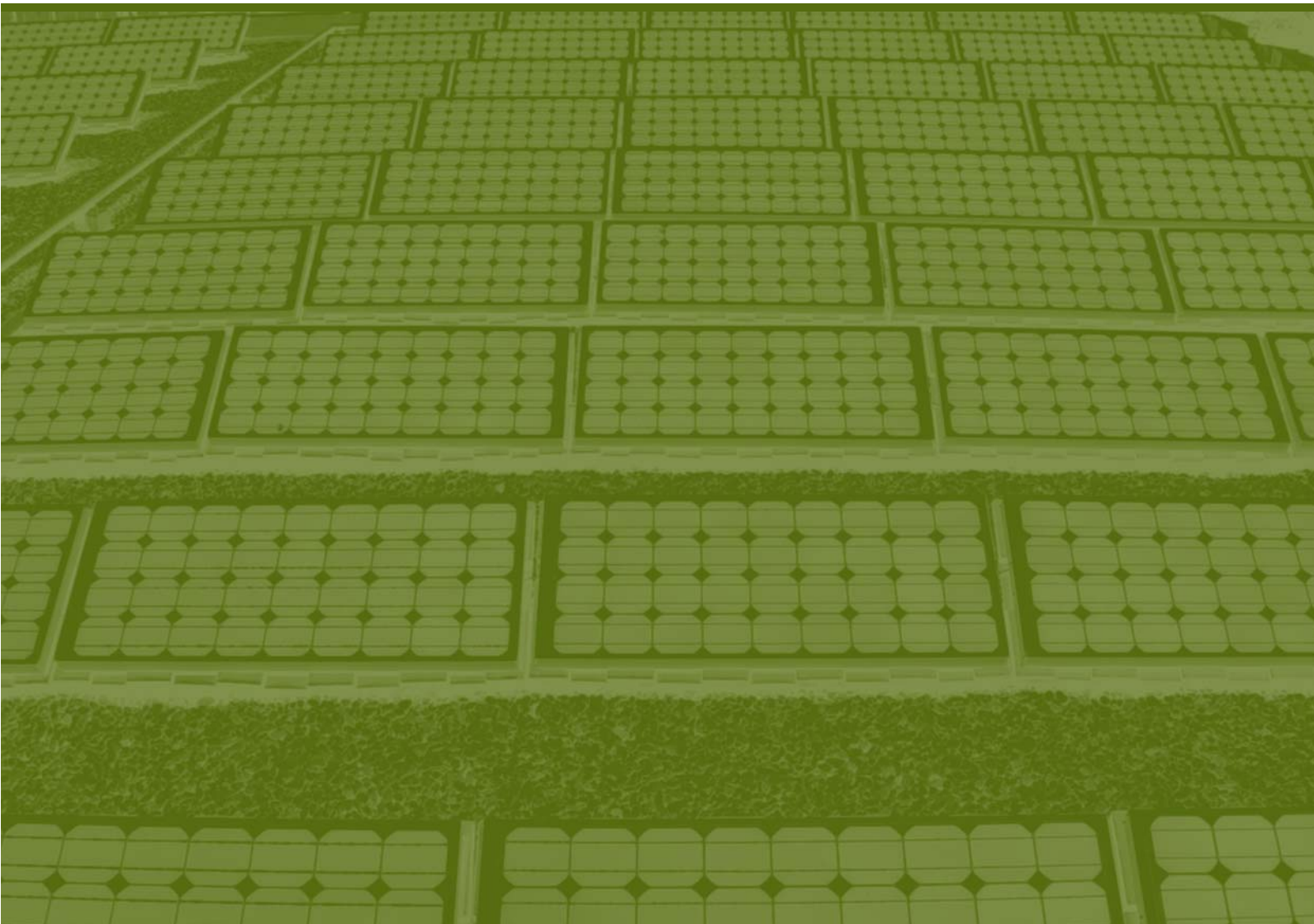

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1. EXECUTIVE SUMMARY

1. Executive Summary

This handbook aims to describe best practices on how to implement PV Joint ownership (JOPV) in the countries involved in this EU project: France, Germany, Portugal and Spain.

Best practise means that the development of - as far as - existing PV-installations, which are not pilot projects, is described. For those countries without realised joint ownership projects the most probable way of realisation is presented.

It is obvious that no common approach is possible as all countries have

- different legal boundary conditions (laws, legal societies regulations)
- different technical standards
- different financing schemes such as credit lines, collaterals accepted for PV.

Consequently, we will present the best practices separately for each country involved. Germany is leading not only in PV market volume but also in experiences with JOPV. Consequently, the description of the German case is used as reference and put in the front.

To realise projects means to combine technical know-how with detailed knowledge of legal conditions and an expertise in the requirements of financing institutions.

Nobody will be an expert in all these disciplines. Therefore, it is a must to join an interdisciplinary group for the realisation. It depends of each partner's know-how, which of the above mentioned expertise must be contracted or joint by external stuff.

Many meetings have been already help with public and private entities, and show a real interest in such a citizen investment in Spain and France. When a concrete project starts to be build and when the corresponding legal and financial information are found, this handbook will be very useful.

In particular the current experiences and best practices are:

GERMANY

For more than 10 years this model of independent power producers IPP is a very successful way to build PV plants. The IPP company is owned by several investors.

Since the feed-in law EEG is in force (2000) the procedures to realise jointly owned plants are well established. From the various legal forms existing two have been identified:

1. GmbH&Co. KG - limited partnership with a limited liability company as general partner

2. GbR - non-trading partnership

In principal two different applications can be identified:

- roof mounted PV plants without permit as long as the house is not landmarked (listed as national monument); landmarked buildings are not considered here

- ground based PV plants with building permits;

The norms and standards are mainly clear. The law in its last version gives good and clear guidance for PV-installations and foster the independent power producer in his position against the dominant utilities and grid operators.

The administrative procedures are clear and, therefore, roof mounted PV projects can be realised within 6 months. The permit requirements for ground based plants – which are today larger than 1 MWp - result in a total project realisation time of 1-2 years.

Four best practices are described in this WP3 as well as in WP2.

All these measures together create Germany as the leading market in the world, not only in installed capacity but also in jointly owned PV-plants.

Ecovision with its long-term experiences (more than 12 years) explains in this handbook in detail the process of setting-up jointly owned PV plants.

FRANCE

There is no relevant experience in France concerning jointly owned PV systems. This is why working-out a handbook for the set-up of grid-connected PV plants, is a long work that requires imagining all schema that could be compatible with the French legal framework.

Therefore, the following report is not a complete handbook for France but a statement of our current researches. Some projects are on the development phase and many questions still need to be solved.

Due to its complicated legal framework and because of the restrictions imposed by the Financial Markets Authority AMF, a jointly owned PV system is not easy to set up. Small projects can be done, as the building owner does not make any publicity for savings (public call for savings). Asking for an AMF authorization to make a public call for savings is a very hard task. The sum of information required and the burden of the obligations for societies carrying-out public calls, limit the kind of company able to undertake such a procedure. Consequently, this procedure does not seem to be convenient for small companies, as only robust organizations with comprehensive capital and support of a financial expert or advisor seem able to afford such a process.

Another problem important to consider is the financial profitability of such investment. Besides the ecological motivation, PV systems have to be financially interesting, to be able to reach general investors. With the new feed-in tariff law, a non-architecturally integrated PV system -this is the case of systems set up on a roof-top or on the ground - is interesting for jointly owned installation. It benefits of a 0.30 Euros/kWh purchase by the utility. Without additional subsidies this tariff doesn't help to set up a profitable operation.

Nevertheless, Hespul works in this area since many areas and is therefore capable to describe the design of successful JOPV´s in France.

PORTUGAL

As far as it was possible to analyse, the concept of grid-connection of joint ownership PV plants is not yet spread out in Portugal, although there are some examples of grid-connected PV plants: the 11 MW centralised plant in Serpa and some small distributed PV generation plants. However, stand-alone PV systems are still the most of the applications for Photovoltaics in Portugal, specifically for electricity provision of dwellings, telecommunication and water pumping systems.

There are no specific national PV standards applied for PV in Portugal as European or IEEE standards in general. Moreover, there is also a lack of building codes for PV integration.

For the public grid-connection of the power generation systems there are generic guidelines established by the DGGE (General Directorate for Geology and Energy) since 1994, in the scope of the Independent Power Producer Law.

In 2002 the DGGE also established guidelines on the procedures and requirements for licensing of micro-generator installations connected to the low voltage public grid, under the

«producer- consumer» law. These are generic rules for grid-connection of micro-generators that can also be applied to PV systems. A technical commission for PV standards was created in 2006 (CTE 82) for following the work of IEC TC 82.

AFLOPS collects the existing information of the few examples of realised projects.

SPAIN

Spain is the second market in Europe and – currently in the world. Today most plants are ground based, for roof top plants few experiences exist. The system size is very large (normally greater 1 MWp). The main difference to the German case is the requirement for 25 years contract. The same is true for credit and any financing scheme.

PV plants installed on ground are on fixed structures as well as trackers. The legislation in force doesn't favour building integrated PV plants, contrary to the draft of the new decree which is in agreement to other European legislations.

With a regard to administrative aspects, the development issues with local and regional administration are very complex. In the average the expected duration for the promotion phase could last between 6 months to 1 year, which increases the costs and uncertainty of every project. Additionally, the administrative permits and licenses differ depending on each region and municipality, what makes the accomplishment with these administrative obligations more difficult. The role of the local authority is much stronger than in Germany. Without different permits from different department, no PV plant operation is possible.

Jointly owned plants are not common today. Usually the MW-size plants are, for economic reasons, subdivided into 100 kW units («huertas solares»). Therefore, we – Ecodes and ecovision - will try to establish this type of investment in the near future, but no best practice for Spain is given here.

Thus, regarding joint investments there are two propriety models:

- first, several investors participating in one limited company which owns 100 kW – in Spain PV connected to the grid is given as AC power, not kWp peak power - and the right of grid connection, and
- second, privates buying installations of around 5 kW.

The distinctive characteristic of this second model is that the real property of the installation equipments (modules and investor) belongs to the individual, sharing the transformer with other users. In both cases, the evacuation infrastructures are shared. The minimum installed power is about 5 kW, thus the minimum investment is higher that in the German case.

2. GERMANY

2. Germany

Since years PV installations are implemented in the way described below:

The Erneuerbare Energien-Gesetz EEG is the driving force for the German success story. Therefore, all projects aim to receive the payments according to the EEG. Consequently, the projects are designed in a similar way.

Independent power producers (IPA) are implemented and install the PV-plant. These IPA are mainly private based, sometimes a mix of public and private bodies.

The ecovision Solarfonds GmbH&Co. KG Stuttgarter Schulen, is the driving force and deals with all stakeholders. The legal form of this society might be different, but relationships between the stakeholders are similar. The ecovision GmbH (limited company) carries out all activities for the partners. It is legal liable, develops and signs the entire contract on behalf of every limited partner. Once a year ecovision GmbH presents the annual balance to the limited partners at the annual meeting. At this meeting all owners – each according to his share

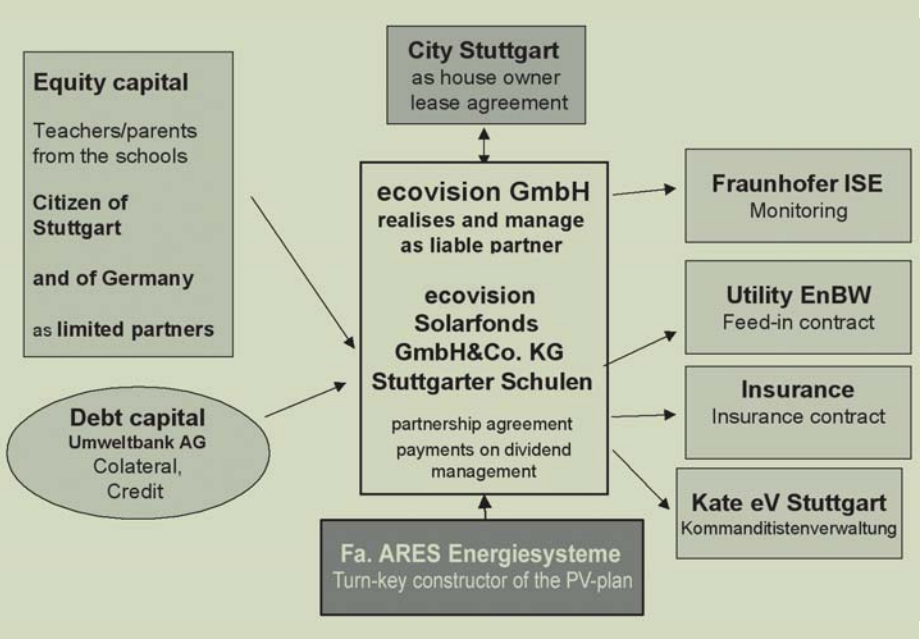


Fig. 1: Example of a Joint Ownership between ecovision-GmbH as an IPP and the city of Stuttgart, installing PV plants on public schools

in the investment – decide about the annual balance and how to continue.

Legal societies mainly used in Germany are

1. GmbH&Co. KG - limited partnership with a limited liability company as general partner
2. GmbH mit stillen Gesellschaftern - limited company with silent partners
3. GbR - non-trading partnership
4. AG – shareholder company and
5. Genossenschaft - cooperative.

According to its project size ecovision GmbH choose either legal form 1 or 2, barely 3.

2.1. STEPS FOR THE IMPLEMENTATION OF PV-PLANTS

This is the core business of any project developer. He/she has to plan the project and with whom he must get into contact. Furthermore he has to set-up a time and budget plan for the envisaged project.

In Germany the approach is different for the following applications:

- roof mounted PV plants do not require any permit as long as the house is not landmarked (listed as national monument);
- ground based PV plants;
- landmarked buildings are not considered here, as long-term permission procedures must be negotiated with the monument conservation departments.

2.1.1. ROOF-MOUNTED PLANTS

1) General **site evaluation**

Map, orientation, scale; photos, 1st assessment of size and annual production

2) The following **check list** for the site evaluation should be considered

- The structural/statically analysis must be carried out including mounting system and - in case – additional weight.
- In case of inclined mounting on a flat roof the possible pull must be considered.
- In case of an external lightning protection the permission of the house owner must be given.
- The place of the electric potential is known.
- The arrangement of the wiring is fixed
- Site for inverters is fixed. The site is well ventilated and cool.
- The arrangement of the wiring is fixed
- Site for the metering system is fixed.
- The utility requirement for hooking-up the plant are known
- The building is not listed as a monument – no permits are required Yes – the PV plant must be legally permitted by the department for monument conservation

3) **Site visit:**

Evaluation of data received – visual evaluation

Shading approval by trees, neighbouring building etc.

Possible infrastructure restricting for installation of the plants according to the check list

4) Design the **roof-renting contract** (details see below)

5) Re-assess the design of the plant.

6) **Bidding procedure** for the turn-key installer including

- required PV-module specification
- mounting structure
- inverter
- wiring
- lightning protection
- documentation
- visualisation kit
- grid-connection

7) Solar yield **study** including shading effects through external expert

- approach and boundary conditions
- evaluation of the technical concept and the components used
- yield forecast (annual yield, Performance ratio)
- description of methods and calculations programs used

8) **Formation** of the required **legal society**

- Set-up the company agreement
- Register the company in the Commercial Registry

- Publishing the registration
- Opening balance of the company

9) **Signing the financing contract** with the creditor

- deliver required information to the bank
- negotiate the credit conditions
- check additional requirements such as collaterals (PV plant, electricity payments, assurances, real servitude, warranty claim)

10) Identifying the **equity capital**

- Defining the target group
- setting up a tool of marketing efforts
- designing the flyers, brochures and hand-outs
- getting the public permit for public relation efforts
- searching for a placement guarantee for the equity capital

11) Defining and **signing other contracts** with stakeholders

- Feed-in permit and operation contract with the grid-operator (and others if required)
- purchase contract with turn key installer
- assurance contracts
- contract for monitoring the plant
- contract for operation and maintenance
- contract for tax consultant (annual Profit/loss declaration)
- contract for technical and administration management

12) Starting **construction of the plant**

- Inspection with roof owner before starting the construction
- quality control of the components delivered
- on-site control – by large plant sizes through external auditor
- detailed down-payment plan according to the construction progress – and according to the quality of the material delivered
- final acceptance procedure of installer and plant owner
- inspection with roof owner after grid-connection
- checking the documentations received
- quality check – and performance measure – by external auditor
- final payment to the installer

13) **Inauguration of the plant**

2.1.2. GROUND-BASED PLANTS

1. General **site evaluation**

Map, orientation, scale; photos, 1st assessment of size and annual production

2. Does any **land utilisation plan** for the area exist

3. The use is usually restricted on «not settling-areas» such as

- conversion areas (from earlier military use),
- landfill
- agriculture or – less - forestry areas

4. Realize a «environmental impact assessment» regarding restrictions such as

- integral nature reserve
- landscape conservation area
- negative impact on natural scenery
- priority area for agriculture, leisure, or flooding protection areas.

5. Define and evaluate compensatory measures

6. **Site visit:**

Evaluation of data received – visual evaluation

Shading approval by trees, neighbouring building etc.

