

Renewable Energy in Albania

National Agency of Natural Resources

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Workshop: “Renewable Energy UNDA project conclusions and way forward”

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ALBANIA



Population 2.95 million

Land area of 28,745 km²

77% of the country is mountainous

Administratively divided into 12

prefectures, 36 districts, 315

communes and 2900 villages

95% of Electricity produce by Hydro

GDP 2016 is 10.5 Billion Euro



Energy Sector Policy

Policies and Objectives will focus on:

- Reduced energy imports and increased domestic energy generation to meet future energy demand
- Improved energy efficiency in the household, services and industrial sectors
- Increased use of RES technologies, based on least-cost planning and environmental protection principles
- Development of mechanisms to encourage foreign direct investment in the Albania energy sector.
- Increased competition in the energy market while preserving customer interests and without impairing the government's responsibilities on energy system functioning and security of supply;
- Improved alignment and integration of Albanian energy-sector policy and regulation with the EU's energy acquis and regional and EU energy markets.
- Development of a more consumer-oriented and decentralized future Albanian energy system.
- Focused activities regarding the use, remediation energy infrastructure that adversely impacts environment and potentially high value areas for other development sectors, i.e. tourism, agriculture, etc.

RES Policy

1. Albania has prepared three important documents, Action Plan of Energy Efficiency approved , Action Plan of Renewable Energy and Draft of National Strategy of Energy to 2030.
2. Increased competition in the energy market while preserving customer interests and without impairing the government's responsibilities on energy system functioning and security of supply;
3. Three key laws: for power sector, for renewable, and for energy efficiency approved by the Government;

Those laws intend to liberalize the electricity market, increase competition, promote efficiency, boost renewable development, and attract foreign investment in the sector.



Renewable Energy Target for 2020

The Energy Community Secretariat (ECS) has adopted the Renewable Energy Directive methodology for allocating targets of Albania for 2020, 38% of Gross Final Energy Consumption and with biofuels assumed to contribute 10% of transportation sector energy.

The policies of Renewable Energy show strong synergies with a goal of moving to a lower carbon footprint for the Albanian energy economy. Renewable Energy policy leads to cumulative reductions of 15.3% in CO₂ emissions.

Implementation of a renewable energy target by 2020 for Albania, is in line with the Energy Community, based on the approach used for setting the EU member state targets under the Renewable Directive.

MEASURES FOR ACHIEVING THE INDICATIVE OBJECTIVES

Albania has taken good steps to implement renewable energy

Hydro Power Plants (HPP)

December 31, 2013, the Albanian Government, based on the Concession Law has issued up to about 200 concession contracts for building different categories of HPPs. Analysis shows that the total projected installed capacity is 1500 MW, and the part for SHPPs is about 48%, with total cost of investment 2.8 billion Euro.

Wind

Albania has issued licenses for several companies to develop this resource with capacities 2000 MW.

Solar

Many companies has prepared the documentations for investment in energy photovoltaic with capacity 50 MW.

Investment needs to 2020

To reach Renewable Energy Target:

