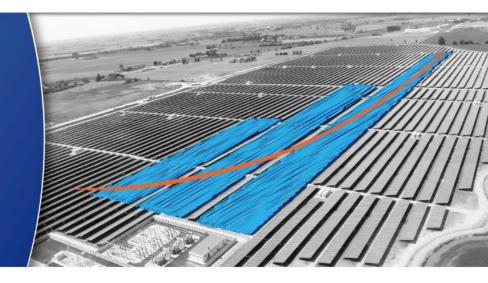




Solar business models in Italy, Spain and Turkey



@PVFinancing

PV Financing EU-wide webinar, Wednesday 17 May 2017 SolarPower Europe



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646554





Intro

Sonia Dunlop, Policy Adviser, SolarPower Europe































Agenda



11:00 Introduction, **Sonia Dunlop**, SolarPower Europe

11:05 Direct wire PPAs in Italy: legislation and case studies, **Riccardo Battisti**, Senior Project Manager, Ambiente Italia

11:20 Cooperative models in Spain, **Gijsbert Huijink**, Manger, SOM Energia ("the green energy cooperative")

11:35 The unlicensed business model in Turkey, **Faruk Telemcioglu**, General-Secretary, GUNDER (Turkish Solar Energy Society)

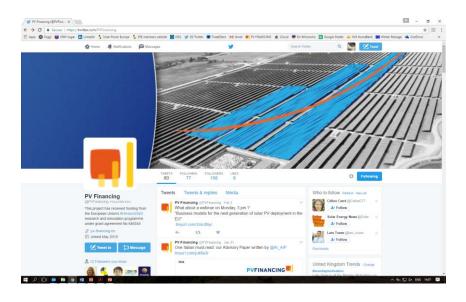
11:50 Conclusions and next steps, Sonia Dunlop, SolarPower Europe

A recording of the webinar will be available after the broadcast.

Send us your questions!







With GoToWebinar (preferred):

Use questions box on right hand side of your screen

Get involved via Twitter:

- @PVFinancing
- @SolarPowerEU
- @soniakdunlop
- @RiccardoBatt
- @AI AIP
- @SomEnergia
- @GunderSolar







Direct wire PPAs in Italy: legislation and case studies

Riccardo Battisti, Senior Project Manager, Ambiente Italia

Webinar 'Solar business models in Italy, Spain and Turkey' May, 17th 2017

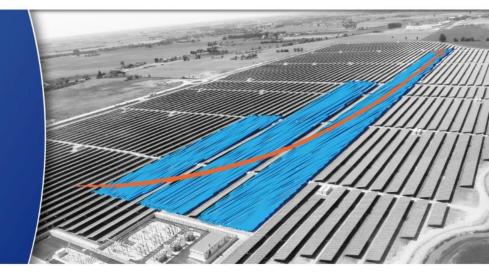


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Direct wire PPAs in Italy Legislation and case studies

Riccardo Battisti, Ambiente Italia





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- Private consultancy company in the energy and environment field
- 20 years of activity
- More than 1,500 local, national and international projects
- 30 experts and 4 offices
- Role in PV Financing: National Implementation Partner for Italy

TOPICS



- PPA legislation and profitability
- Energy cost and electricity bill structure
- Case studies

Future outlook

PPA LEGISLATION



- REMOVED! The PV plant should be installed in an area owned (or managed) by the customer
- Only one final user, thus excluding many market segments (commercial centres, airports, industrial parks, office buildings and multi-family houses)
- Except for common loads

PPA PROFITABILITY



- Wholesale price is low (around 45 €/MWh)
- So self-consumption rate is a key profitability parameter
- Which sectors then?
 - Industrial
 - Commercial
 - Office buildings
 - Public buildings: Lower consumption and smaller size but reliable consumers

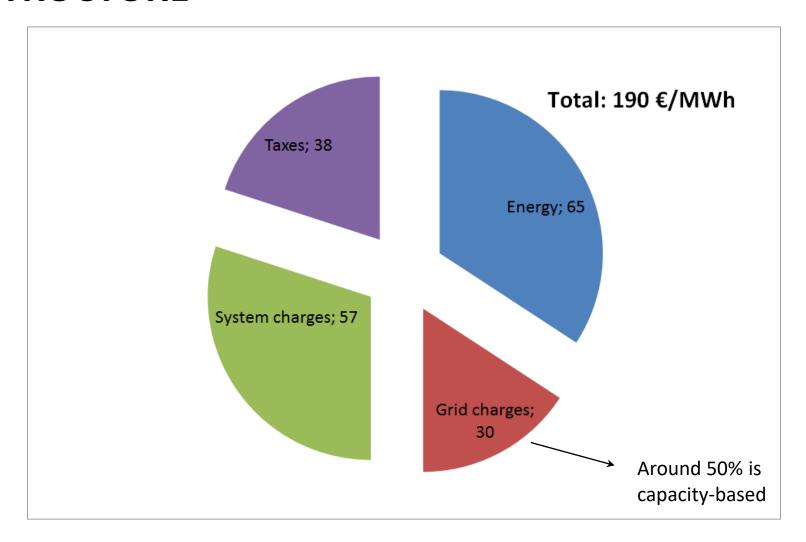
GRID ELECTRICITY COST



- For enterprises in 2016 (source: ENEA)
- Without taxes
- 20÷500 MWh/year: 180 €/MWh
- Up to 2,000 MWh/year: 164 €/MWh
- Up to 20,000 MWh/year: 145 €/MWh

