PVFINANCING

Fact Sheets for Selected Financial Schemes

Italy

PV Financing Project

Deliverable 3.2

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1 Loan

Specific loans for investment in small PV plants for residential applications have been used extensively during the period of feed-in tariff availability. Nowadays, given the cut in incentives, banks often do not have specific products for PV investment but families still can access conventional loans for debt financing.

Key Players	• Banks: Usually the involved bank is the one where the family has its account • Family: Owner and partial investor, since usually it contributes 20÷30% equity in addition to the bank financing • PV company: It delivers the PV plant and is responsible for O&M
Financial Terms / Conditions	• Loan tenor: from 5 to 15 years • Interest rate: 4÷7% • Interest method (floating/fixed): both are available • Debt/equity split: debt can cover 60÷70% of the investment
Risks	Risks are very low for the investor since a 50% tax reduction on the investment is available for systems up to 20 kW_p. This benefit, combined with a typical self-consumption share of 30÷40% for the residential sector, guarantees a good payback time (6-9 years). A potential risk in the future could be the introduction of taxes on self-consumed electricity.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Possibility to achieve at least a 30% share of self-consumption on total electricity needs. • Availability of at least 30% equity (for a 3 kW_p system it means about 2,000 €).
Legal Requirements	In order to benefit of the tax reduction incentive, the owner of the system must have an annual income where to deduct the investment from.

Application on the segment

Given the much lower prices for PV systems with respect to some years ago, the cost of a small residential plant is in many cases acceptable and affordable for families. Accessing a loan means that the required equity to do the investment, as already reported above, is really low.

On the other hand, since a relevant 50% tax reduction is available, at least until the end of 2016, for small PV systems in Italy, many users choose to invest in full equity for not going into debt financing with a bank.

The advantages and challenges are presented below:

Advantages	Challenges
• Conventional family loan	• Family do not want to pay bank interest if they can use the tax reduction
• Low amount that can be paid back in a short period	• Possible future taxes on self-consumption can substantially worsen the initial business plan for the investment
• Combination with the tax reduction is possible	

Application on business models

This financial scheme can be used in a business model based mainly on self-consumption, where the main economic benefit for the investor, which is also the user of PV electricity, comes from the electrical energy which is not taken from the grid and, therefore, creates savings over the year.

In such a business model, also a sort of net-metering is available, even though, according to recent changes in the specific Italian legislation, the remuneration of PV electricity exchanged with the grid is not very favourable.

1 Loan

Multi-family buildings can access bank loans to invest in PV systems, whose electricity is then used for common uses, such as lighting, lift, electronic gates, etc.

However, since the size of such a PV plant, which should only feed these limited uses, is quite small, also the amount to be invested, when divided among all the inhabitants, will be maybe relatively affordable also in full equity, without the need for a loan.

Key Players	• Owner or tenant in the multi-family building: Through the building assembly, they take the investment decision. • Building administration: Through the decision by the assembly, it has the power to require the loan and manage the investment. • Bank: It provides the building administration with the required loan. Probably it is the same bank normally used by the building administration for different loan requests. • PV company: It delivers the PV plant and is responsible for O&M.
Financial Terms / Conditions	• Loan tenor: from 5 to 15 years • Interest rate: 4÷7% • Interest method (floating/fixed): both are available • Debt/equity split: debt can cover 60÷70% of the investment
Risks	Risks can be due to missing payments by some of the inhabitants for covering the equity share though this is not a specific risk for investment in PV. Future taxes on self-consumption could also represent a risk for the financial viability of the project.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Relevance of electricity consumption for common uses. • Possibility to achieve a good share of self-consumption on total common electricity needs. • Good awareness, in average among inhabitants, of energy efficiency concepts.
Legal Requirements	From 2016, also multi-family building entities will be allowed to access the national 50% tax reduction incentive.

Application on the segment

Debt financing through a conventional loan can be and is used easily in the multi-family house segment because of the low amount of investment needed, which is due to the fact that PV plants can only be used to meet common electricity consumption.

Nevertheless, also a full equity solution is possible, if the inhabitants are willing to invest their own money through the building administration.

The advantages and challenges are presented below:

Advantages	Challenges
• Low amount of the loan due to the limited size of the PV system	• Convince the building assembly
• Possible combination with tax reduction	• Possible future taxes on self-consumption can substantially worsen the initial business plan for the investment

Application on business models

This financial scheme can be used in a business model benefitting of self-consumption as main driver. In fact, savings on the common electricity bill of the buildings can make the business plan of such an investment attractive.