Possible infrastructure restricting for installation of the plants according to the check list

7. Design the **area-renting contract**

- Contract index
- Duration
- Renting fee
- Subleasing/renting
- Change of land use
- Change of land owner
- End of use
- Liability
- Responsibilities of owner

- Responsibilities of renter
- Closing remarks

8. Re-assess the design of the plant.

9. **Bidding procedure** for the turn-key installer including

- required PV-module specification
- mounting structure
- inverter
- wiring
- lightning protection
- documentation
- visualisation kit
- grid-connection

10. Solar yield **study** including shading effects through external expert

- approach and boundary conditions
- evaluation of the technical concept and the components used
- yield forecast (annual yield, Performance ratio)
- description of methods and calculations programs used

11. **Formation of** the required **legal society**

- Set-up the company agreement
- Register the company in the Commercial Registry
- Publishing the registration
- Opening balance of the company

12. Signing **the financing contract** with the creditor

- deliver required information to the bank
- negotiate the credit conditions
- check additional requirements such as collaterals (PV plant, electricity payments, assurances, real servitude, warranty claim)

13. Identifying the **equity capital**

- defining the target group
- getting the public permit for public relation efforts
- searching for a placement guarantee for the equity capital

14. Defining and **signing other contracts** with stakeholders

- Feed-in permit and operation contract with the grid-operator (and others if required)
- Purchase contract with turn key installer
- assurance contracts
- contract for monitoring the plant
- contract for operation and maintenance
- contract for tax consultant (annual Profit/loss declaration)
- contract for technical and administration management

15. Starting **construction of the plant**

- Inspection with roof owner before starting the construction
- quality control of the components delivered
- on-site control – by large plant sizes through external auditor
- detailed down-payment plan according to the construction progress – and according to the quality of the material delivered
- final acceptance procedure of installer and plant owner
- inspection with roof owner after grid-connection
- checking the documentations received
- quality check – and performance measure – by external auditor
- final payment to the installer

16. Inauguration of the plant

2.2. CONTRACT DESIGNS

Contracts exist to define relationships between different stakeholders of any project. Contracts are a must, however, form and size of contracts may vary considerably.

The following description will only mentioned the three most important contracts in Germany

1. Contract between legal society and each limited partner

2. Contract for land lease /roof renting

3. Purchase contract for the PV plant

The feed-in contract is not necessary in Germany, as the EEG defines this completely. It is therefore not mentioned here.

The following contracts are – from the authors' point of view – of lower importance and will therefore not be mentioned in details: management contract, limited partner administration contract, operation & maintenance contract, assurance contract, monitoring contract, contract for tax consultant (annual profit/loss declaration).

2.2.1. CONTRACT BETWEEN LEGAL SOCIETY AND EACH LIMITED PARTNER

1. Firma und Sitz - Name and location

2. Gesellschaftszweck - Purpose of the company - e.g. sale of electricity produced by PV

3. Dauer der Gesellschaft, Kündigung Duration of contract and cancellation Legal start of the company, legal end, possibility of the partners to cancel their participation

4. Gesellschafter - Partners

This defines exclusively partners at the initiation of the company, in Germany at least the liable partner which is usually a limited company GmbH. In some cases a physical person must exist, too.

5 Aufnahme neuer Kommanditisten, Haftungsbegrenzung der Kommanditisten vor Eintragung.

In this very important chapter one designs the partners envisaged: they can – but don`t need to be - partners of any association, can live in a city, or anybody may participate as limited partner.

The participation fee must be defined here, a minimum amount is a must, a maximum a could be. The actions to be taken until one is a partner must be described (sign of contract, payment of participation, signature of the ...)

6. Konten der Gesellschafter - account(s) of each limited partner

Definition of payment, losses/profits according to each one´s share.

7. Geschäftsführung und Vertretung,

Management and their do´s and don´t s

8. Vergütung der Komplementärin, Remuneration of management: normally linked to the electricity production. The annual revenue without a fixed rate but with an inflation factor. Definition how forecast exceed will be reimbursed;

9. Gesellschafterversammlung, annual meeting of partners: invitation procedure, management of meeting

10. Gesellschafterbeschlüsse, decisions during annual meeting – how the shares are quoted (e.g. 1000 €, one vote), limitation of aggregated quotes (eg. Max of 20 votes independent of share)...

11. Geschäftsjahr/Jahresabschluss, fiscal year and annual balance

12. Ergebnisverteilung, distribution of loss and profit to the partners, liquidity management

13. Ausscheiden von Gesellschaftern, cancellation of partners

14. Abfindung von ausscheidenden Gesellschaftern, payment procedure to leaving partners

15. Übertragung von Kapitalanteilen, transfer of partnership from one to a new partner

16. Tod eines Gesellschafters/einer Gesellschafterin, death of a partner

17. Auflösung der Gesellschaft, liquidation of the legal society

18. Schlussbestimmungen final remarks

2.2.2. CONTRACT FOR LAND LEASE / ROOF RENTING

1. Gesellschaftszweck - Object of the contract - e.g. rent or borrow of area or roof for electricity production from PV, definition of place

2. Dauer – duration of the contract. Defines duration and limitation of cancellation of the - e.g. sale of electricity produced by PV

3. Vergütung – reimbursement. Payment size and form and date of transfer for the unique or annual payments

4. Untervermietung – sublease. Defines if and how sublease of the area is permitted.

5. Wechsel des Grundstückeigentümers – change of land/roof owner - defines the continuation of the contract in case of some change of the partners.

6. Beendigung der Nutzung – termination of the contract. Defines how the area/roof has to be refurbished at the end of the contract.

7. Haftung – legal liability.

8. Weitere Verpflichtungen – miscellaneous commitments.

2.2.3. EQUIPMENT PURCHASE CONTRACT EPC FOR THE PV PLANT

1. Anlagenbeschreibung order including detailed description of the PV

plant (modules, inverter, cabling, grid connexion, documentation, inauguration)

2. Dokumentation. Detailed description of the entire construction

3. Abnahmemessung – acceptance test by an independent auditor

4. Servicevereinbarung. Operation & maintenance contract

5. Preis. Price in details

6. Zeitplan. Detailed plan of construction begin, progress and (part-) commissioning

7. Bonus-Malus Vereinbarung. Bonus and penalty agreement for commissioning

8. Versicherungsvereinbarung. Assurance contracts

9. Gewährleistungsvereinbarung . Warranty contract

10. Zahlungsbedingungen. Payment practice

2.3. BEST PRACTICE OF REALISED JOINT OWNERSHIP PLANTS

In this chapter we present example of realised PV projects with all data available. These informations are most comprehensive for our own ecovision GmbH joint ownership projects. For other projects some data are confidential – especially the target performance comparison.

The technical and economic data of these four best practices are given further; here we are characterizing the history and significance.

2.3.1. EXAMPLE SOLARFONDS STUTTGARTER SCHULEN FROM ECOVISION – GMBH

Schools are a perfect focus for JOPV. But whereas many schools want to have PV plants on their roof-tops, the realisation must usually carried-out by external bodies, as teachers, administration and pupils are not professionals. ecovision underestimated various times the reluctance and – sometimes - disability of these stakeholders. Those of our five schools are very active where key persons at the schools, mainly teachers, exist.

Without the local administration, no project of this type will be realised! If there are laggards and inhibitors within the responsible departments of the administration, it is almost impossible to realise installations on the sites envisaged.

It happened to us that after the successful planning, authorisation and installation of four schools on department of the city of Stuttgart tried to stop our construction of the fifth plant two days before the construction should begin. After some extra efforts we obtained the final permit.

Solarfonds Stuttgarter Schulen was the first of its kind in the city of Stuttgart (neglecting some very small installations) where still almost 2000 buildings could theoretically be equipped with PV.

Fig. 2: For more details see www.ecovision-gmbh.de

2.3.2. EXAMPLE EVANGELISCHER OBERKIRCHENRAT STUTTGART (OKR) FROM ECOVISION – GMBH

If schools are sometimes difficult, churches and congregations are – much more. Decisions are taken in a long process, in many times too long for a professional project developer as ecovision GmbH. However, the contrary is as well true! Some «lighthouse» projects are realised by priests, and more than 600 churches and congregation are equipped with PV in Germany. In theses cases, if a positive decision is taken, equity is easily collected, administration barriers are conquered. In our project OKR we accompanied a struggle between the court for legal register and the protestant church – which has more long-term rights in the cadastral register than Germany exists (1848).

Today, as this project is going very well – 15% surplus against the revenue forecast – many doors have been opened to ecovision GmbH due to this project.

Fig. 3: For more details see www.ecovision-gmbh.de

2.3.3. EXAMPLE B31 SOLAR, FREIBURG FROM FESA GMBH

This project was the first commercial project on noise barriers (after approx. 6 demonstration plants). It was planned in two steps: a realised eastern part and a planned western part.

The first part was quite difficult to realise as the ground is owned by the municipality of Freiburg, the road by the federal state of Baden-Württemberg (4 –lane-highways with tunnel) and the tunnel owned by the Bundesrepublik Deutschland.

Fig. 4: For more details see www.fesa-gmbh.de

2.3.4. EXAMPLE BÜRGER-KRAFTWERKE -FÖRDERVEREIN ZUKUNFTSENERGIEN, SOLARREGIO KAISERSTUHL E.V.

This project is a typical locally driven initiative for solar applications (PV as well as solar thermal, energy saving, environmental benign mobility etc.) Whyl, where it is located, is very famous in Germany to be the first site for a nuclear power plant, where the construction was prevented by local and regional movements (in 1977). Whyl is located north of the Kaiserstuhl, a famous wine region. I myself trained the key person Klaus Binder some ten ago. The incorporated society had some 27 members at its inauguration, now they are more than 200 persons. They all have invested into 1.127 MWp, installed today in 23 projects, all jointly owned with different legal societies.

Fig. 5: For more details see http://www.solarregio.de/index.html

2.4. HOW TO ACHIEVE CREDITS

CREDITS for PV installations are designed in the following way:

- Contract index
- Borrower, lender
- Amount
- Nominal interest rate
- Amortisation fees (begin, end, rate)
- Expiration of credit availability
- «de-minimis-subsidy» according to European law.
- Use of credit (detailed description of PV-plant has to be attached as annex)

Colaterals required

- Assignment of the PV-plant including all balance-of-system components
- Assignment of feed-in revenues
- Assignment of all assurance contracts
- Assumption of liability - if overtaken by third parties

Required documentation for pay-out

- Balance of the company (owner of the PV plant) of the last 3 years
- CV of the CEO´s or reliable persons
- Description of the site including photos and a map
- Specification of the PV system which must fulfil minimum technical standards
- Land/roof lease contract signed by all partners
- All permits – if required - are signed by the authorized persons
- Assurance contract signed by all partners
- Feed-in «permit»/contract signed by the utility.
  (Note: a contract is not a must according to the German law EEG)
- Required equity must be transferred to the banc account
- Any credit fee – if demanded by the bank – is paid

- Registration in the cadastre – sometimes called land register.
  Note: This is only a pre-requisite for non-public house or area owners in Germany

- Bank account opened and operable.

Payment terms

Any special account is required, sometimes subdivided into several:

- for repayment and interest rates

- for reserves for dismantling

- and for operation & maintenance payments.

2.5. HOW TO ATTRACT PRIVATE EQUITY

There might be no «white paper» how to attract investors but there exist some general rules and procedure.

- Defining the minimum IRR internal rate of return – or another parameter for profitability

- defining the target group

- setting up a tool of marketing efforts

- designing the flyers, brochures and hand-outs

- setting-up an action plan for marketing

- calculating the required time and human activities until the equity is completely sold.

3. FRANCE

3. France

3.1. STEPS FOR THE IMPLEMENTATION OF PV-PLANTS

In France the approach is different for the following applications:

1. General **site evaluation**

Map, orientation, scale; photos, 1st assessment of size and annual production

2. The following check list for the site evaluation should be considered

- The structural/static analysis must be carried out including mounting system and - in case – additional weight.
- In case of inclined mounting on a flat roof the possible pull must be considered.
- In case of an external lightning protection the permission of the house owner must be given.
- The place of the electric potential is known.
- The arrangement of the wiring is fixed
- Site for inverters is fixed. The site is well ventilated and cool.
- The arrangement of the wiring is fixed
- Site for the metering system is fixed.
- The utility requirement for hooking-up the plant are known
- The PV plant must be legally permitted by the department for monument conservation

3. **Site visit:**

Evaluation of data received – visual evaluation

Shading approval by trees, neighbouring building etc.

Possible infrastructure restricting for installation of the plants according to the check list

4. Design the **roof-renting contract was** not yet done in France.

5. Re-assess the design of the plant.

6. **Bidding procedure** for the turn-key installer including:

- required PV-module specification
- mounting structure
- inverter
- wiring
- lightning protection
- documentation
- visualisation kit
- test of the automatic disconnection device.
- grid-connection: in France this can only be done by the utility and not by the PV installer. The PV installer can nevertheless provide the investor with the technical documents required by the utility for grid connection.

7. Solar yield **study** including shading effects through external expert

8. **Formation of** the required **legal society**

If the society has an entire private capital, the most appropriated legal forms are the following:

- SARL (Société à Resposabilité Limitée) : for small systems, does not require to afford minimum capital for the creation.
- SA (Société Anonyme): for bigger companies (minimum capital 37000 € for creation), give the possibility to ask for a public call for saving.
- SAS (Société par Actions Simplifiée): It is a simplified SA (minimum capital 37000 € for creation), where the statutes are freely designed.
- SCA (Société en Commandite par Action): the management and the capital of the enterprise are separated. The capital owners decide and vote for a manager who will take all decisions and will be responsible on his own capital.

If the society wishes to have a mixed private/public capital, it can uses the two following legal forms:

- SCIC (Société Coopérative d'Interêt Collectif): This legal form allows maximum 20% of public capital which allows council areas to take part of the project. Moreover, the SCIC impose cooperative management of the society, and limiotates the speculation.
- SEM (Société d'Economie Mixte): This legal forms impose a minimum of 51% of public contribution and 15% of private one.

9. **Signing the financing contract** with the creditor

10. Identifying the **equity capital**

This is probably the main difference with France, where one has to get a permit from the AMF to publish public information whose aim is a public call for saving.

11. Defining and **signing other contracts** with stakeholders

- Feed-in permit and power sale contract with the utility (and others if required)
- Grid connection by the utility and operation contract with the grid-operator
- purchase contract with turn key installer
- Power Purchase Agreement with the utility
- inssurance contracts
- contract for monitoring the plant
- contract for operation and maintenance
- contract for tax consultant (annual Profit/loss declaration)
- contract for technical and administration management
- You have to ask for building permit or a working declaration

12. Starting construction of the plant

- Inspection with roof owner before starting the construction
- quality control of the components delivered
- on-site control – by large plant sizes through external auditor
- detailed down-payment plan according to the construction progress – and according to the quality of the material delivered
- final acceptance procedure of installer and plant owner
- inspection with roof owner after grid-connection
- checking the documentations received
- quality check – and performance measure – by external auditor
- final payment to the installer

13. Inauguration of the plant

3.2. CONTRACT DESIGNS

Contracts exist to define relationships between different stakeholders of any project. Contracts are a must; however, form and size of contracts may vary considerably.

The following description will only mentioned the five most important contracts.

- Contract between legal society and each limited partner - has never been done in France yet.
- Contract for land lease /roof renting
- Equipment purchase contract EPC for the PV plant
- Grid connection contract – this is in France a central point of project development
- Power Purchase Agreement (PPA), to sign with the utility
- Financing contract with the financial entity

Signing both grid connection contract and purchase contract for the energy production, require to get different administrative authorizations.

- For the grid connection contract:
  - Document providing the technical information of the system (a template to fill is proposed by the utility).
  - Civil responsibility insurance.
  - Building license or permission.
  - Authorization to operate an electricity production system.
  - A document attesting the conformity of the installation to the electrical norms.
- For the PPA contract:
  - PPA demand (template provided by the utility).
  - A document attesting that the system has been connected to the grid.
  - Building license or permission.
  - Authorization to operate an electricity production system.
  - A certificate allowing to benefit from the feed-in tariffs.

Note: This implementation method is correct if a specific entity follows it up and creates the whole project before selling it to interested investors.

One must also consider that a leader (one of the investors, PV supplier, installer, NGO) must punctually – according to given deadlines - launch such a project and identify all the investors of the project before creating the legal society (solar yield study before reassessing the plant design).

3.3. JOINT OWNERSHIP PLANTS: TYPES AND BEST PRACTICE IN FRANCE

TYPE 1: THE PV OWNER IS A STRATA TITLE.

If a certain number of apartments are organized through a strata title. - Remark: Strata title is a specific French word.

In France, some apartments in a building are gathered together through what we call in French "copropriété" to facilitate some common tasks such as maintenance of the elevator, the common places (garden, roof, etc). Sometimes, houses are also gathered together when they have common places (a garden or a portal, etc). Therefore, to set up a PV system, one "copropriété" (or Strata title) can manage it. The strata title can then set up the PV system on the building or on the different houses. Having this intermediary can facilitate the setting of the project and then with a unique electricity meter measure the production and distribute the profit with the proportion of every system (if the strata title done for individual houses).

Taxe advantages:

- Under 3 kWc per apartment owner, a tax credit deductible from the private individuals' income is set at 50 % of the costs of the equipment with a ceiling at 8 000 EUR per fiscal home, if the PV system is set up on the principal home of the individual. If the power is above this limit, the owner of the system has to produce on a maximum the double of his consumption, to be able to benefit from the tax credit.
- Small investors (as individuals) are exonerated from social taxes if the incomes of the electricity sold are under 4336 €.
- Accelerate amortization over 12 months, of the PV system is possible.
- The "professional taxes" is calculated on 50% of the amount considered for the taxation.
- If the benefits of the individual are under 76300 €, the PV revenues are considered as "Industrial and Commercial Benefits Non professional" and 71% of their amount (or a minimum of 305 €) are exonerated from the taxation.
- Under 3 kWc, and for residential buildings at least two years old, the VAT considered for the taxation of the system is 5,5% (instead of 19,6%).

Problems to be considered:

- To set up a PV system, the decision procedure is complicated and requires to have the acceptance of more than 50% of the apartment owners in possession of more than 76 % of the property.
- In many strata title, apartments owners are renting the considered place and therefore they cannot profit from the tax deduction.

TYPE 2: THE OWNER OF THE PV SYSTEM IS A PRIVATE ENTITY:

A group of investors decide to participate to the creation of a private entity which aim is to set up PV systems. Therefore, different forms exists (SA, SARL, SAS...) and the choice depends on the characteristics of the system. It is possible to have a cooperative working mechanism for the SME.

Moreover, a venture capital mutual fund can be set up and can dedicate all it capital to photovoltaic projects. It offers fiscal advantages and allows facilitation in the collect of funds dedicated to a certain kind of projects.

In France, no capital specially dedicated to the investment in PV system exists, but different financial entities are looking forward to propose it for their client.