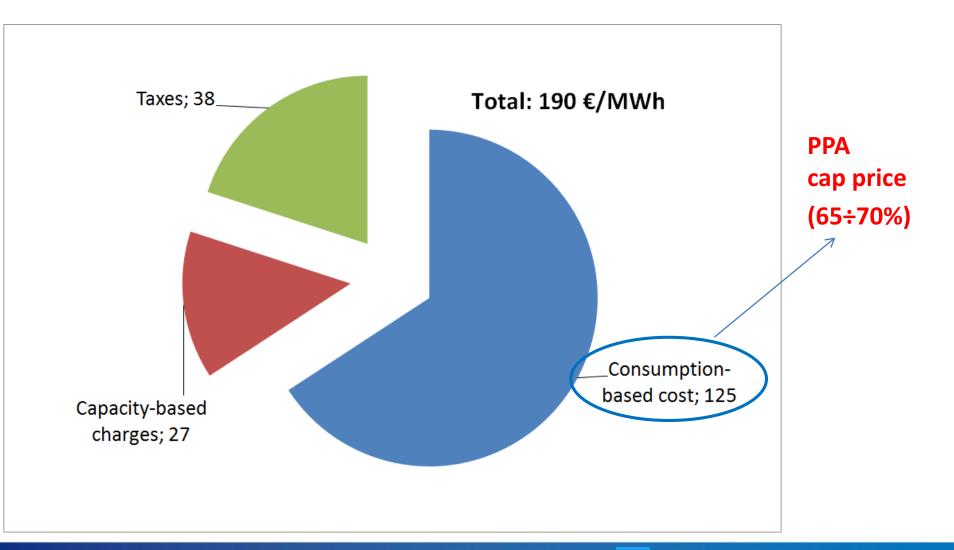
ELECTRICITY BILL STRUCTURE





ELECTRICITY BILL SELF-CONSUMPTION SAVINGS





L'OREAL INDUSTRIAL PLANT



- 3 MW_p PV plant
- Total yield: 3,600 MWh/year
- Specific yield: 1,200 kWh/year per kW_p
- Self-consumption rate: 100%
- PV output: 30% of the total demand



Source: Qualenergia.it

L'OREAL INDUSTRIAL PLANT



- Investment: 3,000,000 €
 (about 1,000 €/kW_p)
- Balance sheet finance, no debt financing
- 20 years contract, including a "take or pay" provision
- 10% savings with respect to grid price
- Investor also broker for the additional energy demand of the factory



Source: Enersol

ARESE SHOPPING CENTRE



- 50% of the common loads covered by PV (1.4 MW_p)
- Lighting and space cooling through heat pumps
- Also 2 cogeneration units



ARESE SHOPPING CENTRE



- Expected yield: 1,500 MWh/year
- Self-consumption rate: almost 100%



Source: Solar Frontier Europe



ARESE SHOPPING CENTRE







OUTLOOK ELECTRICITY MARKET



- Reform of the electricity market is under consultation
- Expected (declared...) deadlines:
 - Published June 2017
 - Into force January 2018
- PV plants (with storage) could get revenues from additional grid services (management of energy flows, frequency, voltage, etc.)
- Most probably only pilot projects in the first stage

OUTLOOK NON-RESIDENTIAL BILL



- Non-residential customers: Industrial, tertiary, agriculture
- 75% of the national consumption
- Reform currently under consultation
- Jan 2018...?
- System charges increase their capacity-based share...But how much?
- 5 scenarios: 10÷50% moved to the capacity-based share
- 3 of them drastically negative for PV (estimated cut of 4.5 billion investments until 2030)
- The Energy Authority is oriented towards the 2 'positive' ones (estimated market decrease: 7÷12%)
- Capacity-based share of system charges could be 10÷30%
- Of course it is retroactive...

OUTLOOK MULTIPLE USERS



- 'Closed distribution systems' (SDC): Private grids with multiple consumers
- Petition (about 25,000 signatures) to the Prime Minister for amending the 'Competition Law' and including this topic
- View of the Regulatory Authority: SDCs should not be used for promoting renewables and efficiency (this should be done through incentives) but only when it is cheaper than the connection to the public grid
- Positive opinion by the Authority for Competition and Market

OUTLOOK



- Workshop on May 16th
- Ministry for Economic Development:
 - «Self-consumption will be a key point of the new National Energy Strategy»
 - «A proposal will be sent to the EC in the second half of 2017»
 - "Grid and system charges should not hinder self-consumption"
 - «The growth of self-consumption is sustainable for the grid costs»

CONCLUSIONS



- PPA is a promising business model in Italy
- Especially in specific application segments (public buildings, large industrial or commercial plants)
- Main risks are:
 - Stability of user consumption (low wholesale price)
 - Lower value of electricity savings with the new electricity bill
- Possible 'compensations':
 - Additional revenues from grid services
 - Multiple consumers reducing risk and unlocking new market segments





Thank you for your attention!