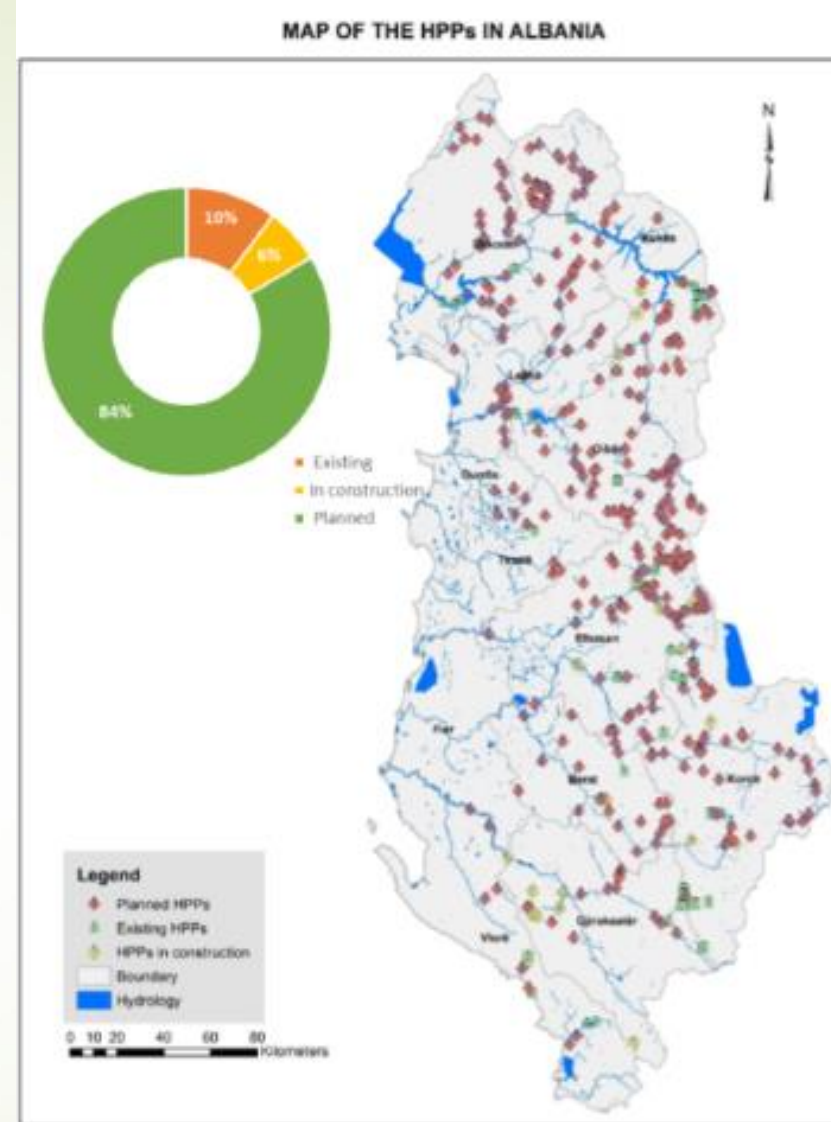
Energy system in Albania will continue expansion of hydropower, with cumulative additional capacity of 1270 MW by 2020. Wind with an important contribution 150 MW and PV 40 MW.

New capacities of Renewable Energy Resource to 2020

	Hydro	Capacity
1	<1MW	120 MW
2	1MW–10 MW	400 MW
3	>10MW	750 MW
4	Wind	150 MW
5	PV	40 MW

HYDRO ENERGY

- The hydrographic territory of Albania has a surface of 44,000 km² or 57% more than the national area of our country.
- The total reserves of the hydro power make possible the installation of a capacity of about 4500 MW with an annual potential of production may amount to 16-18 TWh.



Distribution of existing HPP

SOLAR ENERGY

- In Albania, average solar radiation is 1500 kWh/m² per year and Maximal radiation is 2200 kWh/m² per year
- In 2016, a total of 160 000 m² were installed (60% by services, 40% by households), bringing total installations to 160 000 m² (equivalent to around 55 GWh/y or 1.1% of electricity consumed by households in 2016).
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Solar Radiation in Albania