TYPE 3: THE OWNER OF THE PV SYSTEM IS A PRIVATE ENTITY, WHICH CAPITAL IS PARTLY CAPITAL

If a council area or any other public entity is interested to participate to the set up of jointly owned PV systems, it can be partly part of the capital of the enterprise. Therefore, specific legal forms (the most adequate are SCIC, SEM) exist to offer the possibility to have a private/public capital in it.

The following scheme brings an example of such combination.

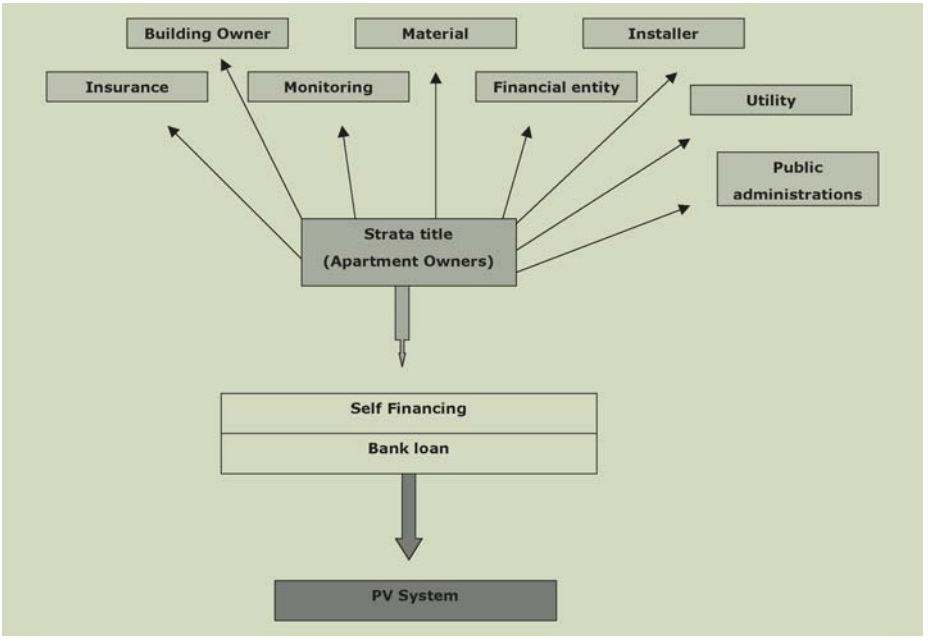


Fig. 6: Type 1 scheme

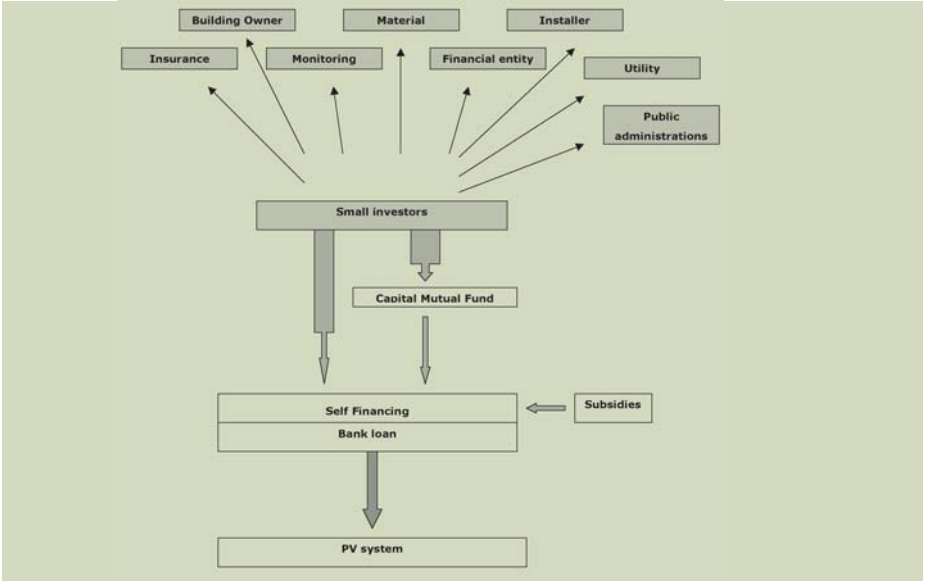


Fig. 7: Type 2 scheme

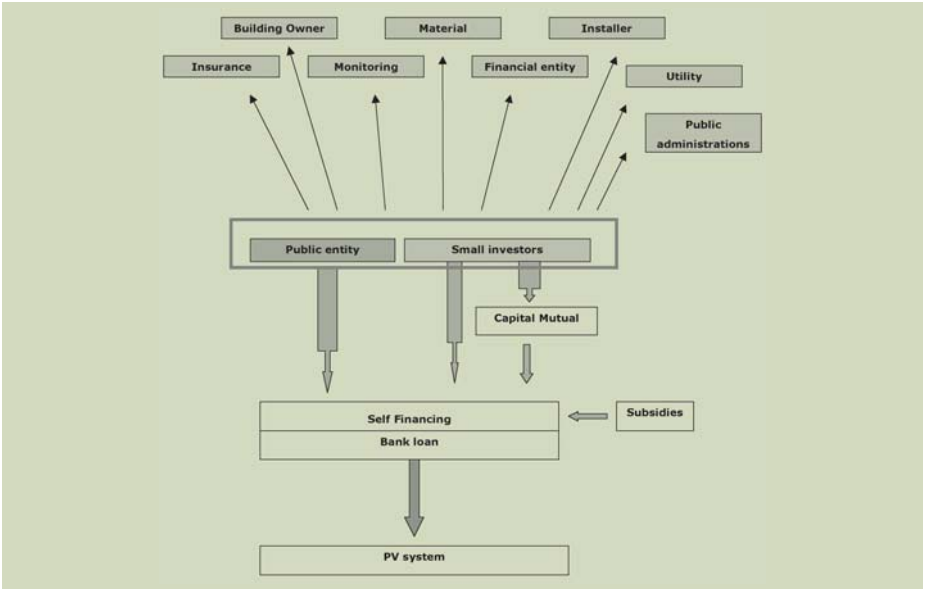


Fig. 8: Type 3 scheme

4. PORTUGAL

4. PORTUGAL

4. Portugal

4.1 STEPS FOR THE IMPLEMENTATION OF PV-PLANTS

As it was referred before, in Portugal it is not yet spread out the concept of joint ownership PV plants.

According to the analysis of the methodology by some PV companies, these steps are also integrated in the procedures of PV installations in Portugal, whether it is the case of stand-alone installations or the grid-connection projects of roof-mounted and soil installed panels.

4.1.1 ROOF-MOUNTED PLANTS

The **check list** is similar to the one given for Germany (see. Chapter 2.1.1 page 14 ff) besides the following aspects:

- roof mounted PV plants do not require any permit as long as the house is not landmarked.

8. Formation of the required legal society – According to the new Law-Decree most probably it will not be necessary the creation of a trading entity

9. Signing the financing contract with the creditor - the Law-Decree guaranties the bank financing due to an existing «guarantied» Cash-Flow.

4.1.2 GROUND BASED PV PLANTS.

The check list is similar to the one given for Germany (see. Chapter 2.1.2 page 15 ff) besides the following aspects:

14. Defining and signing other contracts with stakeholders (municipalities, environmental impacts, Ministry of the Environment, AIA, RECAPE, if necessary. For small plants it will not be required.)

15. Starting construction of the plant

The quality check – and performance measure – by external auditor is only required for large installations.

4.2 CONTRACT DESIGNS

The following contracts are required in Portugal:

a. Contract between legal society and each limited partner

b. Contract for land lease /roof renting

c. Equipment purchase contract for the PV plant

The new legislation will tell if the feed-in contract is necessary.

4.2.1 CONTRACT BETWEEN LEGAL SOCIETY AND EACH LIMITED PARTNER

Important note: only after the new legislation comes into force

The majority of the projects implemented until now are stand-alone projects approved before 2005, considering dwellings.

Actually it is not possible for small producers to get grid-connection unless they are social solidarity entities or schools (they have to endow the profit for social projects). With the new legislation, it will be possible for small private investors and also for building administration entities to invest in PV power plants, and therefore it will be considered the partner figure.

The check list is similar to the one given for Germany (see. Chapter 2.2.1 page 14 ff) besides the following aspects:

8. Administration fee is only applicable in large plants

9. Annual meeting of partners is only applicable in large plants

4.2.2 CONTRACT FOR LAND LEASE /ROOF RENTING

No additional information available.

4.2.3 Purchase contract for the PV plant

No additional information available.

4.3 BEST PRACTICE OF REALISED JOINT OWNERSHIP PLANTS

In this chapter we present three examples of grid-connected small PV plants. However, it has not been possible, until now, to have access to information with the same detail as in the German example.

1. The «Solar Energy in Schools» project (2004), in the Municipality of Moura (Alentejo, South of Portugal)

It implemented grid-connected PV systems in three schools, with installed power of 15, 25 and 35 kWp.

Location: Moura, south of Portugal

Characteristics: Roof-mounted plants.

Schools:

- Escola Secundária com 3º ciclo do E.B. de Moura: PV installation with 25 kW;
- Escola Básica Integrada de Amarelleja: PV installation with 35 kW;
- Escola Profissional de Moura: PV installation with 15 kW.

Project owner: Amper Central Solar, S.A.

This anonymous society had the following stockholders:

1. Municipality of Moura – 88%;

2. Renatura Networks.Com, S.A. – 10%;

3. COMOIPREL – Cooperativa Mourense de Interesse Público de Responsabilidade Limitada – 2%

Last year, the Spanish enterprise Acciona1 bought 100% of the capital of Amper, accepting all the commitments of this legal entity such as:

- keeping the schools PV installation producing energy;
- installing 62 MW in a large PV plant;
- investing in a factory for the assembly of PV panels;
- creating a three million Euros fund for R&D and PV panels' installation.

Note: To have more information concerning this project, a written request was sent to Acciona.

2. Central de S. Brás. The PV plant of Barcelinhos

It is an independent 4,96 kWp system connected to the low voltage grid.

Location: Barcelinhos, north of Portugal

Characteristics: Ground-based plants

Owner: Suntechnics/COEPTUM, Lda.

Supplies all the energy to the grid (~0,5 €/kWh).

3. The PV plant of Alqueva

It is an independent 65 kWp system connected to the low voltage grid.

Location: Alqueva, south of Portugal

Characteristics:

Owner: Edia.

4.4. LEGISLATION IN PORTUGAL

Portugal is one of the European countries with the highest availability of solar radiation.

The average number of hours with sun, per year, varies between 2.200 and 3.000 h.

Portugal, due to its climatic characteristics, has excellent conditions for the photovoltaic conversion with production index between 1.000 and 1.500 kWh per year (fixed panels), for each kWp installed.

There are several reasons for the slow development of solar energy in Portugal:

- Some bad experiences during the first period of expansion of solar (80's), associated with the low quality of the equipment and, especially, of the installations, that negatively affected its image;
- Lack of specific information distributed among the potential users explaining the reasons for the interest on this technology and its possibilities;
- High cost on the initial investment, not encouraging the adoption of such a solution to compete with the conventional alternatives;
- Technical and technological barriers to the innovation at the levels of industry, construction and installation of thermal equipments;
- Not enough and adequate support and incentive measures.

There is a Law-Decree (nº 68/2002, of 25th March) regulating the general micro-generation as electrical energy production activity in low voltage with the possibility to connection to the public electrical grid.

This legal diploma predicts that the electrical energy produced would be predominantly self-used and the exceeding amount would be whether:

- delivered to third parties, or
- delivered to the public grid, on this case with until a limit of 150 kW electrical power.

The Law-Decree nº 29/2006, of 15th March, established the general basis for the organization and functioning of the National Electrical System, classifying the electricity production in two regimes:

- the production in ordinary regime, and
- the production in special regime.

The special regime corresponds to the electrical energy production by means of incentives:

- to the utilization of endogenous renewable energy sources, or
- to the combined heat and power production.

However, the number of electrical energy micro-generation systems, licensed and functioning, have no expression. The reasons may be the excessive administrative and bureaucratic centralization of the licensing processes for the small and micro generation projects, not competitive feeding tariffs, and also the lack of authorization of licenses for grid-connection.

There is a new Law-Decree regarding micro generation foreseen for application of a simplified licensing regime (internet) for local grid-connection, low voltage, for small/residential producers based in renewable energy sources (until 1,5 kW – PV and until 2,5 kW – micro wind power). This legal document will come out around September 2007, and hopefully will make that new projects come on PV.

This document is supposed to be an approximation (yet small) to the one existing nowadays in Germany with the EEG (Regulation, prices and Access to the Grid for the several kinds of renewable energies).

In a very short future, it will be possible also for Social solidarity entities, schools and buildings' managing entities to get the connection to the public grid, depending on the new legislation on micro-generation that is about to be approved and released.

The independent power producers are mainly private. There are already a few cases of collaboration between public and private bodies.

4.5. PROCEEDINGS FOR LICENSING OF MICRO-GENERATION POWER PLANTS WITH SELF-CONSUMPTION

Approved by the General Director of Energy, on the 29th October 2003

Although at the present moment the grid-connection is closed for the small producers, the following information concerns the steps for licensing micro-generation power plants, as it is described in the Regulation of the Law-Decree nº 68/2002 of the 25th March.

4.6. CONDITIONS FOR LICENSING

1. The requesting entity for the micro-production plant must be also the entity that consumes electrical energy (Producer-consumer);

2. The licensing entity (DRE) must analyse and validate the project in terms of balance between the electrical energy produced versus the electrical energy consumed (Artº.2 of the D.L. nº 68/2002, 25 March);

3. The licensing entity (DRE) must indicate in the license the maximum limit of the electrical energy that the producer may sell to the public grid (L.D. nº 68/2002, 25th March);

4. The producer-consumer maybe allowed to sell to the public grid more energy than the predicted one in the L.D. nª 68/2002, from the 25th March, as long as it is accorded with the EDP distribution the respective tariff and other contractual clauses;

5. After the license emission the DRE must deliver a copy to EDP distribution;

6. The supply of electrical energy to third parties should be done through direct and exclusive feed-in and it will not be accepted their connection to the public grid or their utilization of the collective buildings and entrances;

7. In case there should be supply of electrical energy to third parties, they must be totally fed by the producer-consumer, being this last one able to buy from the public-grid the necessary energy to complement the third parties' supply including the energy provided during the period of unavailability of the production installation;

8. Alternatively to the last one, the utilization of the public grid for selling to third parties will be admitted in the conditions established in the future by the Regulating Entity for the Energy Services (ERSE), in the Regulation of the Access to the Grids and to the Interconnections.

4.7. REQUESTED DOCUMENTS FOR LICENSING MICRO-GENERATION PLANTS WITH SELF-CONSUMPTION

A. Requirement for the Establishment License demanded to the Regional Director of the Ministry of Economy;

B. File with INFORMATION FOR THE PROJECT, containing information from the electrical energy public distributor about the connection power, tension, reception point, minimum short-circuit power, connection branch, connection point, neutral regime compatible with the public grid and security devices;

C. Evidence of the municipal licensing, or exemption, of the utilization installation infrastructures;

D. Responsibility term for the project of the production-consumption installations and possible energy selling grid for third parties;

E. Electrical project (two copies), including the following elements:

a) Project identification file;

b) Descriptive and justification resume indicating the nature, importance, function and characteristics of the installations to be used, of production-consumption and of possible third consumers, general conditions for their establishment and exploitation, ground connection system compatible to the public distributor, main dispositions of the micro-generation equipment, origin and destination of the energy to be produced, the characteristics of the devices for protection against over intensities, over tensions, cutting power and the respective calculations;

c) Description, types and characteristics of the micro-generators, cutting and protection devices, as well as the indication of Norms and certification they comply with;

d) General map with the localization of the installation, duly pointed out, scale not less than 1/25 000;

e) Map with implantation of all the producer-consumer installation and possible third parties, scale not less than 1/2000.

f) Map, different views and cuts, scale not less than 1/200, of the installation with the disposition of the equipments;

g) Standardized schemes of the boards and electrical general installation schemes, with indication of all the metering, counting, protection and commanding devices and characteristics of the cables and conductors.

F. All the pieces of the project must be signed by the responsible architect, except for the last piece that must be the signature, the whole name (extension) and the references of their inscription in the Ministry of Economy;

G. The written and drawing pieces of the project must have normalized dimensions, be elaborated and foiled according to norms and technical rules and have sequential numbers.

H. Each copy must have a folder, duly fixed and presented in a way that allows the easy analysis

I. Enlargement, changes on the utilization of pre-installation must be indicated, in the written as in the drawn pieces.

4.8. INAUGURATION AND OPERATION

1. After the project is installed, they should be presented:

a) Request for the checking;

b) Responsibility certificate for the Execution of the Installation;

c) Responsibility certificate for the Installations' Exploitation;

d) Execution file (Model nº 936 of IN-CM);

e) Report of the responsible expert (Model nº 937 of IN-CM);

f) Copy of the contract for service contracting (annex: IV of the Dec. Reg.31/83, of the 18-4), or declaration signed by the responsible expert and the requester, proving the prescribed in article 23º for the Statute of the Responsible Expert for the electrical installations for private service.

g) Inscription confirmation of the installer in the IMOPPI.

2. The starting up of the operation is only able to initiate after the realization of the approving checking and emission of the respective Exploitation License.

5. SPAIN

5. SPAIN

5. Spain

5.1 GENERAL REMARKS ON PV INSTALLATIONS IN SPAIN

The main difference to the German case is the requirement for 25 years contract. The same is true for credit and any financing scheme.

Today most plants are ground based, for roof top plants few experiences exist.

As it is true in Germany the classification of suitable land excludes protected and used land. The rules can differ from one municipality to the other. On the other hand generally speaking PV needs a permit from local/regional authorities.

The laws and legislations are in an ongoing adaptation process. For example now the authorities require contracts and reserves for dismantling the PV plant.