Email: riccardo.battisti@ambienteitalia.it

Website: www.ambienteitalia.it

Linked in Ambiente Italia S.r.l.







Q&A

Riccardo Battisti, Senior Project Manager, Ambiente Italia







Cooperative models in Spain

Gijsbert Huijink, Manager, SOM Energia



Gijsbert Huijink

May 17th 2017 gijsbert.huijink@somenergia.coop

Som Energia

10-10-2010





Goal:



change our energy system



Energy retailing VFINANCING

Estás aquí: WEB

Hazte socio/a

Contrata la luz













Servicios que ofrecemos V Participa V Blog V Centro de Ayuda V





What makes Som Energia different?

- 20% of members voluntarily pay 0.01€/kWh extra to support the cooperative activities(=270.000€ for 2017)
- our financing comes exclusively from our members
- potential future investment: 1000€/ member
- we are not profit oriented
- aim to get maximum involvement of our members



Strategy 2017

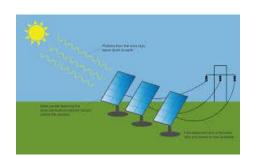
SELF CONSUMPTION

EFFICIENCY





100% SELF PRODUCTION MAINLY VIA NEW PROJECTS









Self-production

Facilitate and promote maximum development of self consumption.

We start a pilot test with test installation of SONNEN BATTERIES products.

We aim to cover 5 % of consumption of our members by 2025.







Energy efficiency

Facilitate and promote maximum development of energy efficiency.

Joint purchases more efficient household appliances.

Promote rehabilitation and more efficient construction.

We aim to reduce the consumption of our members by 5% by 2025.













Spain Panorama

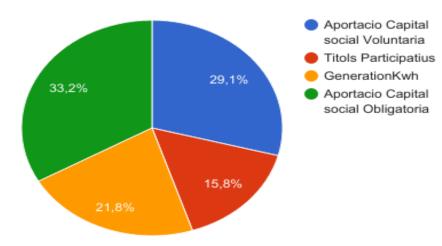
- Since 2012 moratorium on new renewable projects
- o And strong disincentives for self production
- o And retroactive cuts to existing FITs

But:

- o Tens of GWs of solar and wind projects under development
- o Lots of space and really good solar and wind resources
- o Until 2020 only one tender for 2+1 GW capacity
- o With most likely no retribution



TOTAL INVEST MEMBERS 10.058.000 €



The last emision (09/2015) of APORTACIO CAPITAL SOCIAL 900.000 € obtained in less than 2 hours.





- 25 year investment without financial return
 - 100€ gives 170 200 kWh/year at cost price
 - cost price = 36€ vs 43€/ MWh market price
 - 2600 persons
 - 2.5 m€ contributed

- Collective Self Consumption
- o participants invest all together in mix of projects
- o aim is to follow demand curve as much as possible

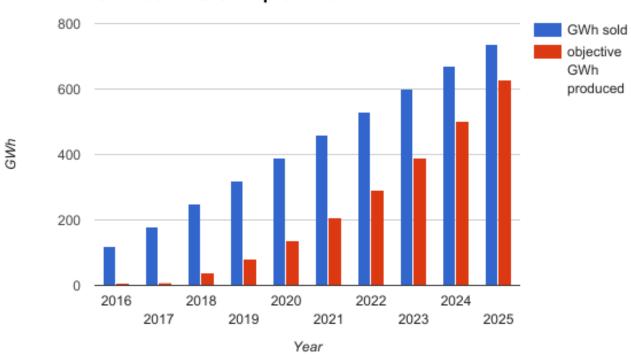
2.2 MW PV near Sevilla in 2016 PVFINANCING





100% SELF PRODUCTION

GWh sold VS GWh produced





100% self production in 2025

- 300 MW by 2025
- roughly 300 m€ investment
- Mix of:
 - o 5 MW existing small hydro
 - 150 MW new wind
 - 150 MW new solar



Financing 300 m€

- General structure:
 - o 40% members contributions @ 1.75%
 - 15% local etical and cooperative banks @ <1.5%
 - o 45% long term very low cost finance @ ??
- Limiting factors:
 - LCOE at 0% WACC between 30 35€/MWh
 - each 1% in WACC adds roughly 5€/MWh
 - Future market price for 2018 2021 is 43€/MWh
 - o But after 2021 ?????