If PPAs with multiple users were possible, then individual flats would benefit from the PV electricity for their self-consumption. In this case, the size of the PV plant could be larger than the one needed just for common uses. In a 5-storey building, for instance, with 4 flats per floor, a PV plant between 60 and 80 kW_p could be installed, provided there is enough space on the roof. The cost of such a plant is 80,000÷100,000 € so, if the loan covers 70% of the investment, the needed equity would be between 24,000 and 30,000 €, which is not very high considering the high number of residents.

Such a multiple PPA would not change very much this financing scheme while, of course, it influences the business model because it can enhance the self-consumption rate.

2 Green Cooperatives

Collective ownership of PV systems was born in the feed-in tariff era but it is still considered as a key financial scheme, especially in the perspective of innovative financing of PV without incentives. In such a scheme the so-called "Green Cooperative" can be composed either by the same inhabitants of the multi-family buildings which will use the PV electricity or by external subjects.

Key Players	• Green Cooperatives: It acts as the investor party and as the plant owner. Depending on the investment size, it can operate in full equity or do a partial use of a bank loan. • Bank: It has a role in the case the cooperative needs a loan. • Multi-family building: It is the user of the PV electricity, buying the PV production from the owner (see below for possible uses of this production).
Financial Terms / Conditions	The PV electricity can be sold to the multi-family buildings for the common needs (lift, lighting, etc.) through a PPA at a competitive price, for instance 0.15 €/kWh, with respect to the grid electricity. A better solution would be to sell also electricity for self-consumption of single users but this is at the moment not possible due to the restrictive Italian legislation on PPAs. The cooperative investors could have a 3-4% annual interest on the investment done if they invest through lending, while they could expect a payback time between 6 and 10 years if they invest in company shares.
Risks	The risk of total insolvency is quite low since it is a residential application. Main risks are: Possible future taxes on self-consumption and lateness in paying, which is quite common in Italian multi-family buildings.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Good relationship and trust between the cooperative and the building administration (best case: cooperative owned by the inhabitants). • High rate of self-consumption. • Relevance of electricity consumption for common uses.
Legal Requirements	At the moment, the mandatory legal requirement is that the PV plant owner can sell the produced PV electricity only to a single user which, in the case of multi-family buildings, is constituted by the consumption for common uses.

Application on the segment

This financing scheme could be used in this segment especially when there is a direct relationship of trust between the cooperative and the inhabitants. Of course, the use of PV electricity only for the building common needs is not as attractive as the option of selling the PV production to the single building users. Nevertheless, as already outlined, this solution would need a change in the current legislation.

The advantages and challenges are presented below:

Advantages	Challenges
• Good relationship based on trust between the PV plant owner and the electricity user	• Possibility of selling the PV electricity to single users in the building for their self-consumption
• Possible combination with tax reduction from 2016 in case of plants up to 20 kW_p	• Possible future taxes on self-consumption
	• For cooperative equity investors, the invested capital could be lost or reduced in case of partial or total default of the electricity consumer

Application on business models

Such a financing scheme based on Green Cooperatives can be used, as above described, in a business models for multi-family houses based on a PPA. The produced PV electricity can then feed the common electricity consumption of the building or, in case of a change in legislation, also the self-consumption of single users living in the multi-family house.

1 Self-funding

Self-funding is a somehow innovative financial scheme, due to the new environment of the PV sector: no incentives and therefore not easy access to debt financing and lower investment cost needed due to the price drop of the PV systems.

Key Players	• Shopping centre management: It acts as the investor party and as the plant owner. • Shopping centre tenants: They could buy, if allowed in the future, the PV electricity from the central management. • PV company: It delivers the PV plant and is responsible for O&M.
Financial Terms / Conditions	No specific financial conditions are needed, except for the availability of budget.
Risks	Risks are mainly linked to a good medium term perspective of the shopping centre and to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Large size plant with a low specific investment cost. • High rate of self-consumption and high grid electricity price. • Possibility of selling electricity to multiple users through a PPA.

Application on the segment

The main advantage of such a scheme in this application segment is that, by avoiding the need for accessing debt financing, it can speed up the procedures.

Furthermore, usually shopping centres have large roof available for installing large scale plants, characterized by a low specific investment cost.