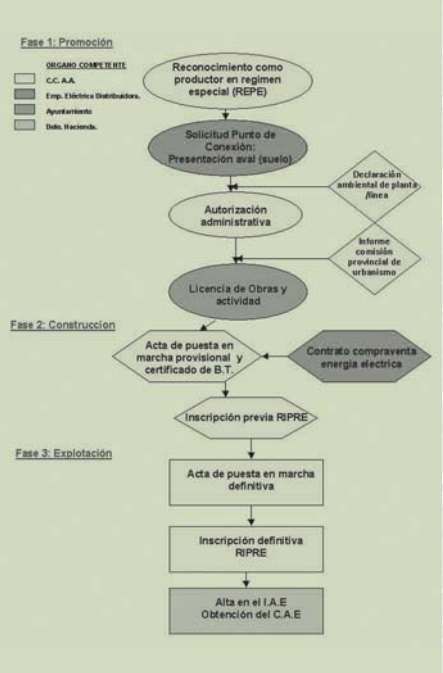
Besides general laws specific regulation for the autonomous regions exists. As an example Castilla Leon defines minimum required distance between PV plants. Other regions require a permit by the local Engineering Association (colegio de ingenieros).

The following figure 9, explained by TRIODOS in other project document, gives an overview to the general approach of how to realise a PV plant. Moreover, additional steps are required to define the JOPV.

Some explanations:

- Autorización Administrativa (Comunidad Autonoma).
- Inscripción provisional en el RIPRE (Registro de instalaciones de producción en régimen especial). (Comunidad Autonoma)
- Punto de conexión (Compañía eléctrica).
- Licencia de obras, autorización urbanística y licencia de actividad. (Comunidad Autónoma).
- Alta en el IAE: impuesto de actividades económicas. (Delegación de Hacienda).
- Obtención del CAE: Código de actividad y establecimiento. (Delegación de Hacienda).

Fig. 9: General approach of how to realise a PV plant in Spain



5.2. STEPS FOR THE IMPLEMENTATION OF PV-PLANTS

5.2.1 ROOF-MOUNTED PLANTS

As these installations are still in the early-market-dissemination state, most steps are theoretically equal to those seen in the chapter for Germany. Only where differences exist today, they are mentioned here.

- **General site evaluation**

Map, orientation, scale; photos, 1st assessment of size and annual production

- **Site visit:**

Evaluation of data received – visual evaluation

Shading approval by trees, neighbouring building etc.

Possible infrastructure restricting for installation of the plants according to the check list

- Design the **roof-renting contract**

In addition to the design of the contract, we shall obtain a guarantee from the homeowners' association that they agree on the renting of their roof. The whole process includes information to the association, the vote of homeowners and a written agreement previous to the contract signature.

- Re-assess the design of the plant.

- Bidding procedure for the turn-key installer including
  - required PV-module specification
  - mounting structure
  - inverter
  - wiring
  - lightning protection
  - documentation
  - visualisation kit
  - grid-connection
  - offer for operation and maintenance
  - Performance Ratio guarantee

- Solar yield **study** including shading effects through external expert

- **Formation of** the required **legal society**

- Pre-inscription and later inscription to the «special power generation registry» (REPE).

- To obtain the technical permit for grid connection (to be checked with the local power company).

- **Signing the financing contract** with the creditor

- Identifying the **equity capital**
  - Defining the target group
  - setting up a tool of marketing efforts
  - designing the flyers, brochures and hand-outs
  - getting the public permit for public relation efforts
  - searching for a placement guarantee for the equity capital

- Defining and **signing other contracts** with stakeholders
  - Roof renting contract
  - Feed-in permit and operation contract with the grid-operator (and others if required).
  - Purchase contract with turn key installer
  - assurance contracts
  - contract for monitoring the plant
  - contract for operation and maintenance
  - contract for tax consultant (annual Profit/loss declaration)
  - contract for technical and administration management

- Starting **construction of the plant**
  - Inspection with roof owner before starting the construction
  - quality control of the components delivered
  - on-site control – by large plant sizes through external auditor
  - detailed down-payment plan according to the construction progress – and according to the quality of the material delivered
  - final acceptance procedure of installer and plant owner
  - inspection with roof owner after grid-connection
  - checking the documentations received
  - quality check – and performance measure – by external auditor
  - final payment to the installer

- **Inauguration of the plant**

- **Monthly invoices for power generated**

5.2.2 GROUND-BASED PLANTS

Most installations in Spain are of this type. The process to get the permission is complicated and longsome. In the following the single steps are described.

- General **site evaluation**

  Map, orientation, scale; photos, 1st assessment of size and annual production

- Realize a «environmental impact assessment» regarding restrictions such as
  - integral nature reserve
  - landscape conservation area
  - negative impact on natural scenery
  - priority area for agriculture, leisure, or flooding protection areas.

It is important to know the particularities of the regulation of application in the municipality and in the region; in order to know that the available sol is not classified inside of the regional or municipality legislation as protected land within the overall plans for urban management, like rural land, which will have an authorization for exceptional use.

In general, PV installations need to obtain previously the following urban licenses:

- Urban license and authorization for exceptional use in the case of rural area.

- Environmental license (in case the autonomous regulation needs it)

- and activity license.

The authorization of exceptional use is proceeded and solves inside the procedures for the grant of urban license.

It has priority to get the resolution of the environmental license -in case the autonomous regulation needs it - for obtaining the other authorizations.

- Define and evaluate compensatory measures

- **Site visit:**

  Evaluation of data received – visual evaluation

  Shading approval by trees, neighbouring building etc.

  Possible infrastructure restricting for installation of the plants according to the check list

- Design the **area-renting contract**

- **Bidding procedure** for the turn-key installer including
  - required PV-module specification
  - mounting structure
  - inverter
  - wiring
  - lightning protection
  - documentation
  - visualisation kit
  - grid-connection

- Solar yield **study** including shading effects through external expert
  - approach and boundary conditions
  - evaluation of the technical concept and the components used
  - yield forecast (annual yield, Performance ratio)
  - description of methods and calculations programs used

- **Formation** of the required **legal society**
  - Set-up the company agreement
  - Register the company in the Commercial Registry
  - Publishing the registration
  - Opening balance of the company

- Identifying the **equity capital**
  - Defining the target group
  - setting up a tool of marketing efforts
  - designing the flyers, brochures and hand-outs
  - getting the public permit for public relation efforts
  - searching for a placement guarantee for the equity capital

- Getting the **required permissions**

  As the administrative procedure is longsome in Spain, the described following procedure must be carried-out in parallel to the site evaluation (see also Fig.2)

- **The inscription to the special power generation registry**

  Especial de Producción Eléctrica (REPE)

  Furthermore a permit from either the department for technology in the autonomous community or the department for energy policy and mines in the Ministry for Economics is required. The permit must be part of the technical description of the project –to be presented to the autonomous community.

- Grid connection point

  To get a grid connection, the local grid operator, where the PV plant shall be installed, must be contacted. The project developer must send a letter to the grid operator including technical information about the installation (electric scheme), and the references of

the location land. Also it is recommended to give the number of the contract and the name of the investor.

With this information the power purchase contract with the utility will be signed according to the national approved model (General Management to Energetic Policy and Mine, according to the Royal Decree 1663/2000).

If the grid operator requires more information, he has 10 days to reclaim. The utility has one month, from receiving the documents, to give the connection point. Usually it coincides with the hook-up point of the place – if this already exists.

If the project developer agrees upon, he sends the signed contract back to the utility together with the REPE permit. If there are dissensions, the Concerned Authority will decide within a maximum of 3 months.

- Final inscription to the REPE

With the technical document of the grid operator, which includes all technical conditions, the local authority must give the special power generation registry REPE. However, this process can take several months and is difficult to preassess. A fee depending from the installed power has to be paid.

- **Financing aspects**

If these documents and procedures are fulfilled, the credit from the banks can be acquired.

For details see document Basics on PV Finance.

- deliver required information to the bank
- negotiate the credit conditions
- check additional requirements such as collaterals (PV plant, electricity payments, assurances, real servitude, warranty claim)

- Defining and signing other contracts with stakeholders
  - Equipment purchase contract with turn key installer
  - assurance contracts
  - contract for monitoring the plant
  - contract for operation and maintenance
  - contract for tax consultant (annual Profit/loss declaration)
  - contract for technical and administration management

- Starting construction of the plant
  - Inspection with roof owner before starting the construction
  - quality control of the components delivered
  - on-site control – by large plant sizes through external auditor
  - detailed down-payment plan according to the construction progress – and according to the quality of the material delivered
  - final acceptance procedure of installer and plant owner
  - inspection with roof owner after grid-connection
  - checking the documentations received
  - quality check – and performance measure – by external auditor
  - final payment to the installer

- **Finalising the construction**

When the construction is finished, the project developer gets an e-bulletin and finalization certificate. He must show:

- to the installer the e-bulletin
- to the construction authorities of the municipality the certificate of finalising the work.

- **Inauguration of the plant**

With the e-bulletin and finalization certificate the project developer must got to the industry authority to get the Acta de Puesta en Marcha for the installation.

A technician of the industry authority – or a contracted company – will carry out a final inspection of the installed plant. If it fulfils the electrical requirements contadores, fusibles e ICP, he will sign the Final Act.

This inspection must be paid by the project developer to the utility´s account. After the payment and with this final act the project developer will finally get the power purchase contract from the utility. The utility will charge a first metering.

- Power sale

If the final inspection is satisfying the metering system is set to zero. From then onwards the produced electricity will be sold. After the first months the project developer is now an IPP independent power producer. He will send his – standardised - bill monthly to the utility and will be reimbursed within 30 days.

6. GERMAN GOOD PRACTICES

6. German good practices

6.1. SOLAR INSTALLATION: REGIOSONNE GMBH&CO. FREIBURG KG

6.1.1. INTRODUCTION

Successful project, with cooperation between local private project developer, the local football team of the first bundesliga and the regional utility, realized in 2004 and 2005.

It was the first project of its kind with 1 MWp, in the meantime the utility realized more two projects with a total of 1.05 MWp, 214 (co-) owners have invested 7,009 € per capita by a required minimum of 1,500 €. 5,076 million € were invested, 30% by equity and 70% by a 15 years credit with 2 years of free of redemption.

Initially the project had huge problems with availability of roofs and the delivery delays of modules of up to 10 months. Therefore the first two years profit forecast could not be fulfilled. Nevertheless the profit promised in the brochure was 6.0 %, now after three years it is 6.1 %. The utility offers an additional down-payment of 16.6% of the initial equity to those clients who pay an (increased) green tariff - this increase the IRR to 7.5% for this investor group.

Fig. 10: Regiosonne GmbH&Co. Freiburg

6.1.2. GOOD PRACTICE MAIN ISSUES

6.1.2.1. Introduction

Reasons to be considered a good practice	Successful project, with cooperation between local private project developers and the regional utility. Realized in 2004 and 2005.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	It was the first project of its kind with 1 MWp, in the meantime the utility realized more two projects with a total of 1.05 MWp

6.1.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Regiosonne GmbH & Co. Freiburg KG GmbH&Co. KG – limited company with joint ownership The complementary regiosonne Verwaltungs Gmbh is co-owned by the utility Badenova AG, the SC Freiburg, the 1st Bundesliga football team and Ökostrom GmbH, a local project developer.
Why this legal option was chosen? And how the set-up process took place?	Lowest risk for the investors, easy and fast to realize, but high legal-register costs
Number of (co)-owners	214
Average investment per co-owner or range of investments	7,009 € by a required minimum of 1.500 €
Type of assets bought by the co-owner: shares, kWp, etc.	Shares of the Kommanditgesellschaft
Other comments (specific regulation of the ownership within the project)	Membership can only be cancelled already after 5 years - credits are paid after 18 years. Second market for «used» shares is under development.

6.1.2.2.a. PV plant location

Country	Germany
Region	Baden Württemberg
City	Freiburg
Database	Daily monitoring available for each of the 20 plants

See www.regiosonne.solar-monitoring.de -> regiosonne

6.1.2.3. System description

6.1.2.3.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	1,000 kWp at two roofs

6.1.2.3.b. Site

Land ownership	City
Position (roof, ground)	different° inclined roof

6.1.2.3.c. PV array description

PV module manufacturer	Solarfabrik (German)

6.1.2.3.d. Power Conditioning

Inverter manufacturer	Sunways, Konstanz, Germany

6.1.2.3.e. Power generation

Production collected annually	kWh	935,000(expected),1,020,000 (real). (+12% in 2.007, average +4% in the last years)
Equivalent hours	kWh/kWp	935(expected),1,020(real)
Performance Ratio (Global PV system efficiency)	%	Total PR 85.7% in 2007 and 85.3 in 2006 and 82.9 in 2005

6.1.2.3.f. Production (Real Power Generation Data)

See www.regiosonne.solar-monitoring.de -> regiosonne

Annually AVERAGE above 1000= kWh/kWp; planned were 935 kWh/kWp

6.1.2.3.g. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	2 years construction
Project Warranties	Warranty on equity placement by the utility

6.1.2.4. Economic and financial description

6.1.2.4.a. Investment plan

Construction (€)	4,780,000
Permits (€)	0
Feasibility study (€)	60,000,- flyer and marketing activities (co- sponsored by the utility)
Engineering (€)	0
Others (€)	151,000 Financing and discount
TOTAL	5,067,000 (expected), 4,991,000 (real)
Ratio (€/Wp)	5,067 (expected), 4.99 (real)

6.1.2.4.b. Financing plan

Investors (€)	1,637,000
Grants (€)	0
Bank loan (€)	3,430,000
Others (€)	0
TOTAL (€)	5,067,000 (expected)

6.1.2.4.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	935(expected) 1,020 (real)
Yearly Incomes (€)	486,000 (expected), 550,000 (real).(+12% in 2007 year average + 4% in the last years). Break-even after 14 years total payments on equity 3,354,000€ (related to 1,500,000 invested= 223%)

EXPENSES	
Operation and Maintenance	20,000 € with 1.5% inflation factor, after 5 Years increase to 40,000 €
Lease contract	0 initial payment
Insurance	14€ / kWp and year = 14,000 €/p.a.
Security	Not required
Others	17,500 for administration andcomplementary risk
NET BENEFIT (€)	5,500,000 € on the equity
PROJECT IRR (%)	n.a.
INVESTOR IRR (%)	6.10 % - real currently after three years: 6.10 % The utility offers an additional down-payment of 16.6% of the initial equity to those clients who pay an (increased) green tariff - this increase the IRR to 7.5% for this investor group

Note: IRR: Internal Rate of Return

6.1.2.5. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	Feed in tariff retribution llegally fixed in Germany by EGG law, during 20 years
Lease contract: years	Utility is owning some buildings, others are rent from public and private bodies, such as the SC Freiburg, the 1st Bundesliga foot-ball team 21 years, twice extension for 5 years possible
Operation & Maintenance: years and coverage	Expenditures must cover cost for replacement of all inverters once in 20 years. Real time monitoring, once a day report
Insurance: coverage	Third party liability, electronic parts, uninterruptible operation

6.1.2.6. Problems faced / solutions found

PROBLEMS	SOLUTIONS
Site lease/purchase	Lease contracts from the roof owners required, contracts had to be returned due to fixes reasons for some sites
Subsidies	Bank required afterwards a 50% permanent liquidity reserve until complete redemption of dept service of the following year, this reduce the payment of free liquidity on the limited partners Still under negotiation
Investors management	IRR initially permitted is 1.0-1.5% lower than other solar funds in the German market But good performance rate had increased the IRR above this level now
Bank loan	See above
Construction	Huge problems with delivery delays of modules of up to 10 months. Therefore the first two years profit forecast could not be fulfilled
Maintenance	Theft of modules at two remote sites, once even twice
Control and protection of the installation	Monitoring problems as the same type is required for 5 – 100 kWp plant size resulting in increased costs Especially inclination to two different tilts within one PV plant causes higher monitoring costs
Administrative management	Effectiveness in work administration
Other	As it was our first project the limited partners were reluctant to invest

6.1.2.7. Other issues

Recommendations that the owner(s) or the developers would like to make	Utilities can be good partners if they are willing to realize such type of projects. However, utilities could see independent power producers as competitors. If the size for each plant of a joint ownership is lower than 200 kWp other legal forms of society should be searched

6.2. SOLAR INSTALLATION:OEKOGENO SOLAR GMBH & CO. KG.

6.2.1. INTRODUCTION

Zweite OekoGeno Solar GmbH & Co. KG is a project of the OekoGeno EG, cooperative of the former ecological bank Ökobank EG. It is a GmbH&Co. KG mit atypisch stillen Gesellschaftern – (limited company with one limited partner and atypical silent partners). The 150 kWp PV plant is on a garage for buses of the public transport company of the city of Freiburg.

We designed the project with equity of 730,000 € only. Therefore we could offer 8% annual payments from the beginning, and a return of investment of 5.0% over the 20 years duration. Perfect marketing, the project was sold in 8 weeks, due to the foreseen high annual payments. It was our first project with silent partners; we did not know how the market would accept this.