Solar Projects 2017 PVFINANCING

- At the end of the year we expect to finish 5.1 MW photovoltaics projects:
 - 2 MW Sevilla
 - 1.4 MW Sevilla
 - 0.8 MW Almeria
 - 0.9 MW east of Madrid

We have started negotiations on several other projects.





WWW.SOMENERGIA.COOP

WWW.GENERATIONKWH.ORG

WWW.RESCOOP.EU

HTTP://WWW.PV-FINANCING.EU/





Q&A

Gijsbert Huijink, Manager, SOM Energia







The unlicensed business model in Turkey

Faruk Telemcioglu, General-Secretary, GUNDER (Turkish Solar Energy Society)



UNLICANCED PROJECTS IN TURKEY



info@gunder.org.tr , www.gunder.org.tr



Renewable energy targets by 2023

3.000 MW

by 2019

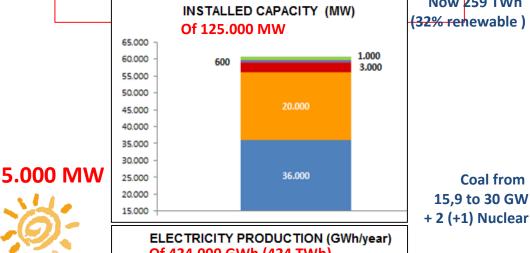
The whole economically feasible hydropower potential (34 GW) of Turkey will be provided for generating electrical energy,

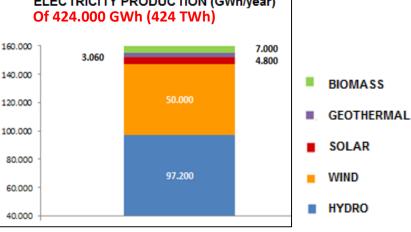
20.000 MW capacity of wind power plant will be in operation

Minimum 3.000 MW of solar PV capacity will be reached

Minimum 1.000 MWe geothermal will be implemented

1.000 MWe installed capacity for biomass energy will be implemented 30% electricity from renewables by Now 259 TWh





Coal from

15,9 to 30 GW

REPUBLIC OF TURKEY – COP21 10.000 MW by 2030



Renewables & Turkey

A summary of potentials and projections for renewable resources in Turkey

				_
Renewable	Feasible Potential	2012	2023 Projection	
Hydropower	37 GW + 5 GW small hydro	19 609 MW	All feasible potential	
Wind power	87 GW	2 260 MW	~20GW	(48 GW
Geothermal	2 GW	162 MW	~600MW (+3	31,5 GW
Solar PV (1500kWh/KWp)	500 GW	~9 MW	3 to 5 GW	
Solar CSP	???	???	1GW?	
Biomass	???	81MW	???	

[•]Installed capacity ~ 75,1 GW (May 2016) – Private 73,4% – State 26,6%

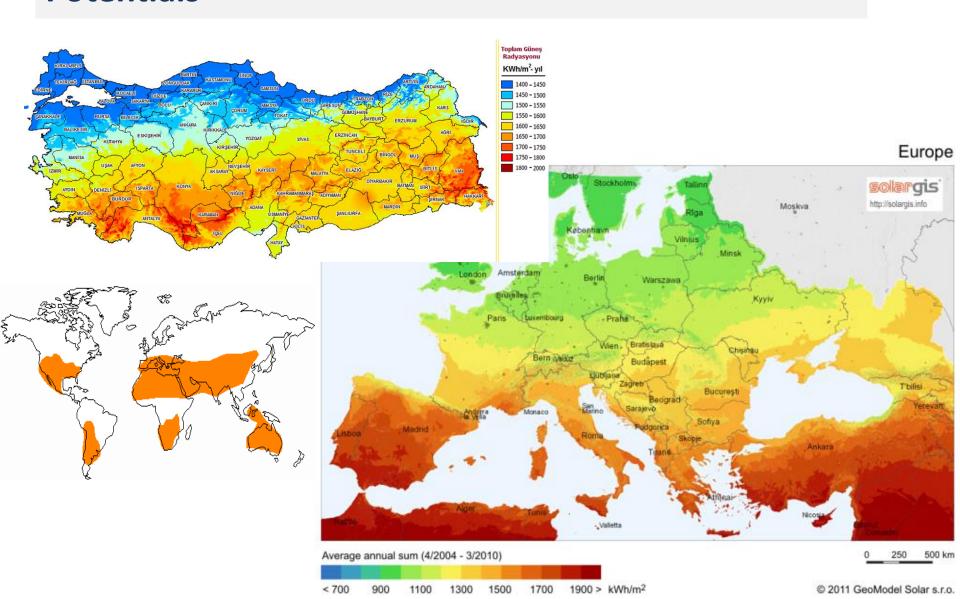
[•]Generation 250.4 TWh (2014) •Consumption 255.5 TWh (2014)

[•]Export 2.7 TWh (2014), •Import 7.8 TWh (2014)

