PVFINANCING

Fact Sheets for Selected Financial Schemes

Turkey

PV Financing Project

Deliverable 3.2

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Residential Sector: Single Family & Multi Family

1 Self-funding

The use of solar energy systems in the residential sector in Turkey promises a bright future and self-funding seems to be one of the best practises for this sector, due to the low risks compared to the loan. Due to the unpredictability of the electricity generation caused by seasonal changes and the volatility of the Turkish financial markets, self-funding appears as an appropriate choice for 13.3 USDc/kWh residential investors. The consumption price from the grid is 7 USDc/KWh and the system payback period is 7-9 years. Due to the high Feed-in Tariff and the 10 year offtake guarantee of the government, producing electricity on the roof is advantageous in creating an additional income.

Key Players	• Investors: single family resident owners or multi-residential families • EPC Companies are also giving service of O&M
Financial Terms / Conditions	• Sufficient budget: when the investment is for the residential consumption, the investor's main criterion is to meet his/her residential consumption with the generated electricity at the minimum price possible • The typical size of PV systems is 3 kWp for single residential consumption. For the multifamily buildings the size depends on the number of investors
Risks	Joint property rights may lead to conflicts among investors in multifamily segment
Rights	Benefits from the Feed-in Tariff
Obligations	The property right issues haven't been defined in the regulations properly. For example, conveyance of rights between property owner and tenant has not been addressed yet. Hence, further development in regulations by state is required in this area.
Investment Criteria	• Suitable rooftop conditions for PV installation • Sufficient share of production in order to meet the domestic consumption • Sufficient level of budget • The investor typically wants the system to amortize in 5-6 years
Legal Requirements	• Project Permission of the Electricity Distribution Company • In the multi-family buildings: co-decision of the block/apartment administration

Application on the segment

This scheme is widely and successfully used in residential segment because, high interest rates, volatility of Turkish financial markets and unpredictable electricity generation due to seasonal change create financial risks to the investors.

The advantages and challenges are presented below:

Advantages	Challenges
• Advance payment: since there is no debt, the financial market volatility is not a risk	• High investment costs: PV system equipment prices are still high in Turkey
• No financial intermediary costs comparing to the loan scheme. There will be no interest rate costs; the system pays itself back faster depending on the exchange rate.	• Inefficiency: The risk of false technical knowledge like wrong position of the PV panels
• No need for collateral	• Information Asymmetry: Low technical knowledge of the owner, adverse selection of the equipment

Application on business models

Self-funding should be used in the net-metering model. The difference between consumed and produced electricity is calculated and residential electricity generation is purchased based on feed-in tariff.

2 Loan

The European Bank for Reconstruction and Development (EBRD) has launched a program called Tureeff (Turkish Residential Energy Efficiency Financing Facility) in order to offer inexpensive financing opportunities for the construction of solar energy systems. Tureeff program funds residential investors via participating financial institutions. The banking system doesn't directly fund the project itself but funds the investors according to their financial conditions and stability due to the legal restrictions.

Key Players	Şeker Bank T.A.Ş, Türkiye İş Bankası A.Ş
Financial Terms / Conditions	• Loan tenor: 3 years-can be extended to 10 years according to Bank's initiative • Interest rate: %15.96 • Interest method: fixed • Debt/equity split: Tureeff program requires 20-25% equity. Besides Tureeff program there is another option consumer loan Here, one can use personal loan option with respect to his/her financial stability data and mortgage thus finance the project up to 100 % of the project
Risks	Currently the FiT doesn´t have a classification according to the technology and offers the same price (13.3 USDc/kWh) to all. In the following years a diversification of subsidy price may be implemented by state and depending on the conditions, this could be a risk. The consumption price of electricity is 9 USDc/kWh The payback period is up to 7-9 years of the project
Rights	Feed-in Tariff for 10 years
Obligations	• Payment of loans • Collateral: mortgage, the PV system itself usually is not perceived as collateral by banks due to the lack of reliable second hand market for PV panels. Hence, instead of collateralization of PV panels, they prefer to collateralize investor's assets (on-balance sheet finance).
Investment Criteria	• Confirmation of an EPC firm authorised by a partner bank • Technical feasibility study • Suitable rooftop conditions for PV installation • Sufficient share of production in order to meet the domestic consumption • The participatory banks require documents such as the electricity bill and the income structure of the investor in order to approve the loan. The electricity consumption amount plays an important role for the decision process of the bank. Hence, the consumption data and the income flow of the investor contribute to form DSCR data.
Legal Requirements	• Project Permission from Electricity Distribution Company • In the multi-family residence case the co-decision of the block/apartment administration

Application on the segment

This scheme is widely and successfully used in the residential segment because loans are offered according to the different needs of the investors such as small investments, rehabilitation, reconstruction and new building cases.