Fig. 11: OekoGeno Solar

6.2.2. GOOD PRATICE MAIN ISSUES

6.2.2.1. Introduction

Reasons to be considered a good practice	First project with atypical silent partners composition. Nevertheless It could be considered as a successful experience
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	It is the commitment of OekoGeno, the cooperative of the former Ökobank eG to offer its members sustainable projects

6.2.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	«Zweite OekoGeno Solar GmbH & Co. KG« mitSolarfonds GmbH&Co. KG Stuttgarter Schulen» GmbH&Co. KG mit atypisch stillen Gesellschaftern – limited company with one limited partnerand atypical silent partners
Why this legal option was chosen? And how the set-up process took place?	Lowest risk for the investors, easy and fast to realise. To prevent high legalregister costs, the atypical silent partners are used
Number of (co-) owners	76
Average investment per co-owner or range of investments	9,368 € by a required minimum of 5,000 €

Type of assets bought by the co-owner: shares, kWp, etc.	Each silent partner has a credit contract with the limited company with one limited partners
Other comments (specific regulation of the ownership within the project)	Membership in the cooperative OekoGeno eG is a pre-requisite

6.2.2.3. PV plant location

Country	Germany
Region	Baden Württemberg
City	Freiburg

See: http://www.oekogeno.solar-monitoring.de/ → Freiburg

6.2.2.4. System description

6.2.2.4.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	150 kWp at the bus store

6.2.2.4.b. Site

Land ownership	It's a particular owner; he has rented the roof for 21 years
Position (roof, ground)	Roofs, on flat-roof

6.2.2.4.c. PV array description

PV module manufacturer	Evergreen, manufactured in Germany

6.2.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt, 20º)

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

6.2.2.4.e. Power Conditioning

Inverter manufacturer	Kaco, Neckarsulm, Germany

6.2.2.4.f. Power generation

Production collected annually	kWh	144,500 (estimation)
Equivalent hours	kWh/kWp	963.3
Performance Ratio (Global PV system efficiency)	%	Above 80%

6.2.2.4.g. Production (Real Power Generation Data)

See http://www.oekogeno.solar-monitoring.de/

6.2.2.4.h. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	2 years construction

6.2.2.5. Economic and financial description

6.2.2.5.a. Investment plan

Construction (€)	640,000
Engineering (€)	48,000
Others (€)	25,000
TOTAL	713,000
Ratio (€/Wp)	4.75

6.2.2.5.b. Financing plan

Investors (€)	713,000
Grants (€)	0
Bank loan (€)	0
Others (€)	0
TOTAL (€)	713,000

6.2.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	144.5 MWh/p.a.
Yearly Incomes (€)	68,000
EXPENSES	
Operation and Maintenance	2,500 with 2.0% inflation factor, after 5 years 3,500.- plus inflation factor
Lease contract	2.2% of net income
Insurance	13€ / kWp and year = 2,000 €/p.a.
Security	Not required
Others	280 metering systems
NET BENEFIT (€)	419,000 € on the equity
PROJECT IRR (%)	Real currently: 5.00 %
INVESTOR IRR (%)	5.00 %

Note: IRR: Internal Rate of Return

6.2.2.6. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	Feed in tariff retribution llegally fixed in Germany by EGG law, during 20 years
Lease contract: years	Lease contract of 22 years of duration, and twice extension for 5 years possible
Operation & Maintenance: years and coverage	Expenditures must cover cost for replacement of all inverters once in 20 years. Real time monitoring, once a day report
Insurance: coverage	Third party liability, electronic parts, uninterruptible operation

6.2.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
Site lease/purchase	Complex structure of the building leads to complex statical proof. The lease contract has to be registered before construction starts
Grid access point	No problems but transformer must be bought from other IPP operating a 400 kWp plant on another roof
Bank loan	Perfect marketing, project was sold in 8 weeks due to the high annual payments of more than 8% from the beginning
Control and protection of the installation	Perfect due to Fraunhofer monitoring, however, sometimes the monitoring is interrupted whereas the plant is fully operating
Administrative management	Work is done well and effectiveness
Duration of administrative procedures and unexpected delays	no delays
Other	It was our first project with silent partners; we did not know how the market would accept this. Next time we will repeat this legal model as it bears low risks for the cooperative members and prevents high costs for the register

6.6.2.8. Other issues

Recommendations that the owner(s) or the developers would like to make	Fix a minimum size for each plant of a joint ownership, as preparation, planning and procurement are almost independent from the plant size

6.3. SOLAR INSTALLATION: BÜRGERKRAFTWERK TURN- UND FESTHALLE WYHL GBR.

6.3.1 INTRODUCTION

The Förderverein Zukunftsenergien, SolarRegio Kaiserstuhl e.V.project is successful, as an active local Solar NGO, realizing such type of project plant by plant. In total 1,127 kWp are realized since 2004. The city Wyhl is the centre of resistance against nuclear power stations, here in the 70´th the first nuclear power plant was prevented by massive local and national protest.

In this case of 30 kWp 20 person have invested an average of 2,945 €

6.3.2. GOOD PRACTICE MAIN ISSUES

6.3.2.1. Introduction

Reasons to be considered a good practice	Successful project, with an active local Solar NGO, realizing such type of project state-of-the-art In total 1,127 kWp are realized since 2004
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	Wyhl is the center of resistance against nuclear power stations; here in the 70's the first nuclear power plant was prevented by massive local an national protest

6.3.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	*Bürgerkraftwerk Turn- und Festhalle Wyhl GbR* – civil law association
Why this legal option was chosen? And how the set-up process took place?	Lowest costs for this small investment, but higher risksfor the investors, easy and fast to realize, low administrations costs
Number of (co-) owners	20
Average investment per co-owner or range of investments	2,945 € by a required minimum of 950 €
Type of assets bought by the co-owner: shares, kWp, etc.	Shares of the GbR
Other comments (specific regulation of the ownership within the project)	Membership can only be cancelled after credit amortization

6.3.2.3. PV plant location

Country	Germany
Region	Baden Württemberg
City	79369 Wyhl

6.3.2.4. System description

6.3.2.4.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	30.24kWp at one roof

6.3.2.4.b. Site

Land ownership	Municipality (It has been rented a roof for 21 years)
Position (roof, ground)	Roof (tilt, 30º)

6.3.2.4.c. PV array description

PV module manufacturer	Solarfabrik and others (German)

6.3.2.4.d. PV tracking

PV tracking mode*	Fixed System

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

6.3.2.4.e. Power generation

Production collected annually	kWh	25,704(expected), 30,844,8 (real)
Equivalent hours	kWh/kWp	850 (expected), 1,020 (real)
Performance Ratio (Global PV system efficiency)	%	Total PR better 80% not measured in details

6.3.2.4.f. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	2 years construction
Project Warranties	Warranty on equity placement by the utility

6.3.2.5. Economic and financial description

6.3.2.5.a. Investment plan

Construction (€)	136,000
Permits (€)	0
Feasibility study (€)	1,000,- flyer and marketing activities
Engineering (€)	0
TOTAL	137,000
Ratio (€/Wp)	4,228 in 2005

6.3.2.5.b. Financing plan

Investors (€)	58,900
Grants (€)	0
Bank loan (€)	78,100
Others (€)	0
TOTAL (€)	137,000

6.3.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	30.84 MWh
Yearly Incomes (€)	15,000
EXPENSES	
Operation and Maintenance	400 € with 2.0% inflation factor
Lease contract	0 initial payment
Security	Not required
Others	1,200 for administration with 1.5% inflation factor
NET BENEFIT (€)	13,400 (5,500,000 € on the equity)
PROJECT IRR (%)	n.a.
INVESTOR IRR (%)	6 % - real currently better due to higher solar production

Note: IRR: Internal Rate of Return

6.3.2.6. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	Feed in tariff retribution legally fixed in Germany by EGG law, during 20 years.
Lease contract: years	NGO is renting from the local small city
Operation & Maintenance: years and coverage	Expenditures must cover cost for replacement of all inverters once in 20 years. No monitoring cost, No real time monitoring, once a month report.
Insurance: coverage	Third party liability

6.3.2.7 Problems faced / solutions found

PROBLEMS	SOLUTIONS
Site lease/purchase	Lease contracts from the roof owners required, contracts had to be returned due to statical reasons for some sites.
Investors management	The keyperson Hr. Bindner contacted Georg Hille through the bank, financing the OKR project
Administrative management	Work is done well and effectiveness
Other	It was the first of 25 projects of this NGO

6.3.2.8. Other issues

Recommendations that the owner(s) or the developers would like to make	Local based NGOs lead to the highest share in the use of renewable energies in all places. However, key factor for success are key persons with high local reputation

6.4. SOLAR INSTALLATION: ECO-VISION SOLARFONDS GMBH&CO. KG STUTTGARTER SCHULEN

6.4.1. INTRODUCTION

Ecovision Solarfonds GmbH&Co. KG Stuttgarter Schulen is a successful project, first of its kind on five schools in Stuttgart. The legal form is a limited company with joint ownership

We choose this legal option for its lowest risk for the investors, easy and fast to realise - but with high legal register costs. We have 77 co-owners with an average investment of 7,447 € per capita by a required minimum of 1,500 €.

We have promised a project IRR of 4.0% due to the outranging performance ratio of 85% we have 15% more annual revenues at the moment and, consequently, a real current IRR of 4.0 %.

Fig. 12: Ecovision Solarfond

6.4.2. GOOD PRATICE MAIN ISSUES

6.4.2.1. Introduction

Reasons to be considered a good practice	Successful project, first of its kind in Stuttgart
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	It is our commitment to start such type of project

6.4.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Ecovision Solarfonds GmbH&Co. KG Stuttgarter Schulen, GmbH&Co. KG – limited company with joint ownership
Why this legal option was chosen? And how the set-up process took place?	Lowest risk for the investors, easy and fast to realize, but high legal register costs
Number of (co-) owners	77
Average investment per co-owner or range of investments	7,447 € by a required minimum of 1,500 €
Type of assets bought by the co-owner: shares, kWp, etc.	Shares of the Kommanditgesellschaft
Other comments (specific regulation of the ownership within the project)	Membership can only be cancelled when credits are paid (in the average after 12-15 years). Second market for «used» shares is under development

6.4.2.3. PV plant location

Country	Germany
Region	Baden Württemberg
City	Stuttgart

6.4.2.4. System description

6.4.2.4.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	309 kWp at five schools

6.4.2.4.b. Site

Land ownership	The city hall has rented a roof for 21 years
Position (roof, ground)	Roofs, 4 flat-roof, one inclined

6.4.2.4.c. PV array description

PV module manufacturer	Several German manufacturer (Solon, Sunways)

6.4.2.4.d. Power Conditioning

Inverter manufacturer	Sunways, Konstanz, Germany

6.4.2.4.e. Power generation

Production collected annually	kWh	230,000 (planned), 262,000 (real)
Equivalent hours	kWh/kWp	945(planned), 1,077(real)

6.4.2.4.f. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	2 years construction

6.4.2.5. Economic and financial description

6.4.2.5.a. Investment plan

Construction (€)	1,570,000
Permits (€)	6.00
Engineering (€)	61,000
TOTAL	40,000
Ratio (€/Wp)	5,461

6.4.2.5.b. Financing plan

Investors (€)	564,000
Grants (€)	0
Bank loan (€)	1,114,000
Others (€)	0
TOTAL (€)	1,678,000

6.4.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	230 (planned), 262 (real)
Yearly Incomes (€)	153,800, Break-even 12 years total payments on equity 1,300,000€, related to 566,000€ invested =230%)
EXPENSES	
Operation and Maintenance	7,500 with 2.0% inflation factor, after 5 years 10,000.- plus inflation factor
Lease contract	0 initial payment of € 1,500 per roof
Security	Not required
Others	400 metering systems
NET BENEFIT (€)	140,171 €
Bank repayments (€)	345,000 € within 15 years
PROJECT IRR (%)	Real currently after three years: 4.30 %
INVESTOR IRR (%)	4.00 %

Note: IRR: Internal Rate of Return

6.4.2.5.d. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	Feed in tariff retribution legally fixed in Germany by EGG law, during 20 years
Lease contract: years	22 years, twice extension for 5 years possible
Operation & Maintenance: years and coverage	Expenditures must cover cost for replacement of all inverters once in 20 years. Monitoring cost
Security: coverage	Real time monitoring, once a day report
Insurance: coverage	Legal liability insurance, Electronic parts, uninterruptible operation

6.4.2.6 Problems faced / solutions found

PROBLEMS	SOLUTIONS
Site lease/purchase	From 25 schools only five were appropriate due to static problems of the roof or the age of the roofs without refurbishing
Grid access point	No problem but an 24h free-access switch must be installed outside the buildings, so it is expensive
Local / regional / national permits and approvals	After the PV plants have been installed at four schools a national accident – due to high snow weight, caused a change in the permission procedure and the school dep. Did not give the permit for installation. We started the construction without the permit with the risk of dismantling later. After some extra work of our static engineer we got the final permit
Investors management	IRR permitted is 1.0-1.5% lower than other solar funds in the German market. Slow sales of shares and high effort to attract investors were required
Bank loan	Perfect cooperation with project financer Umweltbank AG
Construction	No problems
Maintenance	No problems
Control and protection of the installation	Perfect due to Fraunhofer monitoring, however, sometimes the monitoring is interrupted whereas the plant is fully operating

Administrative management	Work is done well and effectiveness
Duration of administrative procedures and unexpected delays	Problem of scarcity of modules and rising prices for the 4th and 5th plant, almost no delays
Other	We had no equity pre-financing for all plants. Therefore, we needed to build one plant just-in-time after the other and hoping that the required equity could be acquired in the meantime

6.4.2.7. Other issues

Recommendations that the owner(s) or the developers would like to make	Local based NGOs lead to the highest share in the use of renewable energies in all places. However, key factor for success are key persons with high local reputation

6.5. SOLAR INSTALLATION. CARRIAGEWAY B1.

6.5.1. INTRODUCTION

Ecovision GmbH started this successful project of a 60 kWp plant on a roof of the congregation due to our long-term relationship with this group

It was our first project. It is our commitment for this type of co-owner project.

The high quality measure during installation and operation leads to an out ranging performance of the PV plant (PR 85.7% in 2007 and 85.3 in 2006).

The investor IRR of 5.10 % promised rose to- currently: 6.50 % real after three years of operation.

Fig. 13: Solar installation Carriage B1, Freiburg

6.5.2. GOOD PRATICE MAIN ISSUES

6.5.2.1. Introduction

Reasons to be considered a good practice	PV on top of a dual carriageway. First project of its kind
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	Continuation of Fesa (limited association), tradition of organizing community projects in renewable energies that was started in 1994

6.5.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	GmbH&Co. KG – limited company with joint ownership
Why this legal option was chosen? And how the set-up process took place?	Lowest risk for the investors, easy and fast to realize The standard type for participation projects
Number of (co-) owners	80
Average investment per co-owner or range of investments	7,750 € (minimum share of 3,000 €)
Type of assets bought by the co-owner: shares, kWp, etc.	Shares of the Kommanditgesellschaft
Other comments (specific regulation of the ownership within the project)	Shares can be sold only if buyer is found

6.5.2.3. PV plant location

Country	Germany
Region	Baden Württemberg
City	Freiburg

See: Daily monitoring via meteocontrol www. meteocontrol.de

6.5.2.4. System description

6.5.2.4.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	366 kWp

6.5.2.4.b. Site

Land ownership	Federal Republic of Germany, It has rented it for 21 years
Position (roof, ground)	Roof gallery on top of a road

6.5.2.4.c. PV array description

PV module manufacturer	Sanyo

6.5.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt, 30º)

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

6.5.2.4.e. Power Conditioning

Inverter manufacturer	Siemens, Germany

6.5.2.4.f. Power generation

Production collected annually	kWh	341,275 (planned), 410,000 (real,+20%
Equivalent hours	kWh/kWp	932 (planned), 1,120 (real)
Performance Ratio (Global PV system efficiency)	%	86.3

6.5.2.4.g. Project size and type

Planned: 341,275 kWh/year, 932 kWp/kWp; Real: 410,000 kWh, 1,120 kWh/kWp

6.5.2.4.h. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	2 years construction

6.5.2.5. Economic and financial description

6.5.2.5.a. Investment plan

Ratio (€/Wp)	5,235

6.5.2.5.b. Financing plan

Investors (€)	620,000
Grants (€)	0
Bank loan (€)	1,296 Mio €
Others (€)	0
TOTAL (€)	1,916 Mio €

6.5.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	410,000 kWh/p.a.
Yearly Incomes (€)	200,000
EXPENSES	
Operation and Maintenance	20,000 rising with 2.0% inflation factor
Lease contract	500 € p.a.
Insurance	5,500 € p.a. rising with inflation
Security	Not required
Others	400 metering systems
NET BENEFIT (€)	173,600 €
INVESTOR IRR (%)	5%

Note: IRR: Internal Rate of Return

6.5.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	Feed in tariff retribution legally fixed in Germany by EGG law, during 20 years
Lease contract: years	20 years, extension possible
Operation & Maintenance: years and coverage	Expenditures must cover cost for replacement of all inverters once in 20 years. Monitoring cost
Security: coverage	Real time monitoring, once a day report
Insurance: coverage	Third Party damage, Electronic parts, uninterruptible operation

6.5.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
Site lease/purchase	Site lease from Federal Republic of Germany via City of Freiburg
Grid access point	20 kV transformer and 40 meter cable connected to 20 kV gird of local operator. Container was required to house transformer and 20 kV switching gear and inverter
Local / regional / national permits and approvals	Exemption form landscape protection legislation
Investors management	Local advertising for equity. 620,000 € were placed within 6 months
Bank loan	Perfect cooperation with project financer GLS Bank, Bochum
Control and protection of the installation	The site is regularly visited and controlled on a daily basis by Fesa. Alarm service via email

Administrative management	By managing director of GmbH & Co KG
Other	City of Freiburg sat on the lease contract for 5 months so it made more difficult to start with the project Lost half a month due to bad weather during construction

6.5.2.7. Other issues

Recommendations that the owner(s) or the developers would like to make	We think participation projects are perfect
Other issue	Administration made things more difficult even in Freiburg
Other issue	Renewable energies are the fire brigade in climate protection and fossil resource management. It is high time that administrators do treat renewable energies with more respect

7. FRENCH GOOD PRACTICES

7. French good practices

7.1. SOLAR INSTALLATION: THE APEVES PV PROJECT «MESSIA»

7.1.1. INTRODUCTION

APEVES is a non-profit organization whose aim is to produce and to develop the photovoltaic energy in France. It has developed a project named «turn your electricity to a green one thanks to the sun» consisting of the set up of a PV system, named MESSIA.This system has the particularity of being partly financed by individuals (the other part of the financing is the subsidies), witch means that any person who wants to contribute to the green electricity development, and does not have the specific place to implement her system, or does not have the money to invest in it, can buy a «part» of the PV installation. Each part is a 20 € contribution named «bon Verelectron». The project MESSIA will be set-up by two parts: MESSIA 1 and MESSIA 2 at Messia-Sur-Sorne.