[•]Market value ~ 37 Billion US\$



Potentials





Solar Energy Potential of Turkey

✓Annual average solar radiation

1527kWh/m² per year

✓ Annual average total sunlight period

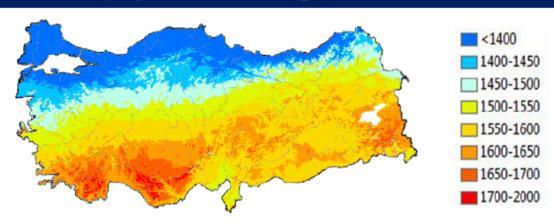
2,738 hours/year

(7.5 hours a day)

Using current PV technologies

Annual Global Solar Radiation (kWh/m2-year) Turkey is between 36° and 42°N latitudes

<1400 kWh/m² per year in the Black Sea region



~ 1600- 2000kWh/m² per year in the South East and the Mediterranean region

✓ Feasible land area for PV investment (with annual Global Solar radiation > 1650 kWh/m²)

~ 4 600 km²

√ Total feasible PV Power

~ 450-500GWp

✓ Annual PV electricity generation capacity;

~650-700 TWh

Source: YEGM, General Directorate of Renewables Energy,

http://gepa.yegm.gov.tr/

39.000 GW if all lands available....

73 GW - roofs

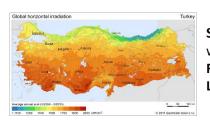
1600 km² = demand for electricity by 2050

Lake Salt - 1665 km²

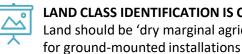


Turkey Solar Market Outlook – Road to 5GW by 2023

until commercial operation



THE REPUBLIC OF TURKEY PRIME MINISTRY INVESTMENT SUPPORT AND PROMOTION AGENCY **STRONG POTENTIAL** with avg. annual irradiation of 1.7-2 MWh/m2 FIT at 13.3 cents/kWh for 10 years + Local content FIT at 6.7 cents/kWh for 5 years



LAND CLASS IDENTIFICATION IS CRITICAL Land should be 'dry marginal agricultural land'

	UNLICENSED MARKET	LICENSED MARKET	MEGA PROJECTS		KONYA KARAPINAR 6,000 hectares for 4 GW	
Capacity Threshold	< 1MW, < 50 kW for rooftop	> 1MW	> 1MW		NIGDE BOR 2,500 hectares for 1.5 GW	
Location	Based on DisCo capacity	Based on TEIAS capacity	Renewable Energy Supply Zones			
Electricity sales	Spot market at FIT via authorized supply company	Spot market at FIT	Spot market at FIT??			
FIT Application timeline	Apply to DisCo's with no specific timeline	Apply to YEKDEM in October	Not yet defined	-		
Auction model	No auction	Reverse auction; applications in October	Reverse auction		PV panel integration & structures: 0.8¢/kWh	
Local content		-	Extra FIT; mandatory		PV modules: 1.3 ¢/kWhPV cells: 3.5¢/kWh	
Installed capacity (as of 2016 June)	562 MW	-	-	Inverter: 0.6¢/kWh Optical material: 0.5¢/kWh		
Pipeline (as of 2016 June)	Over 4 GW	600 MW	-			
INVEST IN TURKEY			Transier of Sev Silates is	not	possible	



Regulatory Framework

MAIN LAWS FOR RENEWABLE ENERGY

- ELECTRICITY MARKET LAW (No: 6446) 2013 Electricity Market Law No. 4628 (2001)
- LAW ON UTILIZATION OF RENEWABLE ENERGY SOURCES FOR THE PURPOSE OF GENERATING ELECTRICAL ENERGY (Law No: 5346) 2005

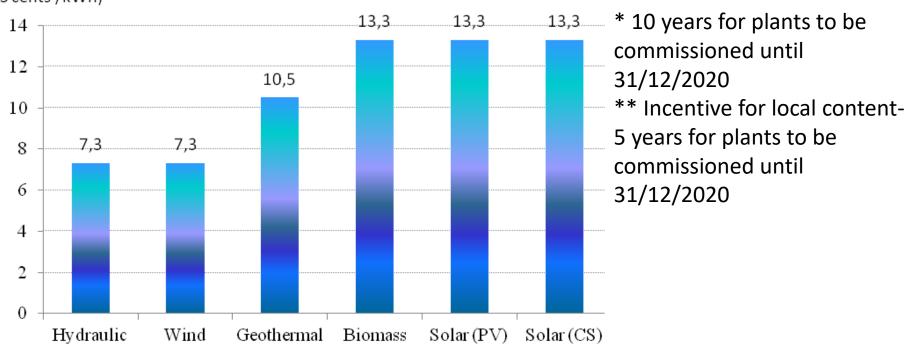
SECONDARY REGULATIONS FOR RENEWABLE ENERGY