In order to have this financial scheme working at its best, it would be necessary to sell the PV electricity to the shopping centre tenants via a PPA, a solution which is at the moment not possible according to the Italian legislation.

The advantages and challenges are presented below:

Advantages	Challenges
• No need for long procedures and high interest of the debt financing	• PPAs with multiple users are not allowed at the moment
• High self-consumption rate is possible	• Stability of the commercial activities in the medium term
• Large plant size (low investment cost)	

Application on business models

This financial scheme can be used in two business models: a first one relying on self-consumption for the common electrical uses in the shopping centre and a second one based on a Power Purchase Agreement between the centre management and the tenants (not possible at the moment).

2 Green Cooperatives

Collective ownership of PV systems through the constitution of a cooperative company to develop the project and then run the plant is a possible financing solution for large plants such the ones feeding shopping areas. The "green cooperative" can raise funds either for a specific plant or for a development line, for instance foreseeing several PV systems to be installed in the commercial sector.

Key Players	• Green Cooperatives: It acts as the investor party and as the plant owner. Depending on the investment size, it can operate in full equity or do a partial use of a bank loan. • Bank: It has a role in the case the cooperative needs a loan. • Shopping centre: It is the user of the PV electricity, buying the PV production from the owner. The PV electricity can be used for the common needs (only this solution is allowed at the moment) or sold to the different users in the shopping area.
Financial Terms / Conditions	The cooperative sells the electricity to the user/s through a PPA at a price which could be 15÷20% lower than the grid price. Cooperatives can collect money through capital from associated partners, lending with a defined interest rate and debt financing.
Risks	Risks are on the investor, therefore the cooperative, and are mainly due to the future existence of the shopping area (and therefore of a buyer for the PV electricity) and to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Reliability of the shopping centre and probable sustainability in the medium term (10÷15 years). • High rate of self-consumption. • Stability of the electricity consumption fixed in the PPA. • Relevance of electricity consumption for common uses.
Legal Requirements	The possibility of selling PV electricity to multiple users through a PPA would be the best solution to maximise the project business plan.

Application on the segment

The main advantage for the cooperative company to go into this segment is to increase the investment volume and, therefore, obtain a lower specific system cost, as well as to benefit of a usually high self-consumption rate. Furthermore, cooperative equity capital, especially if compared to full self-funding, is usually relatively easily available for investments in PV.

On the other hand, the benefits of such a scheme would become real only in case the Italian legislation on PPA will open to the possibility of selling PV electricity to multiple users.

The advantages and challenges are presented below:

Advantages	Challenges
• High self-consumption rate is possible	• A change in legislation is needed to allow PPAs with multiple users
• Low specific cost for investment (large plant size)	• Existence of the shopping centre for a period of at least 10÷15 years
• Possible easier access to bank debt financing for cooperative companies	• Possible increase of the taxes on self-consumption

Application on business models

This financial scheme can be used in a business model based on a Power Purchase Agreement, where the green cooperative acts as the investor and the electricity producer while the shopping centre (or its single users, if possible) are the buyers of the produced PV electricity.

1 Self-funding

Self-funding is a somehow innovative financial scheme, due to the new environment of the PV sector: no incentives and therefore not easy access to debt financing and lower investment cost needed due to the price drop of the PV systems.

Key Players	• Office building management: It acts as the full-equity investor party and as the plant owner. Usually the PV plant investment is managed through on-balance funding. • Office building tenants (if different from the management): They could buy, if allowed in the future, the PV electricity from the central management. • PV company: It delivers the PV plant and is responsible for O&M.
Financial Terms / Conditions	No specific financial conditions are needed, except for the availability of budget.
Risks	Risks are mainly linked to a good medium term perspective of the office activities and to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Large size plant with a low specific investment cost. • High rate of self-consumption and high grid electricity price. • Possibility of selling electricity to multiple tenants through a PPA.

Application on the segment

The main advantage of such a scheme in this application segment is that, by avoiding the need for accessing debt financing, it can speed up the procedures.

In order to have this financial scheme working at its best, it would be necessary to sell the PV electricity to the office tenants via a PPA, a solution which is at the moment not possible according to the Italian legislation.

The advantages and challenges are presented below:

Advantages	Challenges
• No need for long procedures and high interest of the debt financing	• PPAs with multiple users are not allowed at the moment
• High self-consumption rate is possible due to the concentration of activities during the day	• Stability of the activities in the medium term
	• Roof conditions, available area and restrictions on visual impact

Application on business models

This financial scheme can be used in two business models: a first one relying on self-consumption for the common electrical uses in the office building and a second one based on a Power Purchase Agreement between the office management and the tenants, if present (not possible at the moment).