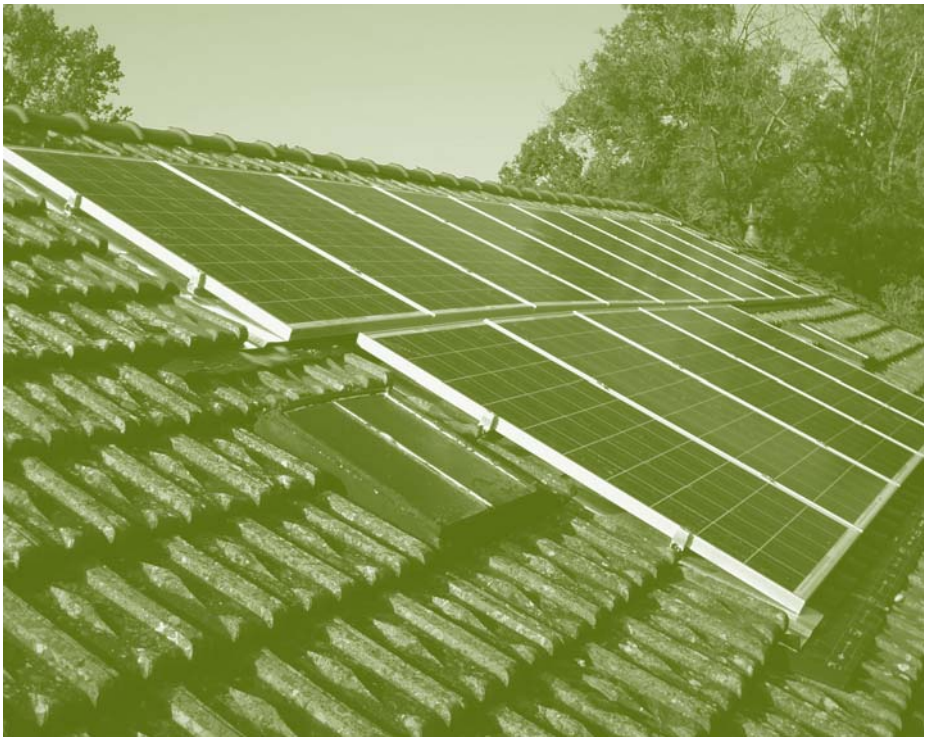


Fig. 14: The APEVES PV Project «MESSIA»

The system was set up before the publishment of the law related to the new feed in tariff (law of 10th of July 2008), and for this reason it was not integrated to the roof. When the new tariffs appeared, APEVES took advantage of still not having signed the purchase contract, to integrate the system to the roof and sign a purchase contract with a tariff of 0.55€/kWh. However, the additional costs necessary to integrate the system, brought the price of the installation to 12 €/kWc, much higher than the costs of the usual integrated systems.

However, one problem is important to precise: the incapability for a non-profit organization to reverse money to a profit one or to individuals. This kind of project is not «economically' interesting», only few persons are concerned and not the general public.

Although the fact that the contributors now perceive revenue from the installation, and their investment is a donation, we see a clear interest in the development of the PV systems even when a person does not have the necessary conditions (no roof space, or not enough money to invest, etc) to elaborate it.

The MESSIA project is a new step towards the jointly owned system.

7.1.2. GOOD PRACTICE MAIN ISSUES

7.1.2.1. Introduction

Reasons to be considered a good practice	One of the first jointly owned investment in France.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	Before the actual feed in tariffs was adopted, only few motivated investors could install PV on their roofs. A group of people decided to promote the photovoltaic energy and proposed small shares to be able to offer the possibility to every energy consumer to participate to the fight against climate change.

7.1.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Non profit association following the 1.901 law.
Why this legal option was chosen? And how the set-up process took place?	The association 1.901 is a legal form easy to set up, requiring very little fees.
Number of (co-) owners	57
Average investment per co-owner or range of investments	The value of each donation is minimum 20 €
Type of assets bought by the co-owner: shares, kWp, etc.	Donation

7.1.2.3. PV plant location

Country	France
Region	HAUTE-Saône
City	Messia-sur-Sorne

7.1.2.4. System description

7.1.2.4.a. Project size and type

Location (rural or urban area)	Rural area
Type (isolated, grid-connected, solar farm)	Gird-connected installation.
Size (kWp)	2.45 kWp

7.1.2.4.b. Site

Land ownership	Private building
Position (roof, ground)	Roof

7.1.2.4.c. PV array description

PV module manufacturer	Conergy

7.1.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt, 30º)

* No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

7.1.2.4.e. Power Conditioning

Inverter manufacturer	SMA

7.1.2.4.f. Power generation

Production collected annually	kWh	2,400 (estimation)
Equivalent hours	kWh/kWp	1,000 kwh/kWc (estimation)
Specific yield	kWh/m2	124.22 kWh/m2

7.1.2.4.g. Technical Warranties

Equipment Warranties:	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years.

7.1.2.5. Economic and financial description

7.1.2.5.a. Investment plan

Construction (€)	22,626 €
Others (€)	Grid connection:650 € The panels have been afterwards integrated to the building: 6,000 €
TOTAL	29,276 €
Ratio (€/kWp)	11.94 €/Wp

7.1.2.5.b. Financing plan

Investors (€)	5,400 € (some owners donated more than 20 €)
Grants (€)	Total:14,000 € – ADEME (The Environmental and Energy Agency) – Franche-Compté: 7000 € – The Franche-Compté region: 7,000 €
Bank loan (€)	9,876 € (external Loan: 3,876 € + Roof renter loan: 6,000 €)
TOTAL (€)	29,276 €

7.1.2.5.b. Financial forecast (yearly figures)

INCOMES:	1,320 €
Power sold (MWh)	2.4
Yearly Incomes (€)	1,320 €
EXPENSES:	298 €
Net Benefit (€)	1,022 €
Bank repayments (€)	1,303.71 €/year over 7 years + 750 € the 8th year

7.1.2.5.c. Bank Loan

Financing amount (% of the total investment)	34
Type of product (Personal loan, project finance, VAT finance, leasing...	Private loans
Period	3,876 €: over 7 years
	6,000 €: over 8 years
Interest rate (interest rate, Fix, variable)	
Warranties	Personal resources and purchase contract

7.1.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	The purchase contract has duration of 20 years and is guaranteed by the law with specific feed in tariffs.
Lease contract: years	20
Insurance: coverage	20 years

7.1.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
	No problems

7.2. SOLAR INSTALLATION: THE SOLEIL MARGUERITE PROJECT

7.2.1. INTRODUCTION

Soleil Marguerite is a non-profit organization that owns a PV installation of 12.8 kW. This installation was set-up as an application to the European program UNIVERSOL whose aim was to realise 15 installations mainly used for educative applications.

Soleil Marguerite got different subsidies from Europe (through Universol), ADEME (French environmental energy) and the Rhône Alpes Region, which is a high percentage of subsidies in comparison with the actual financing for PV. However, Soleil Marguerite did not benefit from the new feed in tariff, and is selling her energy at only 0.15 €/kWh.

The characteristic of this project is to have received the investment of two organisms (members of Soleil Marguerite): La Nef and Hespul. The system is installed on the La Nef's building roof, where are also located the Hespul's offices. Nevertheless, the indirect owners are not individuals but organisms (La Nef is a financial organism and Hespul is a non profit organization), which is not the first aim of the DeSolaSol program.

In the mean time, we can see through this example that carrying up a photovoltaic system through a common owner whose status is a non-profit organization, is a possible solution to set up the jointly owned PV system.

The system is designed with three different kinds of PV panels: BP solar: 6.12 kWp, Total energy: 2.1 kWp, Isofoton: 4.62 kWp.

This technical choice was made up, to be able to experiment the technical solutions proposed in the French PV market and compare between the commercial proposition and the real production and functionment.

Soleil Marguerite is regularly visited by students, general public and professionals.

Fig. 15: The Soleil Marguerite Project.

7.2.2. GOOD PRACTICE MAIN ISSUES

7.2.2.1. Introduction

Reasons to be considered a good practice	One of the first jointly owned investment involved two organizations, one is a NGO and the other is a financial entity.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	HESPUL and La Nef are occupying the same building in Villeurbanne (France). Therefore, the common will of both structures to set up a PV system, have been realised with the creation of the non-profit association Soleil Marguerite.

7.2.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Non profit association following the 1.901 law
Why this legal option was chosen? And how the set-up process took place?	The association 1.901 is a legal form easy to set up, requiring very little fees.
Number of (co-) owners	2
Average investment per co-owner or range of investments	10,500 €
Type of assets bought by the co-owner: shares, kWp, etc.	Donation

7.2.2.3. PV plant location

Country	France
Region	Rhône-Alpes
City	Lyon

7.2.2.4. System description

7.2.2.4.a. Project size and type

Location (rural or urban area)	Urban area
Type (isolated, grid-connected, solar farm)	Gird-connected installation
Size (kWp)	12.84 kWp

7.2.2.4.b. Site

Land ownership	Private building
Position (roof, ground)	Roof

7.2.2.4.c. PV array description

PV module manufacturer	BP Solar- Total Energie - Isofoton

7.2.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt, 30º).

7.2.2.4.e. Power Conditioning

Inverter manufacturer	SMA

7.2.2.4.f. Power generation

Production collected annually	kWh	12,660
Equivalent hours	kWh/kWp	986 kwh/kWc
Specific yield	kWh/m2	127.74 kWh/m2
Performance Ratio (Global PV system efficiency)	%	BP Solar: 77.06% Total Energie: 81.78% Isofoton: 83.6% (Total average: 83.6 %)

7.2.2.4.g. Production (Real Power Generation Data)

	E	F	M	A	M	J	J	A	S	O	N	D	Tot
2004	339	795	1089	1095	1652	1634	1710	1453	1325	735	452	255	12,534
2005	619	687	1124	1217	1618	1751	1610	1323	1135	983	609	225	12,901
2006	451	502	1003	1351	1399	1711	1725	1401	1242	915	616	429	12,744
2007	342	654	1129	1532	1274	1408	1511	1324	1359	1027	545	358	12,460

Monthly data in kWh; Total annual data in MWh

7.2.2.4.h. Technical Warranties

Equipment Warranties:	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years.
Project Warranties	

7.2.2.5. Economic and financial description

7.2.2.5.a. Investment plan

Construction (€)	105,000 €
Others (€)	Grid connection:650 € Insurance: 350 €
TOTAL	106,000 €
Ratio (€/kWp)	8.25 €/Wp

7.2.2.5.b. Financing plan

Investors (€)	21,000 €
Grants (€)	Total: 85,000 € – ADEME (The Environmental and Energy Agency) – Universol (European Program) – The Rhône Alpes region: 7,000 €
Total (€)	106,000 €

7.2.2.5.c. Financial forecast (yearly figures)

INCOMES:	1,950 €
Power sold (MWh)	12.8
Yearly Incomes (€)	1,950 €
EXPENSES:	350 €
Net Benefit (€)	1,600 €

Note: IRR: Internal Rate of Return

7.2.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	The purchase contract has duration of 20 years and is guaranteed by the law with specific feed in tariffs.
Lease contract: years	20
Insurance: coverage	20

7.2.2.7. Problems faced / Solution found

PROBLEMS	SOLUTIONS
	No problems

7.3. SOLAR INSTALLATION: THE PV JOINTLY OWNED PROJECT «ENERGIES PARTAGÉES»:

7.3.1. INTRODUCTION

Energies Partagées, witch means shared energies in French, is an SME situated in the west of France, in the Loire-Atlantique department. It was created following a will of investors to set up a jointly owned PV system on a public owned roof.

The legal statute of the society is «SARL: Société Anonyme à Responsabilité Limitée» with the «SCIC: Société Civile à Investissement Collectif» certification.

The advantages of being certified SCIC are:

- To allow public and private investment in a same structure.
- To have a democratic operation (The influence of a person on the activities of the society does not depend of the capital invested, 1 person = 1 vote).
- To limit the lucrative aspect: 57.3% of the benefits is conserved and undividable.

The public roof is a possession of the community of local authorities of Chemillé.

With the choices of having a SCIC certification and the use of a public roof for the installation, Energies Partagées wanted to set up a real citizen project model where the public authorities jointly with private investors of the region, build up a unique sustainable project.

The «Energies Partagées» project is one of the first real jointly owned PV system in France and is a concrete example of a possible citizen engagement towards the development of the renewable energies. The system (May 2007) is still not installed but it is expected for this summer time.

Economically, this project seems to be globally interesting but we have to take into consideration that he have beneficiated of 50% of subsidies, witch is a high percentage and is generally not the case for French projects. However, the choice of fixing the price of the part at 100 € shows that the real motivation is not an economical one.

Web site:
www.energiespartagées.org

The system has a purchase contract with the utility and a regulated feed-in tariff of 0,30 €/kWh for a guaranteed period of 20 years. The annual PV revenue is about: 2,700 €

Contribution of the investors: To be co-financer of the system, a private investor has to buy a share (or several ones) in the society. The value is fixed to 100 €. Until now, «energies partagées» has 81 associates; 3 of them are city halls. The SCIC statute obliges to have at least one employee; witch is the case of Energies Partagées.

7.3.2. GOOD PRACTICE MAIN ISSUES

7.3.2.1 Introduction

Reasons to be considered a good practice	Introduces a legal form, which can be used for other projects. However, this system has benefited from exceptional subsidies, which Is not the case of most of the French systems. That's why the economical issues cannot be representatives.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	A group of friends decided to build a representative social project and propose all an experience to develop

7.3.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Limited Society with a cooperative mechanism: SARL (Societé à Responsabilité Limitée), SCIC (Societé Cooperative d'Intérêt Collectif).
Why this legal option was chosen? And how the set-up process took place?	The SARL is a facilitated form of society, whose creation does not impose to have a minimum of own funds. The limited aspect protects all the investors and limits their responsibility to their investment. The advantages of having a SCIC title are: To allow public and private investment in a same structure. The public contribution is limited to 20% of the capital. To have a democratic operation (The influence of a person on the activities of the society does not depend on the capital invested). To limit the lucrative aspect: 57.3% of the benefits is conserved and undividable. To create an SARL, only an administrative procedure is to be set up with the «Centre de Formalités des Entreprises». An SCIC is a nomination that different kinds of legal forms can have. The SCIC title is given by the «Prefecture», local authority representing the national government.
Number of (co-) owners	94
Average investment per co-owner or range of investments	The value of each share is minimum 100 €
Type of assets bought by the co-owner: shares, kWp, etc.	Shares

7.3.2.3. PV plant location

Country	France
Region	Maine Et Loire
City	Chemillé

7.3.2.4. System description

7.3.2.4.a. Project size and type

Location (rural or urban area)	Rural area
Type (isolated, grid-connected, solar farm)	Gird-connected installation
Size (kWp)	8.28 kWp

7.3.2.4.b. Site

Land ownership	The roof is owned by the social center of Chemillé, which is a public center. It has rented for 20 years (1€/year)
Position (roof, ground)	Roof

7.3.2.4.c. PV array description

PV module manufacturer	Tenesol

7.3.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt , 30º)

* No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

7.3.2.4.e. Power Conditioning

Inverter manufacturer	Tenesol

7.3.2.4.f. Power generation

Production collected annually	kWh	9,000

7.3.2.4.g. Technical Warranties

Equipment Warranties:	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years.

7.3.2.5. Economic and financial description

7.3.2.5.a. Investment plan

Construction (€)	59,492 €
Permits (€)	Administrative fees: 96 €
Others (€)	Grid connection:438 € - Monitoring system: 2,460 €
TOTAL	62,486
Ratio (€/kWp)	7,54€/Wp

7.3.2.5.b. Financing plan

Investors (€)	30,600 (some owners bought more than 100€).
Grants (€)	Total:31,886 € The Pays de la Loire region: 16,800 € Community of municipal authority: 6,000 € Departmental Energy Syndicate: 5,200 € LEADER +: 2,786 € Chemillé local authority: 1,100 €
TOTAL (€)	62,486

7.3.2.5.c. Financial forecast (yearly figures)

INCOMES:	4,950 €
Power sold (MWh)	9
Yearly Incomes (€)	4,950
EXPENSES:	1,431 €
Operation and Maintenance	100
Lease contract	1
Insurance	260

Others	Access to the electric network: 35 € Communications and administrative aspects: 220 € Employee: 250 € Other costs: 185 € Assessments fees: 150 € Taxes: 230
Net Benefit (€)	3,519

7.3.2.6.a. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	The purchase contract has duration of 20 years and is guaranteed by the law with specific feed in tariffs.
Lease contract: years	20
Insurance: coverage	20

7.3.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
Local / regional / national permits and approvals	It was the first SCIC title the local authority had to treat. For this reason, the administrative procedure to be able to have the SCIC nomination took one year, which should be processed more rapidly for next projects in the future.
Investors management	A series of presentation and meetings have been organised with the different investors to be able to fix the good operation for the society. Each year, a general assembly is held. One employee organises this question.
Duration of administrative procedures and unexpected delays	Unexpected delays: 1 year to have the SCIC permit
Other	The renting contract for the roof had to be built without any previous experience allowing to have a first example

7.4. SOLAR INSTALLATION: ENERGIES CITOYENNES DE LA WEISS (EC LA WEISS).

7.4.1. INTRODUCTION

In France, a non profit organization has to follow the legal text of the law 1901. In the departments (local authority) of the Haut-Rhin, the Bas-Rhin and the Moselle (North East of France), a local legislation exists that have a lot of similar points with the German one. Concerning the non profit organizations, they have to follow the law 1908.

»Energies Citoyennes de La Weiss» is a non profit organization following the law 1908. Its purpose is to make the local citizens participate to renewable energies projects. Their first project was a PV system implemented on the Wood Museum of the city of Labaroche (Alzace).

The choice of the roof, which is a public place, gave a free publicity for the project, and that's how the association was able to get the participation of 50 investors. The communication was also made through exhibitions in which EC La Weiss participated.

Fig. 16: Energies citoyennes de La Weiss

The system was connected to the grid on May 2007.

The success of this first project made EC La Weiss start thinking of a new project; enhance a local participation to invest in a wind turbine.

The «Energies Citoyennes de La Weiss» system is a good example of jointly owned PV system. However, this form cannot be replicated everywhere in France because of its specific local legislation. This legal framework makes possible to an association (non profit organization) to pay interests to the financial contribution of the investors, which is not the case of the association following the national law 1901. This is how it is possible to remunerate the share, giving an economic interest to the project.