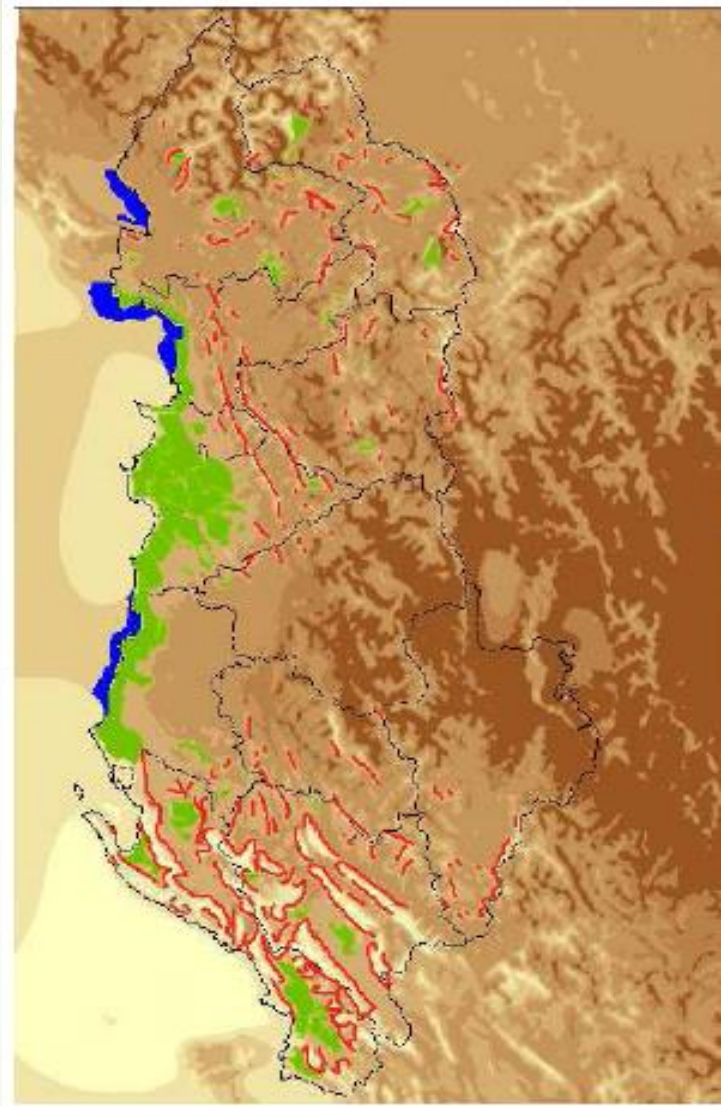
WIND ENERGY

The average speed of wind, is around 4-6 m/s and the average energy density is 150 W/m².

Albania have average 4200 hours with wind per year.

Actually in Albania Territory in under survey for potential of wind energy form different companies.

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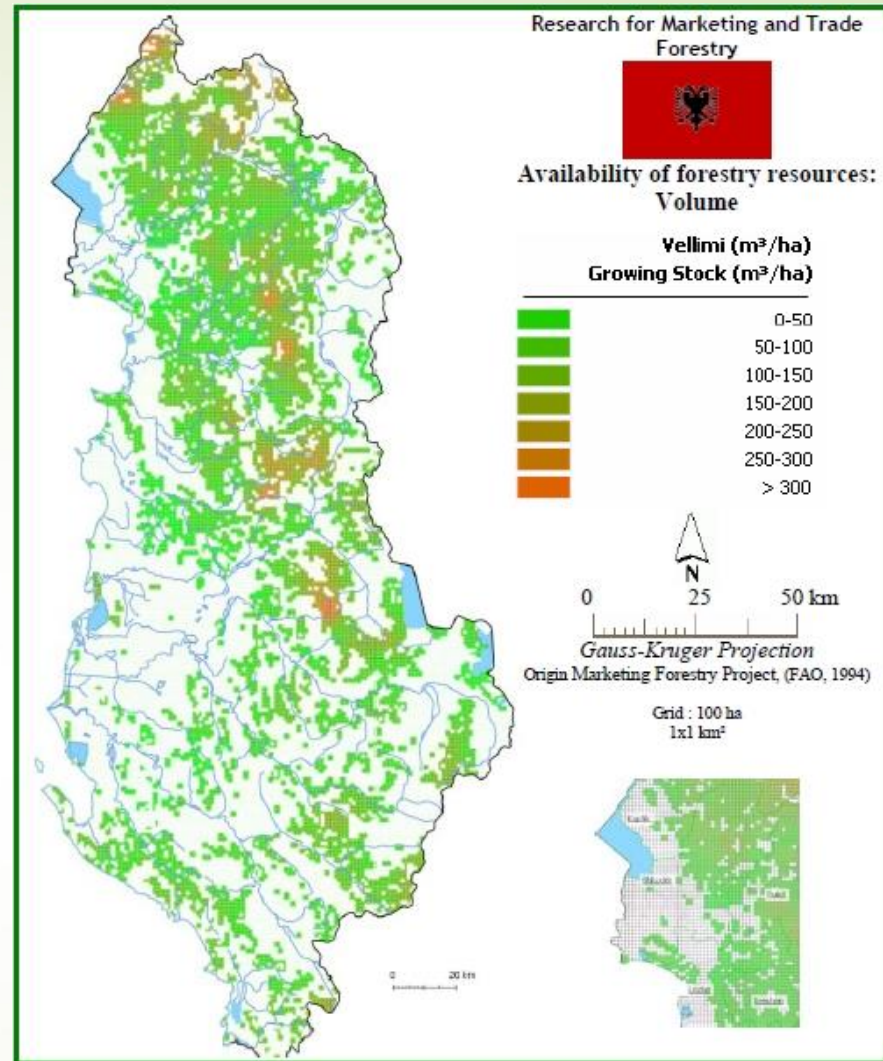