- ELECTRICITY MARKET LICENSING REGULATION
- THE REGULATION FOR UNLICENSED GENERATION OF ELECTRICAL POWER IN THE ENERGY MARKET
- TECHNICAL REGULATION FOR EVALUATING LICENSE APPLICATIONS BASED ON WIND ENERGY GENERATION
- TECHNICAL REGULATION FOR EVALUATING LICENSE APPLICATIONS BASED ON SOLAR ENERGY GENERATION
- THE REGULATION ON COMPETITION FOR GRID CONNECTION RIGHTS FOR THE SOLAR AND WIND POWER GENERATION PLANTS (Tender Regulation)
- REGULATION FOR PRE-LICENSE WIND AND SOLAR MEASUREMENTS
- COMMUNIQUÉ ON MEASUREMENT STANDARDS FOR WIND AND SOLAR POWER PRE-LICENSE APPLICATIONS



Feed-in Tariffs



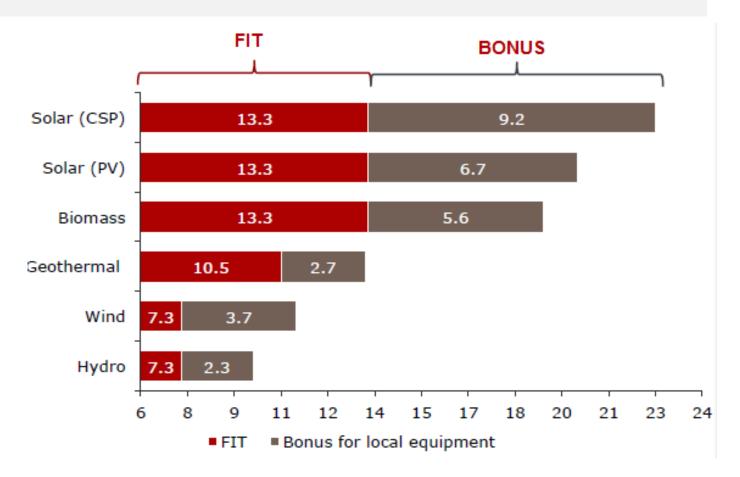


Support mechanism in the electricity market related secondary legislation;

- Payment of only 10% of the total licensing fee
- Exemption from payment of annual license fees for the first 8 years of operation
- Priority for system connection
- Exemption from being a balancing mechanism unit
- Purchasing option from the market up to 100% of the quantity inserted in the relevant license



Feed-in Tariffs & Premiums



In Turkey, renewable electricity production is mainly promoted through a guaranteed feed-in tariff mechanism. The Renewable Energy Support Mechanism's feed-in tariff for renewable energy sources is between 7.3 - 13.3 \$ - cents/kWh for the first 10 years of operation.



Bonus for local content

Туре	Feed-in Tariffs (USD Cent / kWh)		Additional Feed-in Contribution (USD Cent / kWh)
Solar (PV)	13,3	Panel structural mechanics construction	0,8
		PV modules	1,3
		Cells forming PV module	3,5
		Inverter	0,6
		Material focusing solar irradiance onto PV module	0,5
Solar (CSP) 13,3		Radiation collection tube	2,4
		Reflector surface plate	0,6
		Solar tracking system	0,6
	13,3	Mechanical components of the heat storage	1,3
		Mechanical components steam generation	2,4
		Stirling engine	1,3
		Solar panel structural mechanics	0,6



Incentive for Renewables

- Feed-in-Tariffs, (Günder's Survey (245 participants); 76% main leverage for PVS investments, 83% PVS investments can not be realized without FiT)
- Purchase guarantees,
- Connection priorities,
- Lower license fees,
 (Only 1% of licensing fee, Exemption to pay annual license fee for 8 years in operation)
- License exemptions for applications below 1 MW
- Various practical conveniences in project preparation and land acquisition.



Solar PV Industry in Turkey

- PV Module manufacturers 22 (over 1.500 MW production capacity yearly)
- Installers (EPC) over 100
- Installed capacity over 1,4 GW

Costs around 0,8-1,0 (000) Euro/kWe (payback less than 8 years)





UNLICENCED PROJECTS

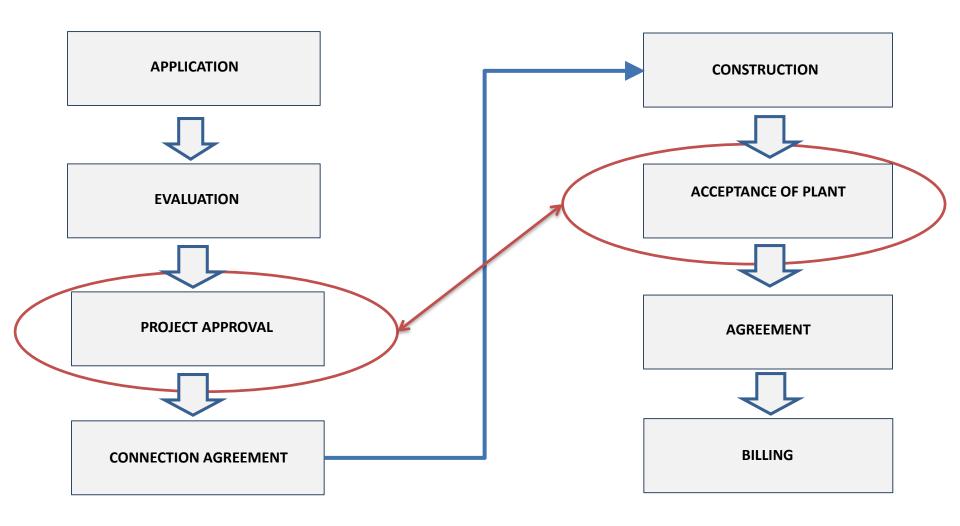
- UNDER 1 MW INSTALATION
- %30 SELF CONSUMPTION
- 10 YEARS FIT
- 5 YEARS LOCAL CONTENT
- EASY AND FAST APPLICATION
- EASY FINANCE