7.4.2. GOOD PRACTICE MAIN ISSUES

7.4.2.1. Introduction

Reasons to be considered a good practice	Introduces a legal form, which can be used for other projects in the department of Alsace (local legislation).
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	Because of the closeness of the German frontier, the French region «Alsace» have close relations with the other side of the frontier. While jointly owned PV systems are very developed in the neighbouring country, a group of persons decided to show that this type of project can also be developed in France.

7.4.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Association following the 1.908 law (local legislation)
Why this legal option was chosen? And how the set-up process took place?	In France, a non profit organization has to follow the legal text of the1.901 law. In the departments (local authority) of the Haut-Rhin, the Bas-Rhin and the Moselle (North East of France), a local legislation exists that have a lot of similar points with the German one. Concerning the non profit organizations, they have to follow the law 1.908, which allows the association to propose a limited remuneration of shares
Number of (co-) owners	50
Average investment per co-owner or range of investments	The value of each share is minimum 100 €
Type of assets bought by the co-owner: shares, kWp, etc.	Shares

7.4.2.3. PV plant

Country	France
Region	Alsace
City	Labaroche

7.4.2.4. System description

7.4.2.4.a. Project size and type

Location (rural or urban area)	Rural area.
Type (isolated, grid-connected, solar farm)	Gird-connected installation
Size (kWp)	8 kWp

7.4.2.4.b. Site

Land ownership	The roof is owned by the wood museum of Labaroche. It has rented for 20 years.
Position (roof, ground)	Roof

7.4.2.4.c. PV array description

PV module manufacturer	Tenesol

7.4.2.4.d. PV tracking

PV tracking mode*	Fixed system (tilt, 30º).

* No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

7.4.2.4.e. Power Conditioning

Inverter manufacturer	Tenesol

7.4.2.4.f. Power generation

Production collected annually	kWh	8,000 (estimation)
Equivalent hours	kWh/kWp	1,000 kWh/kWp (estimation)
Specific yield	kWh/m2	133.33 kWh/m2

7.4.2.4.g. Technical Warranties

7.4.2.5. Economic and financial description

7.4.2.5.a. Investment plan

Construction (€)	60,000 €
Permits (€)	Administrative fees: 96 €
Others (€)	Grid connection:600 € Banking fees for a temporary loan (while waiting f or the payments of subsidies): 1,300 € Others (administrative fees): 1,100 €
TOTAL	63,096
Ratio (€/kWp)	7.88 €/Wp

7.4.2.5.b. Financing plan

Investors (€)	20,000 € , some owners bought more than 100€.
Grants (€)	Total: 40,000 € ADEME (Agence de l'Environnement et de la Maîtrise de l'Energie). Labaroche local authority Alsace Region
Others (€)	3,096
Total (€)	63,096

7.4.2.5.c. Financial forecast (yearly figures)

INCOMES:	2,400 €
Power sold (MWh)	8
Yearly Incomes (€)	2,400
EXPENSES:	1,101 €
Operation and Maintenance	350
Lease contract	1
Insurance	350
Others	Access to the electric network: 50 € Communication and operation fees:350 €
Net Benefit (€)	1,299

7.4.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	The purchase contract has duration of 20 years and is guaranteed by the law with specific feed in tariffs
Lease contract: years	20
Insurance: coverage	20

7.4.2.7. Administration

Level of administration (state, region, municipal)	State – region and municipal
Summarize of permits and licenses required	An authorization to operate an electricity producing system is to be asked for the DIDEME (Direction de la Demande et des Marchés Énergétiques). A certificate allowing selling the electricity with the feed-in tariffs system is to be asked to the DRIRE (Directions Régionales de l'Industrie, de la Recherche et de l'Environnement). Work license or permission (City Hall) Social Responsibility Insurance (Insurance Company) Grid access point (Distributed Company)
Expected duration total administrative procedures	6 month

7.4.2.8. Problems faced / solutions found

PROBLEMS	SOLUTIONS
	No problems

8. SPANISH GOOD PRACTICES

8. Spanish good practices

8.1. SOLAR PLANT: SOCIETIES LA SERNA SOLAR

8.1.1. INTRODUCTION

The city hall is the promoter of the plant. It is a municipal project with the participation of neighbours, natives and descendants, of the town. The investments of each person are small, up to 5% of the shares in order to allow bigger participation. There are investors of all ages, from 3 years old, in the case of a little girl, up to 68 years old, in the case of a village farmer. La Serna is a small town in Palencia, Castilla León, which is suffering of depopulation, as many other towns in rural areas of Spain. At the moment, only 116 people live there and the average age is high.

The first idea for the project was a problem concerned with the municipal water tank that had a high consumption of electricity. So the idea came to install PV panels to generate this necessary energy. But then, it was discovered that it was possible to generate economic benefits and environmental profits, so why not to invite the neighbours to participate? It could also be a way for people who don't live any more in La Serna to

Fig. 17: La Serna PV plant, La Serna, Palencia

have a link with the town, generating at the same time rural development and strengthening the relationships in the town. Many neighbours, specially their descendants who live outside the town, and also people from adjacent towns, were interested and after some information sessions, the decision to invest was taken in assembly. The owners are:5 limited societies (La Serna 1 to La Serna 5), 4 of 100 kW and another one of 50 kW. The number of co-owners are 90, and the average investment per co-owner is in the rank from 3,700 to 34,200€ (in the case of the city hall). The size plant is 520 kWp. In April 2007 the plant started to produce. The project is also being used for the children environmental education. Different activities are carried out in this sense: solar week, guided tours, competitions, etc. For example within the program «Vivo mi pueblo» of the Palencia's Deputation, 150 school students visited the installations.

8.1.2. GOOD PRACTICE MAIN ISSUES

8.1.2.1. Introduction

Name and last name	Societies of SERNA SOLAR
Class (promoter, investor, owner, ...)	City Hall La Serna (Palencia), promoter and owner
Reasons to be considered a good practice	Municipal project, with the participation of neighbours, natives and descendants of the town. Small investments, up to 5%, in order to allow bigger participation. There are investors of all ages: from 3 years, in the case of a small girl, up to 68, in the case of a farmer
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	La Serna is a small town in Castilla León which is suffering of depopulation, as many other towns in rural areas of Spain. At the moment, only 116 people live there and the average age is high The project started from a problem: the pump of the municipal water tank had a high consumption of electricity, and generated big bills to be paid, so the idea came to install PV panels to generate this energy. But then, it was discovered that it was possible to generate economic wealth and environmental profits, so why not to invite the neighbours to participate? It could also be a way for people who don't live any more in La Serna to have a link with the town, generating at the same time rural development and strengthening the relationships in the town Many neighbours, specially their sons who live outside the town, and also people from adjacent towns, were interested, and after some information sessions, the decision was taken in assembly

8.1.2.2. Co-Ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	5 limited societies: 4 of 100 kW and another one of 50 kW
Why this legal option was chosen? And how the set-up process took place?	There were recommendations in this sense
Number of (co-) owners	90
Average investment per co-owner or range of investments	From 3,715 € (743 € of own investment plus 2,972 € of bank loan) up to 34,180 €, in the case of the City Hall (6,836 € of own investment and 27,344 € of bank loan)
Type of assets bought by the co owner: shares, kWp, etc.	Shares

8.1.2.2.a. PV plant Location

Country	Spain
Region	Palencia
City	La Serna

8.1.2.3. System description

8.1.2.3.a. Project size and type

Location (rural or urban area)	Rural area
Type (isolated, grid-connected, solar farm)	Grid connected solar farm.
Size (kWp)	520 kWp (4 plants of 116 kWp and 1 plant of 56 kWp

8.1.2.3.b. Site

Land ownership	The land belongs to the City Hall, who has rented it for 40 years
Position (roof, ground)	Ground

8.1.2.3.c. PV array description

PV module manufacturer	Suntechnics for SS1 and SS2, Sharp for SS3, SS4 and SS5

8.1.2.3.d. PV tracking

PV tracking mode*	Fix system, (Tilt inclination 30º)

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

8.1.2.3.e. Power Conditioning

Inverter manufacturer	Solar Max for SS1 and SS2, Ingecom Sun for SS3, SS4 and SS5

8.1.2.3.f. Power generation

Production collected annually	kWh	765,000
Equivalent hours	kWh/kWp	1,471
Performance Ratio (Global PV system efficiency)	%	88

8.1.2.3.g. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years

8.1.2.4. Economic and financial description

8.1.2.4.a. Investment plan

TOTAL	3,300,000 €
Ratio (€/Wp)	6.34

8.1.2.4.b. Financing plan

Investors (€)	20%
Grants (€)	0
Bank loan (€)	80%
Others (€)	0

8.1.2.4.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	765 MWh
Yearly Incomes (€)	336,892 €
EXPENSES	
Others	1% of the annual production goes directly to the municipal treasury as ground rent
NET BENEFIT (€)	Expected total net benefit: 5,197,410 €

8.1.2.5. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	It is governed by Royal Decree 661/2007, the entire energy will be computed to the distributor company, in this case Enel Viesgo. The feed in contract is signed for 5 years extendable to 25 years
Lease contract: years	40
Operation & Maintenance: years and coverage	2 years
Security: coverage	A perimeter fencing and ray system

8.1.2.6. Problem faced /solutions found

PROBLEMS	SOLUTIONS
Control and protection of the installation	The first phase (La Serna 1 and La Serna 2) was not well installed. Problems arose soon with cables and overcharge protections. This is why the production of SS2 in April 07 and of SS1 in August to October 07 was so low. The second phase has been installed by a different enterprise that corrected the mistakes of the first phase and has worked much more accurately, giving a high performance

8.1.2.7. Other issues

Recommendations that the owner(s) or the developers would like to make	Be very careful when choosing the installers. In cases like this one, where the promoters are motivated people but who lack of technical experience, this might be the most risky point.
Other issue	The project is being used for children environmental education. Different activities are carried out in this sense: Solar Week, guided tours, competitions, ... Within the program «Vivo mi pueblo» of the Palencia's Deputation, 150 school students visited the installations
Other issue	This PV installations prevents the emission of 360 tons of CO_2 per year

8.2. SOLAR PLANT : G.F.M (PHOTOVOLTAIC GENERATIONS OF LA MANCHA)

8.2.1. INTRODUCTION

The GEA Group was founded in 2002 for the development and promotion of projects in the field of renewable energy, especially solar photovoltaic power by two young entrepeneurs.

In 2005, this group began to build the solar plant Villa 1, which is located in the municipality of Villa Don Fadrique, in Toledo, a town in which it is strongly boosting investment in power generation through solar photovoltaic, a fact that has contributed to an important local development in the area.

The solar plant is located on an area of approximately 6 acres with more than 30 owners, most of them living in the same municipality Fadrique. Each owner has acquired the installations of varying potency, in a range between 5 kW to 100 kW according to their economic potential. By the same token, they have installed solar panels on different technologies (both crystalline and thin layer technology) to test what is the optimal configuration depending on the weather conditions of the area.

Fig. 18: Solar farm Villa de don Fadrique, Toledo

The solar power plant is approximately 1,043 kWp, and the annual production of solar plant of Villa Don Fadrique is approximately 1,565,526 kWh per year, with the energy that could supply about 500 homes, and prevents the emission of more than 1,100 tons of CO_2 and more than 2,350 kg SO_2 in the atmosphere.

The plant is being used for children education with schools in the area.

8.2.2. GOOD PRACTICE MAIN ISSUES

8.2.2.1. Introduction

Name and last name	GEA (GFM). Generaciones eléctricas alternativas. Vicente Maqueda
Class (promoter, investor, owner, ...)	Promoter and builder
Reasons to be considered a good practice	Villa Don Fadrique solar farm is a joint investment in grid-connected photovoltaic plants, with 30 installations of private investors and 2 installation of GFM
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	The GEA Group was founded in 2002 for the development and promotion of projects in the field of renewable energy, especially solar energy photovoltaic In 2005 GEA started to promote and build the solar plant Villa 1, which is located in the municipality of Villa Don Fadrique in Toledo, a town in which it is strongly boosting investment in power generation through solar photovoltaic. Most of the investors live in the same village of Fadrique, and their investment in solar plants has contributed to a local development in the area. For the citizens this investment is a profitable activity, so the project have a good acceptance of the people, there are forecasts of expanding to reach the 800 kW in the coming months

8.5.2.2. Co- ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	37 Private developers 3Limited Society
Why this legal option was chosen? And how the set-up process took place?	The legal form is an option of each holder, depending on their circumstances. Regarding the developer GEA, the prosecution in both cases is the same, because the constitution of the societies is made by each investor on their own
Number of (co-) owners	40
Average investment per co-owner or range of investments	81,040 €
Type of assets bought by the co-owner: shares, kWp, etc.	Each owner has to purchase an installation in a range of power that goes from 5 to 100 kWp according to his purchasing power

8.2.2.3. PV plant location

Country	España
Region	Comunidad Castilla la Mancha
City	Villa Don Fadrique, (Toledo)

8.2.2.4. System description

8.2.2.4.a. Project size and type

Location (rural or urban area)	Rural
Type (isolated, grid-connected, solar farm)	Grid –connected solar farm
Size (kWp)	1,043.7

8.2.2.4.b. Site

Land ownership	Lease ground
Position (roof, ground)	ground

8.2.2.4.c. PV array description

PV module manufacturer	KYOCERA SANYO

8.2.2.4.d. PV tracking

PV tracking mode*	2 axis-tracking

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

8.2.2.4.e. Power Conditioning

Inverter manufacturer	Sunways Xantrex

8.2.2.4.f. Power generation

Production collected annually	kWh	1,565,526
Equivalent hours	kWh/kWp	1,500
Performance Ratio (Global PV system efficiency)	%	78

8.2.2.4.g. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years

8.2.2.5. Economic and financial description

8.2.2.5.a. Investment plan

TOTAL	8,120,000
Ratio (€/Wp)	7.8 (price sale to investors+ IVA)

8.2.2.5.b. Financing plan

Investors (€)	20% = 1,624,000
Bank loan (€)	80% = 6,496,000
TOTAL (€)	8,120,000

8.2.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	1.56
Yearly Incomes (€)	712,524.110
EXPENSES	
Operation and Maintenance (€)	39,950
Lease contract (€)	48,427
Insurance (€)	22,961
Net Benefit (€)	601,186
Bank repayments (€)	31,200 year of grace, 60,600 years of bank loan
Project IRR (%)	6.31 – 6.86

Note: IRR: Internal Rate of Return

8.2.2.6. Project Contracts

Energy sale: description of the incomes scheme, duration of the contract	It is governed by Royal Decree 661/2007, the entire energy will be computed to the distributor company, in this case Iberdrola. The feed in contract is signed for 5 years extendable to 25 years.
Lease contract: years	7 years, extendable for at least 8 years plus
Operation & Maintenance: years and coverage	25 years
Security: coverage	La Estrella Insurance
Insurance: coverage	Installations assured against fire, explosion and lightning strike, vandalism, impact of rain, wind, impact of vehicles, electrical damages, theft and deterioration for theft
Others	Also included the stop of the consecutive production, civil responsibility of exploitation, defense and judicial expenses and constitution of bails

8.2.2.7. Problems faced / Solutions found

PROBLEMS	SOLUTIONS
Maintenance	Yes, the maintenance of trackers. Made finally by GFM
Control and protection of the installation	Yes, the differentials
Duration of administrative procedures and unexpected delays	Yes, Excessive complication and extension in time

8.3. SOLAR PLANT: NAVÉS (ECOTECNIA)

8.3.1. INTRODUCTION

Ecotecnia has promoted and constructed this solar photovoltaic plant of 588 kWp of power in 88 installations. Each of these plants are owned by particular investors, most of whom are the employees of Ecotecnia or have an individual link with the enterprise. It is in fact an addittional value offered to the company co-workers. Ecotencia since its foundation, 20 years ago, has developed its activities focusing in the renewable energies, particularly in wind power.

The solar plant is located in the village of Navés in the Catalonia region. Specifically it's configured by 16 installations of 9.3 kWp, and 72 installations of 7.5 kWp. It is situated in a rural area with tracker technology. Its 88 co-owners have constituted an co-ownership community.