2 Green Cooperatives

A cooperative company is an interesting and promising financial scheme also for developing PV plants in the sector of office buildings.

As in other application segments, the company can collect the investment needed for a specific project development or instead group more than one project in one development line.

Key Players	• Green Cooperatives: It acts as the investor party and as the plant owner. Depending on the investment size, it can operate in full equity or do a partial use of a bank loan. • Bank: It has a role in the case the cooperative needs a loan. • Office building: It is the user of the PV electricity, buying the PV production from the cooperative. The PV electricity can be used by just one user (only this solution is allowed at the moment) or sold to the different offices located in the same building.
Financial Terms / Conditions	The cooperative sells the electricity to the user/s through a PPA at a price which could be 15÷20% lower than the grid price. Cooperatives can collect money through capital from associated partners, lending with a defined interest rate and debt financing.
Risks	Risks are on the investor, therefore the cooperative, and are mainly due to the future existence of the office/s located in the building (and therefore of a buyer for the PV electricity) and to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface (an issue especially for offices located in city centres), roof conditions, no shading. • Reliability of the buyers and their sustainability in the medium term (10÷15 years) • High rate of self-consumption (usually true for offices) • Relevance of electricity consumption.
Legal Requirements	The possibility of selling PV electricity to more offices within the same building through a multi-user PPA would be the best solution to maximise the project business plan.

Application on the segment

The main advantage for the cooperative company to go into this segment is to increase the investment volume and, therefore, obtain a lower specific system cost, as well as to benefit of a usually high self-consumption rate, given the fact that offices need electricity during the day.

The advantages and challenges are presented below:

Advantages	Challenges
• High self-consumption rate is possible	• A change in legislation is needed to allow PPAs with multiple users
• Low specific cost for investment (large plant size)	• Existence of the office/s for a period of at least 10÷15 years
• Possible easier access to bank debt financing for cooperative companies	• Roof conditions, available area and restrictions on visual impact

Application on business models

This financial scheme can be used in a business model based on a Power Purchase Agreement, where the green cooperative acts as the investor and the electricity producer while the offices within the buildings are the buyers of the produced PV electricity.

1 Green Cooperatives

For the public sector, always struggling with restrictions on the balance sheets, it is often not feasible to invest directly in PV systems, especially when no incentives are available. The financing scheme in which a "Green Cooperative" company develops and own the system, selling then the produced electricity to the public education building, is therefore quite a feasible solution.

As in other application segments, the cooperative can collect the investment needed for a specific project development or instead group more than one project in one development line.

Key Players	• Green Cooperatives: It acts as the investor party and as the plant owner. Depending on the investment size, it can operate in full equity or do a partial use of a bank loan. • Bank: It has a role in the case the cooperative needs a loan. • Education building: It is the user of the PV electricity, buying the PV production from the cooperative.
Financial Terms / Conditions	The cooperative sells the electricity to the user/s through a PPA at a price which could be 15÷20% lower than the grid price. Cooperatives can collect money through capital from associated partners, lending with a defined interest rate and debt financing.
Risks	Risks are on the investor, therefore the cooperative, and are mainly due to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • High rate of self-consumption. • Security of the stability of electricity consumption as foreseen in the PPA.

Application on the segment

The main advantage for the cooperative company to go into this segment is the reliability of the final customer as an electricity consumer in the medium and long term.

Furthermore, the possibility of combination with specific education initiatives on renewable energy could give the project an added value.

Nevertheless, though schools show a high self-consumption rate on a daily basis, there could be the problem of summer closing which can spoil the project business plan. School buildings which organize activities during the summer break, therefore, should be preferred.

The advantages and challenges are presented below:

Advantages	Challenges
• Good self-consumption rate on a daily basis	• The building could be closed in the summer period
• Reliability of the consumer, also for access to debt financing	• Late payments
• Combination with education initiatives	• Complicated procedure for public tender

Application on business models

This financial scheme can be used in a business model based on a Power Purchase Agreement, where the green cooperative acts as the investor and the electricity producer while the school building is the buyers of the produced PV electricity.

1 Self-funding

Self-funding is a somehow innovative financial scheme, due to the new environment of the PV sector: no incentives and therefore not easy access to debt financing and lower investment cost needed due to the price drop of the PV systems.