BENEFICIARIES

- ROOF TOP
- SMALL INVESTMENTS
- COOPERATIVES
- EU PROJECTS
- AGRICULTURAL UNIONS
- UNIVERSITIES
- INDUSTRIAL ZONES
- PUBLIC INSTITUTIONS

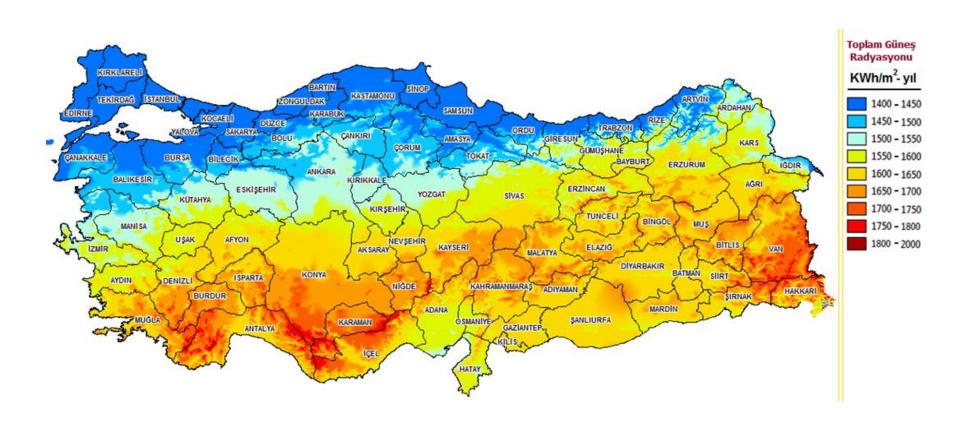
UNLICANCED PROCESS



UNLICENCED PROJECTS



PROJECTS



UNLICANCED PLANT 1 X 8 MW





FINANCE FOR UNLICENCED PROJECTS

EBRD

TURSEFF PROGRAM

UP TO 5.000.000 €

VAKIFBANK-ISBANK-YAPIKREDI-DENIZBANK

BANKS

%25-30 EQUITY -10 YEARS

LEASING





Q&A

Faruk Telemcioglu, General-Secretary, GUNDER (Turkish Solar Energy Society)





More information and next steps

Sonia Dunlop, Policy Adviser, SolarPower Europe National contract templates and **PVFINANCING**