The advantages and challenges are presented below:

Advantages	Challenges
• Diversification of Loans: Loans for Small Investments and Rehabilitation, Reconstruction of Houses and New Buildings.	• Collateral: Financial Conditions of the Investor
• Confirmation of an EPC Firm authorised by a Partner Bank	• Volatility of Turkish Financial Markets
• Feed- in Tariff	• Joint Property Rights

Application on business models

Loans should be also used in the net-metering model. The difference between consumed and produced electricity is calculated and residential electricity generation is purchased based on feed-in tariff. Thanks to the Feed-in Tariff the system it is financed by itself. The typical payback period is around 7-9 years.

2 Green Cooperatives

Green cooperatives are a good way of gathering a huge amount of investment from a crowded group of investors. Cooperatives in Turkey have state support of tax and subsidized credit options. In this sense, Green Cooperatives can be regarded as an innovative way for the financing of the Photovoltaic systems. Nowadays, in Turkey Green Cooperatives have just legally formed a legal framework but they haven't installed physical PV systems yet. The financing of large scale projects can be an achievable target with the help of Green Cooperative scheme. This can be a very fruitful method for the residential sector. Acting together can be quite helpful for the residential investors in order to overcome the problems regarding technical details and again they can benefit the economies of scale advantages together and finance their projects at a lower cost both from financial and engineering institutions. Furthermore, information asymmetry is less likely to occur as a result of a more professional and participatory governance.

Key Players	• Green Cooperative: where the private equity of the members are accumulated. It acts as the investor party and as the plant owner on behalf of the community. Depending on the investment size, it can carry out the project whether solely with the members' private equity or borrow a loan on behalf of the members and use it for the financing of the project. • Bank: It has a role in the case cooperative needs a loan. • The investors such as detached houses or multi flat apartments or blocks etc. can be regarded as prosumers (both producers and consumers). They can use the electricity produced and sell the exceeding portion to the state.
Financial Terms / Conditions	• Loan tenor: 10 years • Interest rate: fixed %12.3 • Debt/equity split: 70/30 The system doesn't constrain minimum limit for kWh or monetary terms but the maximum limit is 250.000 € for small medium size enterprises depending on the enterprise. The main criterion is the financial credibility of the investor. If the investment exceeds the limit, the participatory banks could take the initiative and extend the loans from their own resources with respect to financial data and stability of the investor.
Risks	• The possible diversification of the FiT may be implemented by the state and this could cause a future risk. • The legal system regarding green cooperatives in Turkey is not properly and adequately regulated, so this scheme could lead to problems including governance and the authorization. Due to the fact that the cooperatives have a multi member structure, exit of the existence members and the entrance of the new members should be clearly defined by regulations.
Rights	The Feed-in Tariff and the use of the electricity generated through PV systems.
Obligations	• Payment of loans • Collateral: mortgage, assignment of claims • The PV panels aren't perceived as collateral by the banks. Hence, instead of collateralization of PV panels, they prefer to collateralize investor's assets.

Investment Criteria	Confirmation of an EPC firm authorised by a partner bank: due to the fact that banks don't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions. The Banks also enforces documents to the investors in order to have the right to control the existence and the maintenance of the PV Plant. There exists no minimum size restriction regarding the production data
Legal Requirements	Project Permission from Electricity Distribution Company: due to the fact that banks don't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions.

Application on the segment

The biggest advantage of this system is the possibility of gathering people together who have a sense of nature and suffering from high electricity bills. Large scale projects can be financed through small investments by each member of the cooperative. In order to create a snowball effect the legislation regarding the PPA agreement should be enacted by the government.