Key Players	• Single industrial company or industrial park management: It acts as the investor party, the plant owner and probably the energy consumer. • Tenants of the industrial park (if different from the management): They could buy, if allowed in the future, the PV electricity from the central management. • PV company: It delivers the PV plant and is responsible for O&M.
Financial Terms / Conditions	No specific financial conditions are needed, except for the availability of budget.
Risks	Risks are mainly linked to a good medium term perspective of the industrial activities and thus the stable amount of PV electricity off-take, and to potential future taxes on self-consumption.
Investment Criteria	• Good situation of the roof/or site: Availability of surface, roof/site conditions, no shading. • Large size plant with a low specific investment cost. • High rate of self-consumption, no weekend or seasonal breaks in the industrial processes. • If the investor is not the consumer: Possibility of selling electricity to multiple tenants through a PPA.

Application on the segment

The main advantage of such a scheme in this application segment is that, by avoiding the need for accessing debt financing, it can speed up the procedures. Furthermore, the usual size of plants in this segment is quite large, thus implying a low specific investment cost.

Industrial companies, due to their load profile, can usually reach a high self-consumption rate, provided a good continuity of the activities (no weekend or seasonal breaks).

The advantages and challenges are presented below:

Advantages	Challenges
• No need for long procedures and high interest of the debt financing	• PPAs with multiple users are not allowed at the moment
• High self-consumption rate is usually possible	• Stability of the activities in the medium term
• Large plants with low specific cost	• Continuity of the industrial processes
	• Roof conditions and available area

Application on business models

This financial scheme can be used in a business model relying on self-consumption for the investor itself. Moreover, it is also applicable to a business model based on a Power Purchase Agreement if the investor, which is the industrial park management, could sell the PV produced electricity to multiple tenants. However, this second solution is not possible at the moment, due to restrictions in the Italian legislation on PPAs.

2 Green Bonds

A financial scheme which could be applied in the industrial segment, even though not being explored at the moment, is the one using "Green Bonds". In such a scheme, the industrial company (or the plant developer) issues bonds linked to the PV plant to be built guaranteeing an annual coupon.

Key Players	• Industrial company: It is the energy consumer and it can also be the investor and the subject issuing the bonds. • PV company: It develops and runs the system. It can also be the investor, thus issuing the bonds, and then sell the produced electricity to the industrial company through a PPA. • Bond holders: They buy the green bonds and get a profit from that.
Financial Terms / Conditions	Up to 50% of the investment can be put by the main investor as equity or debt financing from other sources. The remaining part is collected through selling of the bonds. Bonds can have different tenors (maturity), for instance 5 and 7 years with different yield rates. In the period of feed-in tariffs, these yield could reach also 6% or 7% per year but currently they are expected to be much lower (3÷4%). The bonds can also be converted, upon request by the investors, in shares of the company which operates the plant.
Risks	Risks are on all the investors (both the main one and the bond buyers) relating to bond (partial) default and are due to the stability as well as to potential future taxes on self-consumption and on PPA agreements.
Investment Criteria	• Good situation for the roof: Availability of surface, roof conditions, no shading. • Reliability of the main investor and its sustainability in the medium term (10÷15 years). • High rate of self-consumption (usually true for industrial companies). • Stability of the electricity consumption rate agreed upon in the PPA.

Application on the segment

This financing scheme can be used in PV projects in the industrial application segment to overcome the following barriers:

- Not enough budget available for the main investor to develop the project;
- Allowing interested citizens to contribute to green energy production even though they do not have the available space to install PV;
- Allowing small amount of investments;
- Involving potential customers who do not want to tackle with installation, authorization and maintenance issues.

The advantages and challenges are presented below:

Advantages	Challenges
• Lower investment needed by the main investor	• Existence of the consumer for a period of at least 10÷15 years
• Low specific cost for investment (large plant size)	• Roof conditions and available area
• Possible easier access to bank debt financing if most of the needed budget is collected through bonds (depending on the seniority of the bond)	• Create trust in the project to convince bond buyers

Application on business models

This financial scheme can be used in a business model based on self-consumption if the main investor is the industrial company, which is also the consumer of the PV electricity.

Additionally, the scheme is also suitable for a PPA-based business model, where the main investor is either the industrial park management or the PV developing company, which then sell electricity through a PPA to a single user or to multiple users (not possible at the moment).