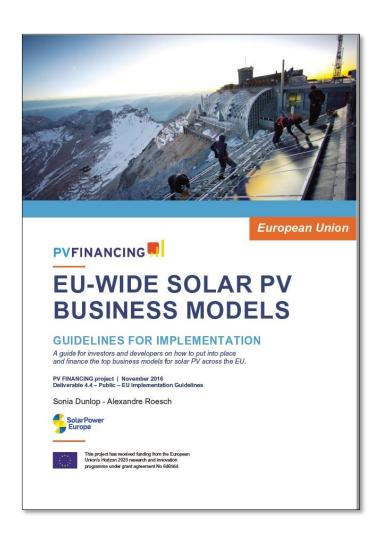
business model guidelines

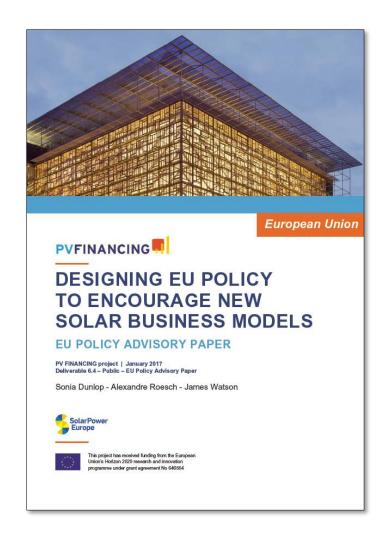




EU-level PV Financing reports

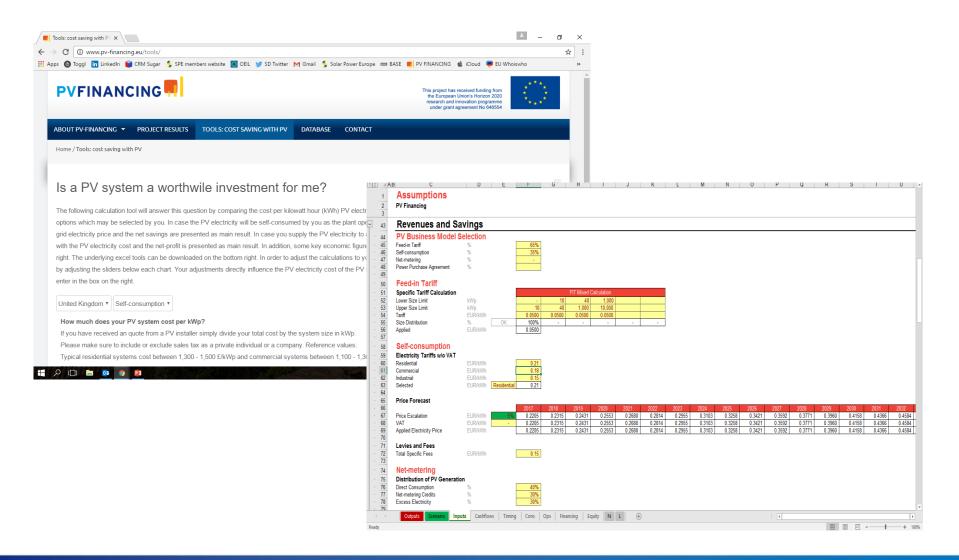






Cash flow models





Forthcoming PVF events and webinars



- "Business models to boost the PV sector in Europe", at Intersolar, Thurs 1 June 14:00-15:30 in room B12
- Webinar "The solar cash flow models and database",
 Thurs 14 June 15:30-16:30
- Further webinars in national languages on Austria,
 UK and Turkey more details here.

Index: national documents



AUSTRIA

Roof rental contract <u>Dachvermietung</u> (Österreich)

Leasing contract Pachtvertrag (Österreich)

Solar cooperative association by-laws <u>Vereinstatuten (Österreich)</u>

Self-consumption model guidelines <u>Leitfaden zu PV-Eigenverbrauchsmodellen</u>

Policy advisory paper Austria Nationales Positionspapier

FRANCE

Collective self-consumption contract Modèle d'autoconsommation collective d'électricité (France)

Surplus electricity in collective self consumption electricity contract <u>Modèle de contrat de vente du surplus</u> <u>d'électricité dans le cadre d'une autoconsommation collective (France)</u>

Solar business model implementation guidelines <u>Guide de Mise en Oeuvre de Projets PV en France</u>

Policy advisory paper France Reccommendations pour un deployment accru du photvoltaique en France

GERMANY

Neighbour electricity model implementation guidelines <u>"Geschäftsmodelle Mit Pv-Mieterstrom"</u> Policy advisory paper Germany Nationales Positionspapier

ITALY

Operational leasing contract for a PV plant Contratto di locazione operativa di impianto fotovoltaico (italia)

Power Purchase Agreement contract for electricity supply through a PV plant <u>Accordo per la costruzione di impianto dedicato e somministrazione di energia elettrica secondo lo schema del sistema efficiente di utenza (italia)</u>

Solar business model implementation guidelines <u>Impianti fotovoltaici: linee guida per l'implementazione</u> Policy advisory paper Italy <u>Fotovoltaico in Italia, quale politiche di supporto?</u>

Index (contd)



SPAIN

Contract template for the participation in the crowdfunding of a PV installation <u>Contrato de cuentas en</u> participación para la explotación de una instalación fotovoltaica ubicada en (España)

Contract template for representation in the electricity trading market for a prosumer with self-consumption 2 Contrato de representación de mercado para la venta de excedentes de una instalación del autoconsumo (España)

Cooperative by-laws template Plantilla de estatutos corporativa (España)

Solar business model implementation guidelines Pautas de Implementación Nacional

National report on regulatory framework Spain <u>Informe nacional de asesoramiento regulatorio</u>

TURKEY

Contract for lease of PV system FV sistemlerin kiralanması için Örnek Kontrat

<u>Electricity utility, investor and solar supplier contract Kontrat tipi 1: Kamu Hizmetleri(Elektrik), yatırımcı ve solar tedarikçi model I (Türkiye)</u>

<u>Electricity supply contract for solar PV electricity supply and example electricity bill Fotovoltaik Elektrik Arzı ve</u> Örnek Elektrik faturası için Örnek Elektrik Arzı Sözleşmesi (Türkiye)

Solar business model implementation guidelines Ulusal uygulama rehberi

Policy advisory paper Turkey <u>Ulusal Politika Tavsiye Belgesi</u>

UNITED KINGDOM

<u>Power Purchase Agreement (United Kingdom)</u>
<u>Making Solar Pay: the future of the solar PPA market in the UK</u>
UK National Policy Advisory Paper

Click here for full list





Thank you for joining our webinar

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