The advantages and challenges are presented below:

Advantages	Challenges
• **Easy and cheap financing**	• **Governance problems stemming from the legal regulations for cooperatives**
• **Larger projects can be financed through economies of scale advantage at a lower cost**	• **Joint property rights lead to the problems regarding the distribution of consumption and income rights.**
• **Enable the local participating stakeholders to gain sustainable income that doesn't pollutes**	

Application on business models

This financial scheme can be profitable at most with the enactment of laws regarding Power Purchasing Agreement. As a result of this the investments become more profitable and tangible and attract more and more member.

1 Loan

The European Bank for Reconstruction and Development (EBRD) has launched a program called Turseff (Turkey Private Sector Sustainable Energy Finance Facility) in order to offer inexpensive financing opportunities for the construction of solar energy systems. Turseff program funds commercial sector investors via local Turkish banking system. Banks doesn't directly fund the project itself but fund the investors according to their financial data and stability due to the legal restrictions.

Key Players	Şeker Bank T.A.Ş, Türkiye İş Bankası A.Ş, Deniz Bank A.Ş, Türkiye Vakıflar Bankası T.A.O, Yapı Kredi Bankası A.Ş Investors: Office and commercial buildings O&M firms in Turkish case EPC firms performs this service.
Financial Terms / Conditions	• Loan tenor: 10 years • Interest rate: %12.3 • Interest method: fixed • Debt/equity split: 70/30. The system doesn't constrain minimum limit but the maximum limit is 250.000 € for small medium size enterprises depending on the enterprise. The main criterion is the financial credibility of the investor. As long as the investors prove the financial stability and sufficient level of collateral, they can be financed through the via bank's initiative
Risks	• Due to no existing classification for Fit each sector is supported over the same price 13.3 US DC/kWh in the following years a diversification of subsidy price may be implemented by state and this could propose a future risk • The average cost of consumption for commercial sector is around 0,27TL/0.09 US D/kwh. The system pays back itself around 7-9 years depending on the location of the panels and the exchange rate fluctuations.
Rights	Payment of the Feed-in Tariff
Obligations	• Payment of loan • Collateral: mortgage, assignment of claims, • The PV panels aren't perceived as collateral by the banks. Hence, instead of collateralization of PV panels, they prefer to collateralize investor's assets.
Investment Criteria	Confirmation of an EPC firm authorised by a partner bank: due to the fact that banks don't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions. The Banks also enforces documents to the investors in order to have the right to control the existence and the maintenance of the PV Plant. There exists no minimum size restriction regarding the production data
Legal Requirements	Project Permission from Electricity Distribution Company: due to the fact that banks don't fund the projects directly in Turkey directly, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions.

Application on the segment

This scheme is widely and successfully used in commercial segment, because loans are provided according to the different features of the investors. Mainly for offices and large scale buildings.

The advantages and challenges are presented below:

Advantages	Challenges
• Free Technical Support	• Collateral: assignment of claims, mortgage
• Grace Period is 6-12 months	• Low electricity price
• Payments on Production Basis	• %15-20 Private Equity Share

Application on business models

Self-consumption should be used for loans, because in Turkey Power Purchase Agreement business model where generally the investor, operator and power consumer are completely different parties is not legally allowed yet for unlicensed projects under 1MW

2 Green Cooperatives

Green cooperatives are a good way of gathering a huge amount of investment from a crowded group of investors. Cooperatives in Turkey have a state support of tax and subsidy. In this sense, Green Cooperatives can be regarded as an innovative way for the financing of the Photovoltaic systems. The financing of large scale projects can be an achievable target with the help of Green Cooperative scheme. Nowadays, in Turkey Green Cooperatives have just legally formed a legal framework but they haven't installed physical PV systems yet. Acting together can be quite helpful for the commercial investors in order to overcome the problems regarding technical details and again they can benefit the economies of scale advantages together and finance their projects at a lower cost both from financial and engineering institutions. Furthermore, information asymmetry is less likely to occur as a result of a more professional and participatory governance.