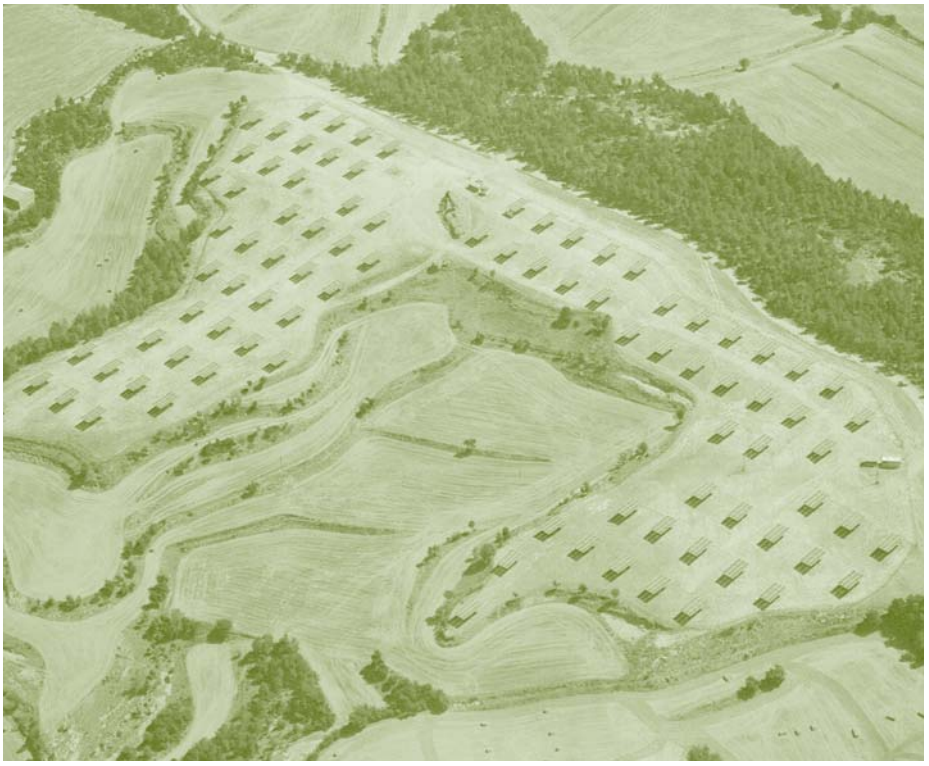


Fig. 19: PV installation in Navès (Lleida) from the sky

8.3.2. GOOD PRACTICE MAIN ISSUES

8.3.2.1. Introduction

Name and last name	Solar farm of Navès.
Category (promoter, investor, owner ...)	Ecotecnia promoter
Reasons to be considered a good practice	It's the first solar farm in Catalonia and partially oriented to the employee of the company
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	The financial return and the social value have been the most important motivations for the investors

8.3.2.2. Co-owner

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	It's a A.I.E. (Interesting Economic Association). It's like a User's Community but it must be registered. This legal option is required by decree of the Generalitat of Catalonia
Why this legal option was chosen? And how the set-up process took place?	This legal option was chosen in order to be able to manage and coordinate common services to all owners' installations and for the use of common zones and infrastructures
Number of (co-) owners	45
Average investment per co-owner or range of investments	According to the economic potential of each investor. From 1 to 8, 2 axis sun tracker. Total minimum investment: 53,800€
Type of assets bought by the co-owner: shares, kWp, etc.	Each co-owner bought a number of trackers (In fact kWp)

8.3.2.3. PV plant location

Country	Spain
Region	Lleida (Catalonia)
City	Navès

8.3.2.4. System description

8.3.2.4.a. Project size and type

Location (rural or urban area)	Rural area
Type (isolated, grid-connected, solar farm)	Grid-connected solar farm
Size (kWp)	703.8 (16 trackers of 9.3kWp and 74 trackers of 7.5kWp)

8.3.2.4.b. Site

Land ownership	Leased ground
Position (roof, ground)	Ground

8.3.2.4.c. PV array description

PV module manufacturer	Solon AG

8.3.2.4.d. PV tracking

PV tracking mode*	2 axis sun tracker technology

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

8.3.2.4.e. Power Conditioning

Inverter manufacturer	Solon AG

8.3.2.4.f. Power generation

Production collected annually	kWh	1,191,177 (927,248, GESE-75 and 263,929, GESE-HP93)
Equivalent hours	kWh/kWp	1,670 (GESE-75) and 1,773 (GESE-HP93
Performance Ratio (Global PV system efficiency)	%	66%(GESE-75) and 70 %(GESE-HP93)

8.3.2.4.g. Technical Warranties

Equipment Warranties	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years
Other	Performance Ratio

8.3.2.5. Economic and financial description

8.3.2.5.a. Investment plan

TOTAL	5,080,832 (GESE-75 = 53,800 ; GESE-HP93 = 68,727)
Ratio (€/Wp)	7.17 (GESE-75) ; 7.39 (GESE-HP93)

8.3.2.5.b. Financing plan

Investors (€)	1,016,166 (20%=10,760 ,GESE-75; 13,745 , GESE-HP93)
Bank loan (€)	4,064,666 (80% = 43,040,GESE-75 ; 54,981, GESE-HP93)
TOTAL (€)	5,080,832 (GESE-75 = 53,800 ; GESE-HP93 = 68,727)

8.3.2.5.c. Financial forecast (yearly figures)

INCOMES	
Power sold (MWh)	1.19
Yearly Incomes (€)	524,118
EXPENSES	
Operation and Maintenance (€)	100
Insurance (€)	71 - 110
Net Benefit (€)	3,384 – 7,119
Bank repayments (€)	1,567 – 4,238 year of grace. 5,812- 10,970 years of bank loan
Project IRR (%)	6.61 – 6.97

Note: IRR: Internal Rate of Return

8.3.2.7. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	It is governed by Royal Decree 661/2007, the entire energy will be computed to the distributor company, in this case Iberdrola. The feed in contract is signed for 5 years extendable to 25 years
Lease contract: years	30 years, included on the Integral Services Contract (5 years available, renewable)
Operation & Maintenance: years and coverage	The 3 first years, the price is a 3% of the solar production, from here, it's the 10%. Included on the Integral Services Contract
Security: coverage	The 3 first years, the price is a 3% of the solar production, from here, it's the 10%. Included on the Integral Services Contract
Insurance: coverage	The 3 first years, the price is a 3% of the solar production; from here it's the 10%. Included on the Integral Services Contract

8.3.2.7. Problems faced / Solutions found

PROBLEMS	SOLUTIONS
	No problems

8.4 .SOLAR PLANT: OPDE. CINTRUÉNIGO, NAVARRA

8.4.1 INTRODUCTION

OPDE is one of the pioneer enterprises in promoting shared owned PV plants in Spain. It is a leader enterprise in the field, with more than 50 MW in promoting and installation up to 2008. The objective was to create an investing alternative, with an environmental ingredient. It is similar to dwelling owners' communities, where each participant owns a private part plus a proportional common part. It has 1.41 MWp of power installed. It consist in 168 installations of 8.4 kWp each one, with 68 investors. It started to produce in August 2006. Is located in a rural area in the ground. The land belongs to the city hall, who has rented it for 30 years

Fig. 20: OPDE PV plant in Cintruénigo, Navarra

8.4.2. GOOD PRACTICE MAIN ISSUES

8.4.2.1. Introduction

Name and last name	OPDE
Categoría (promotor, inversor, propietario, ...)	Promoter and Builder
Reasons to be considered a good practice	It's a shared owned PV plant, with popular participation.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	OPDE is one of the pioneer enterprises in promoting shared owned PV plants in Spain. It is a leader enterprise in the field, with more than 50 MW in promotion and installation up to 2008. The objective was to create an investing alternative, with an environmental ingredient.

8.4.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	Owners community
Why this legal option was chosen? And how the set-up process took place?	It's similar to dwelling owners' communities, where each participant owns a private part plus a proportional common part.
Number of (co-) owners	64 investors in 168 installations of 8.4 kWp
Average investment per co-owner or range of investments	Average investment: 175,045 €
Type of assets bought by the co-owner: shares, kWp, etc.	8.4 kWp

8.4.2.3. PV plant location

Country	SPAIN
Region	NAVARRA
City	Cintruénigo

8.4.2.4. System description

8.4.2.4.a. Project size and type

Location (rural or urban area)	Rural
Type (isolated, grid-connected, solar farm)	Grid-connected solar farm.
Size (kWp)	1,411 MWp

8.4.2.4.b. Site

Land ownership	The land belongs to the City Hall, who has rented it for 30 years.
Position (roof, ground)	ground

8.4.2.4.c. PV array description

PV module manufacturer	Sharp

8.4.2.4.d. PV tracking

PV tracking mode*	2 axis, MECASOLAR
Tracker profit	35%

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

8.4.2.4.e. Power Conditioning

Inverter manufacturer	Mastervolt

8.4.2.4.f. Power generation

Production collected annually	kWh	2,886,744 (17,183 per installation)
Equivalent hours	kWh/kWp	2,046
Performance Ratio (Global PV system efficiency)	%	90.51

8.4.2.4.g. Production (Real Power Generation Data)

	E	F	M	A	M	J	J	A	S	O	N	D	Tot
2006								1,635	1,244	1,157	723	794	5,715
2007	839	826	1,310	1,408	1,715	1,832	2,104	1,773	1,651	1,424	1,404	897	17,183
2008	856												

Monthly data in kWh; Total annual data in MWh

Note: These data are per installation of 8.4 kWp.

8.4.2.4.h. Technical Warranties

Equipment Warranties:	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years.
Total project	2 years

8.4.2.5. Economic and financial description

8.4.2.5.a. Investment plan

Construction (€)	6.11 €/Wp
Permits	0.80 €/Wp
Feasibility study	0.25 €/Wp
Engineering	0.30 €/Wp
Others	0.50 €/Wp
TOTAL	11,233,152 €
Ratio (€/kWp)	7.96

8.4.2.5.b. Financing plan

Investors (€)	20% = 2,246,630 €
Bank loan (€)	80% = 8,986,522 €
Total (€)	11,233,152 €

8.4.2.5.c. Financial forecast (yearly figures)

INCOMES:	
Power sold (MWh)	17,183 per 8.4 kWp -→ 2,886.744
Yearly Incomes (€)	7,566 € per 8.4 kWp -→ 1,271,088
EXPENSES:	900 €/8.4kWp -→151,200 €/year
Net Benefit (€)	6,666 €/year per 8.4 kWp -→ 1,119,888 €/year
Project IRR (%)	11 %
Investor IRR (%)	12 % original estimation of the promoted

Note: IRR: Internal Rate of Return

8.4.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	It is governed by Royal Decree 661/2007, the entire energy will be computed to the distributor company, in this case Iberdrola. The feed in contract is signed for 5 years extendable to 25 years.
Lease contract: years	30 years
Operation & Maintenance: years and coverage	10 years, extendable
Security: coverage	10 years, extendable
Insurance: coverage	10 years, extendable
Others	

8.4.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
	No problems

8.5. SOLAR PLANT: OLA SOLAR. ON THE CARMEL MARKET (BARCELONA)

8.5.1. INTRODUCTION

The foundation Tierra is the promoter of this joint owned PV plant. It is a PV solar installation in which participate citizens from very small amounts of money, but with a very strong environmental compromise.

The expression Ola Solar (Solar wage) was coined by the Foundation Tierra to invite people to invest in photovoltaic installations, as a compromise to fight against the climate change. Investing in photovoltaic thanks to the incentives foreseen in the legislation in force, allows the investors to get profitability from the economic effort.

It's a PV installation in an urban area, in a public space. It is located in Catalonia in the roof oh the Carmel Market. The size is 43.74 kWp. The installation is property of the promoter, with participation accounts, according to the Spanish legislation on private contracts. The participation accounts are promoted by the non profit organization Foundation Tierra. It was considered the good option for having many investors with small participations. It has 1 owner, and 168 co-owners with the participation account contract. This initiative facilitates the popular participation, allowing investments up to a maximum of 3,000 €, and focusing on people that consider it as a compromise gesture against climate change. The economic benefit is small, due to the citizens to compensate their CO2 emissions. The average investment is 2,000 € per person, by participations. The objective of Ola Solar is to share out the benefits returning the investment to the participants. Once the investment is paid off, the benefits are divided up proportionally to the investment amount. It's started to produce in May 2007. The emplacement in a singular building in the centre of Barcelona has made this plant very popular. It is also bringing a lot of awareness around this issue.

Fig. 21: Solar Farm OLA Solar on roof. Barcelona

8.5.2. GOOD PRACTICE MAIN ISSUES

8.5.2.1. Introduction

Name and last name	OLA SOLAR on the Carmel Market – Fundación Terra
Categoría (promotor, inversor, propietario, ...)	Promoter
Reasons to be considered a good practice	Popular participation in a photovoltaic installation, from very small amounts of money and with a very strong environmental compromise.
Background of the project and motivations to start a project involving the civil society (social value, financial return...)	The expression Ola Solar (Solar Wage) was coined by the Fundación Tierra to invite people to invest in photovoltaic installations, as a compromise to fight against climate change. Thanks to the incentives foreseen in the legislation in force, investing in photovoltaic energy is an activity that allows the investor to get profitability from their economic effort. An Ola Solar is a photovoltaic installation in an urban environment, preferably on a public space, with the citizenship contribution. This initiative facilitates the popular participation, allowing investments up to a maximum of 3,000 €, and focusing on people who consider it as a compromise gesture against climate change, as an example for the future generations. The economic benefit is small, due to the size of the contributions, but allows citizens to compensate their CO_2 emissions.

8.5.2.2. Co-ownership

Legal form: Limited Society, Community of Property, Joint venture, cooperative, etc.	The installation is property of the promoter, with participation accounts, according to the Spanish legislation on private contracts.
Why this legal option was chosen? And how the set-up process took place?	The participation accounts are promoted by the non profit organization Foundation Tierra. It was considered the good option for having many investors with a small participation.
Number of (co-) owners	1 owner and 168 co-owners with the participation account contract.
Average investment per co-owner or range of investments	2,000 € per person as average
Type of assets bought by the co-owner: shares, kWp, etc.	Participations

8.5.2.3. PV plant location

Country	Spain
Region	Catalonia
City	Barcelona

8.5.2.4. System description

8.5.2.4.a. Project size and type

Location (rural or urban area)	Urban
Type (isolated, grid-connected, solar farm)	Grid-connected
Size (kWp)	43.74

8.5.2.4.b. Site

Land ownership	Municipal, surrendered for 25 years. In this kind of installations, it is essential to have at one's disposal public space where to install it.
Position (roof, ground)	Roof of the Carmel Market. 134 m. over the sea level.

8.5.2.4.c. PV array description

PV module manufacturer	Conergy

8.5.2.4.d. PV tracking

PV tracking mode*	Fix System, tilt (35º)

*: No tracking; 1-axis tracking; 2-axis tracking; azimuth tracking

8.5.2.4.e. Power Conditioning

Inverter manufacturer	Fronius

8.5.2.4.f. Power generation

Production collected annually	kWh	77,416 (estimation)
Equivalent hours	kWh/kWp	1,769 (estimation)

8.5.2.4.g. Production (Real Power Generation Data)

	E	F	M	A	M	J	J	A	S	O	N	D	Tot
2007					5,939	6,222	6,022	5,778	4,870	3,290	3,611	2,976	38.70(*)

Monthly data in kWh; Total annual data in MWh.

(*) Estimation for 6 months

8.5.2.4.h. Technical Warranties

Equipment Warranties:	Standard Warranties for modules: performance 90% the first 10 years, 80% the first 25 years.
Total project	10 years
Type (Performance ratio or Production)	Production
Value	14,215 €

8.5.2.5. Economic and financial description

8.5.2.5.a. Investment plan

Construction (€)	274,640 €
Feasibility study	0
Engineering	13,040 €
Others	14,215 € production warranty
TOTAL	301,895 €
Ratio (€/kWp)	6.9

8.5.2.5.b. Financing plan

Investors (€)	301,895 €
Grants (€)	0
Bank loan (€)	0
Others (€)	0
Total (€)	301,895 €

8.5.2.5.c. Financial forecast (yearly figures)

INCOMES:	
Power sold (MWh)	77.41 MWh (estimation)
EXPENSES:	
Operation and Maintenance	1,700 €
Lease contract	0
Insurance	0
Security	0
Others	0
Net Benefit (€)	The objective of each Ola Solar is to share out the benefits, returning the investment to the participants. Once the investment is paid off, the benefits are divided up proportionally to the investment amount.

Note: IRR: Internal Rate of Return

8.5.2.6. Project contracts

Energy sale: description of the incomes scheme, duration of the contract	It is governed by Royal Decree 661/2007, the entire energy will be computed to the distributor company, in this case Fecsa-Endesa. The feed in contract is signed for 5 years extendable to 25 years.
Lease contract: years	Assignment for 25 years.
Operation & Maintenance: years and coverage	10 years, with Suntechincs

8.5.2.7. Problems faced / solutions found

PROBLEMS	SOLUTIONS
	No problems

9. GOOD PRACTICES CONCLUSIONS

9. Good practices conclusions

The relatively short track record of this type of projects and the different spirit they have make at the current moment very hard to establish one optimal-unique model. However it can be learned that:

- The motivation of the different good practices is different in most cases. For example, from the financial point of view of the investors to the local development supported by the local authorities. The motivation is clearly conditioning the character of the project favourising either the financial return, or the security, or getting as much investors involved as possible. Therefore when planning a jointly-owned plant it is important to know from the beginning what are the main goals of the project.

- The management of the project seems to be the key issue in these projects. The management is the one who cares about joining the interests of all the owners, and the one who has the clearest view of the project in terms of which are the final goals, and the global quality of the project as such. A professional manager is highly recommended due to the legal, administrative and technical complexity of these projects.

- The legal form is changing significantly from one project to other, and apparently there is no particular optimal legal form, or better, several legal forms can be adapted to jointly-owned plants. It depends on the country regulation and also on the quality of the investors. As an example, the financial investors may look for a well secured package, probably supervised by the financial authorities, whereas the communities look for a more entrepreneurial form as for example direct shares.

- The technical aspects are quite common in most of the projects with one common rule: a qualified and professional technical partner is needed to guarantee the correct performance of the plant. In these sense the project contracts and guarantees do not differ significantly from the conventional projects.

- The financials in terms of returns are quite similar per country according to the market conditions. In general it can be observed

a decrease of the profitability due to higher management costs based on the management of a significant number of participants in every plant. Only in some cases, the management costs can be absorbed by economies of scale. In terms of financing, obtaining as much banking financing as possible seems to be the most general practice in order to reduce the equity as much as possible and to increase the return of the project. Here also the banks tend to leverage slightly below the big projects due to the diversified responsibilities within one single project.

After the interviews with the different developers and owners of this type of projects, it can be stated that they are in general satisfied and proud with the results of their investments, but also that the complexity of these projects is high and it needs an important effort to succeed.

10. ANNEXE

10. Annexe

ABBREVIATIONS

AC	alternating current
CEO	chief executive officer
EPC	Equipment purchase contract
JOPV	jointly owned PV plants
SME	small medium sized enterprise

GERMANY

GbR	non-trading partnership
GmbH&Co. KG	limited partnership with a limited liability company as general partner
IPP	independent power producers
OKR	Evangelischer Oberkirchenrat Stuttgart – evangelic congregation

FRANCE

AMF	Financial Markets Authority
FCPR	a venture capital mutual fund

PORTUGAL

DGGE	General Directorate for Geology and Energy
IEEE	Institute of Electrical and Electronics Engineers

SPAIN

REPE	Especial de Producción Eléctrica - special power generation registry

deSOLaSOL is a European co-operation project that aims at bringing photovoltaic energy closer to the people. More precisely, deSOLaSOL aims at raising awareness about PV energy, and in particular on its decentralised deployment, through the promotion of grid-connected jointly-owned PV plants.

This book provides a useful handbook on the promotion of jointly owned grid-connected PV plants, together with examples of good practices that have been identified in the participant countries through the project. We hope that it will foster the development of this significant model of energy production throughout Europe.

Other results of this project can be found at the website www.desolasol.org

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