Key Players	• Green Cooperative: where the private equity of the members are accumulated. It acts as the investor party and as the plant owner on behalf of the community. Depending on the investment size, it can carry out the project whether solely with the members' private equity or borrow a loan on behalf of the members and use it for the financing of the project. • Banks can take part as long as loan is required by the 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. • Commercial buildings such as offices and shopping centres can be regarded as prosumers (both producers and consumers). In that case the electricity produced can be sold to them or the Fit payments can be shared among them.
Financial Terms / Conditions	• Loan tenor: 10 years • Interest rate: %12.3 • Interest method: fixed • Debt/equity split: 70/30 The system doesn't constrain minimum limit but the maximum limit is 250.000 € for small medium size enterprises depending on the enterprise. The main criteria is the financial credibility of the investor.
Risks	• The possible diversification of the FiT may be implemented by the state and this could cause a future risk. • The average cost of consumption for commercial sector is around 0, 22TL/0.07 USD/kwh (According to 12.2015's exchange rate). The payback period is 7-9 years depending on the location of the panels and the exchange rate fluctuations. • The legal system regarding green cooperatives in Turkey is not properly and adequately regulated, so this scheme could lead to problems including governance and the authorization. Due to the fact that the cooperatives have a multi member structure, exit of the existence members and the entrance of the new members should be clearly defined by regulations.
Rights	The Feed-in Tariff and the use of electricity generated

Obligations	• Payment of Loans • Collateral: mortgage, assignment of claims, • The PV panels aren't perceived as collateral by banks. Hence, instead of collateralization of PV panels, they prefer to collateralize investor's assets.
Investment Criteria	Confirmation of an EPC firm authorised by a partner bank: due to the fact that banks doesn't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criteria is the financial credibility of the investor and the amount of private equity for loan restrictions. The Banks also enforces documents to the investors in order to have the right to control the existence and the maintenance of the PV Plant. There exists no minimum size restriction regarding the production data.
Legal Requirements	Project Permission from Electricity Distribution Company: due to the fact that banks don't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions.

Application on the segment

The biggest advantage of this system is the possibility of gathering people together who are interest in the climate protection and pay high electricity bills. Big projects can be financed through small investments by each member of the cooperative. In order to create a snowball effect the legislation regarding the PPA agreement should be enacted by the government.

The advantages and challenges are presented below:

Advantages	Challenges
• **Easy and cheaper financing**	• **Governance problems stemming from the legal regulations for cooperatives**
• **Larger projects can be financed through economies of scale advantage at a lower cost**	• **Joint property rights lead to the problems regarding the distribution of consumption and income rights.**
• **Enable the local participating stakeholders to gain sustainable income that doesn't pollutes**	•

Application on business models

This financial scheme can be profitable at most with the enactment of laws regarding Power Purchasing Agreement. As a result of this the investments become more profitable and tangible and attract more and more member.

1 Loan

Public Sector (Universities etc.) and Industrial sector (Organized Industrial Zones) consist of stable energy consumer organizations and willing to invest in solar energy systems. The most suitable financing tool in Turkey is the loans provided by banks. In this respect, Turseff program funds Public and Industrial Sector via local Turkish banks.

Key Players	• Türkiye İş Bankası A.Ş, Deniz Bank A.Ş, Türkiye Vakıflar Bankası T.A.O, Yapı Kredi Bankası A.Ş • Investors: Public Institutions(Educational buildings) & Industrial Sector • O&M firms in Turkish case EPC firms performs this service
Financial Terms / Conditions	• Loan tenor: 7 years • Interest rate: %12.8 • Interest method: fixed • Deb t/equity split: 100/ The system doesn't constrain minimum limit but the maximum limit is 5.000.000 € for industrial and educational public institutions. Depending on the enterprise's financial stability and collateral loans can be extended via the bank's initiative.
Risks	Currently the FiT doesn´t have a classification according to the technology and offers the same price (13.3 USDc/kWh) to all. In the following years a diversification of subsidy price may be implemented by state and depending on the conditions, this could be a risk.Currently the average cost of electricity is 0.23 TL/ 0.07 USD and the payback period is 7-9 years
Rights	The payment of the Feed-in Tariff
Obligations	Payment of Loans: due to no existing classification for Fit each sector is supported over the same price 13.3 US DC/kWh where the in the following years a diversification of subsidy price may be implemented by state and this could propose a future risk The system paybacks itself 7-9 years.
Investment Criteria	Confirmation of an EPC firm authorised by a partner bank: due to the fact that banks don't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions.
Legal Requirements	Project Permission from Electricity Distribution Company

Application on the segment

Loan is widely and successfully used in this segment because this segment requires high volume of investment and it is hard to finance it through private equity.

The advantages and challenges are presented below:

Advantages	Challenges
• Free Technical Support	• Collateral: Assignment of Claims, Mortgage
• Grace Period is 6 to 12 months	• Volatility of Turkish Financial Markets
• Payments on Production Basis	• %15-20 Private Equity Share

Application on business models

Self-consumption should be used for this scheme; EPC companies are building the PV plants and providing O&M services regarding the contract made for 3-5 years.

2 Green Cooperatives

Green cooperatives are a good way of gathering a huge amount of investment from crowded group investors. Cooperatives in Turkey have a state support of tax and subsidy. In this sense, Green Cooperatives can be regarded as an innovative way for the financing of the Photovoltaic systems. The financing of large scale projects can be an achievable target with the help of Green Cooperative scheme. The multi-factory structure of the industrial zones is quite suitable for establishing a cooperative. That is because, all the parties has the common point of high electricity demand and have already formed a group for the management of the industrial zone. Nowadays, in Turkey Green Cooperatives have just legally formed a legal framework but they haven't installed physical PV systems yet. They can easily raise the funds due to they pay high amounts of electricity bills and overcome the problems regarding governance. Furthermore, in case they need loans, they are conscious about the banking products, as well as, they are sophisticated on engineering and technical issues. As a result of this, Green cooperatives can be a fruitful and innovative way for the financing of PV projects in industrial sector.

Key Players	• Green Cooperative: where the private equity of the members are accumulated. It acts as the investor party and as the plant owner on behalf of the community. Depending on the investment size, it can carry out the project whether solely with the members' private equity or borrow a loan on behalf of the members and use it for the financing of the project. • Factory or company: In all the cases they can be regarded as prosumers(both the consumer and producer) • EPC company (also the O&M company in Turkey case): It develops and runs the system. • Bank: It undertakes a mission in the case of a loan required by the cooperative
Financial Terms / Conditions	• Loan tenor: 7 years • Interest rate: %12.8 • Interest method: fixed • Deb t/equity split: 70/30 The system doesn't constrain minimum limit but the maximum limit is 5.000.000 € for industrial and educational public institutions. Depending on the enterprise's financial stability and collateral the maximum amount of loan can be extended by some of the banks
Risks	• The possible diversification of the FiT may be implemented by the state and this could cause a future risk. • The legal system regarding green cooperatives in Turkey is not properly and adequately regulated, so this scheme could lead to problems including governance and the authorization. Due to the fact that the cooperatives have a multi member structure, exit of the existence members and the entrance of the new members should be clearly defined by regulations. .

Investment Criteria	Confirmation of an EPC firm authorised by a partner bank: due to the fact that banks doesn't fund the projects directly in Turkey, they are not interested in the financials of the project mainly. Hence, the main investment criterion is the financial credibility of the investor and the amount of private equity for loan restrictions. The Banks also enforces documents to the investors in order to have the right to control the existence and the maintenance of the PV Plant. There exists no minimum size restriction regarding the production data

Application on the segment

The biggest advantage of this system is the possibility of gathering people together who have a sense of nature and suffering from high electricity bills. Big projects can be financed through small investments by each member of the cooperative. In order to create a snowball effect the legislation regarding the PPA agreement should be enacted by the government.

Advantages	Challenges
• Easy and cheaper financing	• Governance problems stemming from the legal regulations for cooperatives
• Larger projects can be financed through economies of scale advantage at a lower cost	• Joint property rights lead to the problems regarding the distribution of consumption and income rights.
• Enable the local participating stakeholders to gain sustainable income that doesn't pollutes	

Application on business models

This financial scheme can be profitable at most with the enactment of laws regarding Power Purchasing Agreement. As a result of this the investments become more profitable and tangible and attract more and more member.