Annual average wind speed

BIOMASS

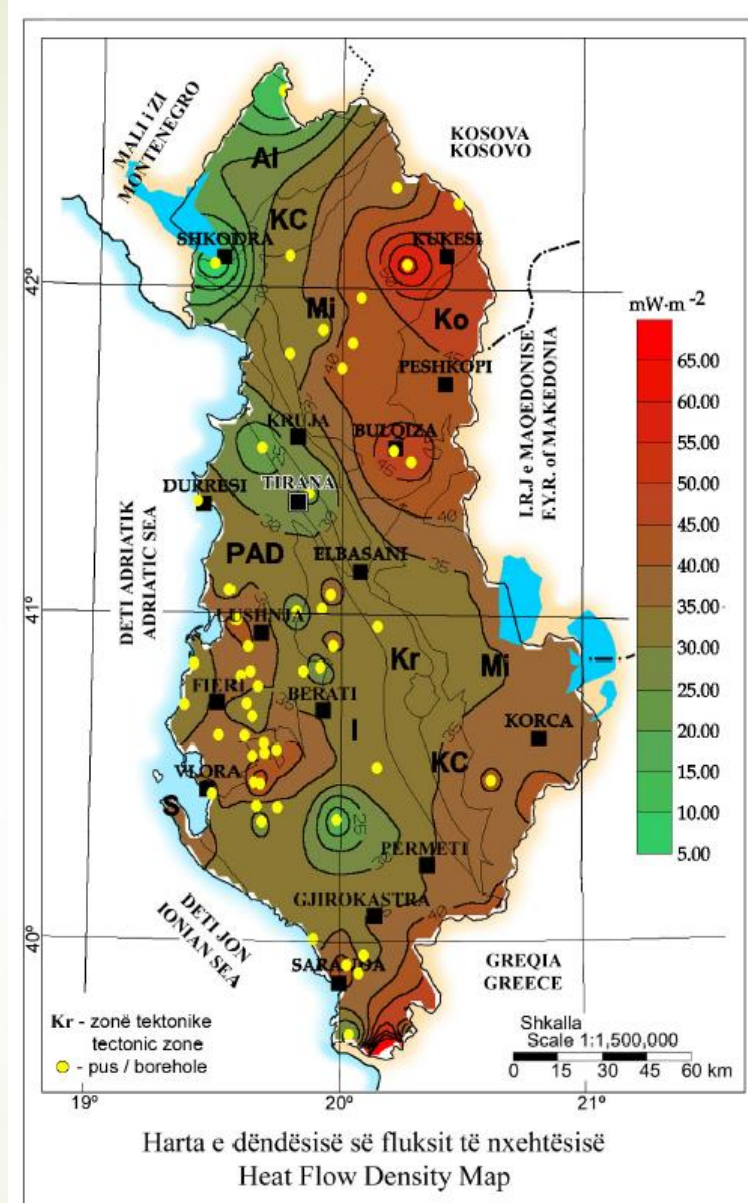
“Biomass Potential in Albania”

- Forests cover 36% of the land area of Albania. Total proven reserves on wood as fuel is about 6 Mtoe.
- Wood production for energy in 2016, is 190 Ktoe
- Agricultural biomass
- Agriculture is a source of considerable biomass quantities that can be used for bioenergy production.



GEOTHERMAL ENERGY

- Albania, actually is in the feasibility phase of assessment of the geothermic energy use potential
- The geothermic situation of Albania presents two directions for use of geothermic energy:
 - The thermal sources with low enthalpy
 - The usage of the depths of the abandoned wells



Map of Geothermal Energy in Albania

RES project in Albania

Malsia Solar 3 x 2.5 MW

Geographic location of the plant



Albania

- **Project:** Three PV parks with combined DC-Power of 7.5MWp
- **Progress:** Majority of project documentation is completed and construction permits will be received within months
- **Solar Radiation:** 1,450 full load hours per year
- **Ownership Stake:** 34% and 100% ownership with Albania partners
- **Financials:**
 - IRR 9-10%
 - Repayment period 10 years

Shkel Solar Parks



PHOTOVOLTAIC PARK

Shkel 1,2,3 - Location description

Description

- **Area:** The 3 solar park are situated in a plot of total 25 ha. The ground is flat with excellent ground structure for constructing solar plants
- **Electrical grid proximity:** The park connection point is the next electrical column, which is Apr. 400m. from the plot. The closest transform station is located Apr. 4 km from the site
- **Accessibility:** A first (local nomenclature) class road is connecting the site to the near village and the 1st class highway

Road Infrastructure



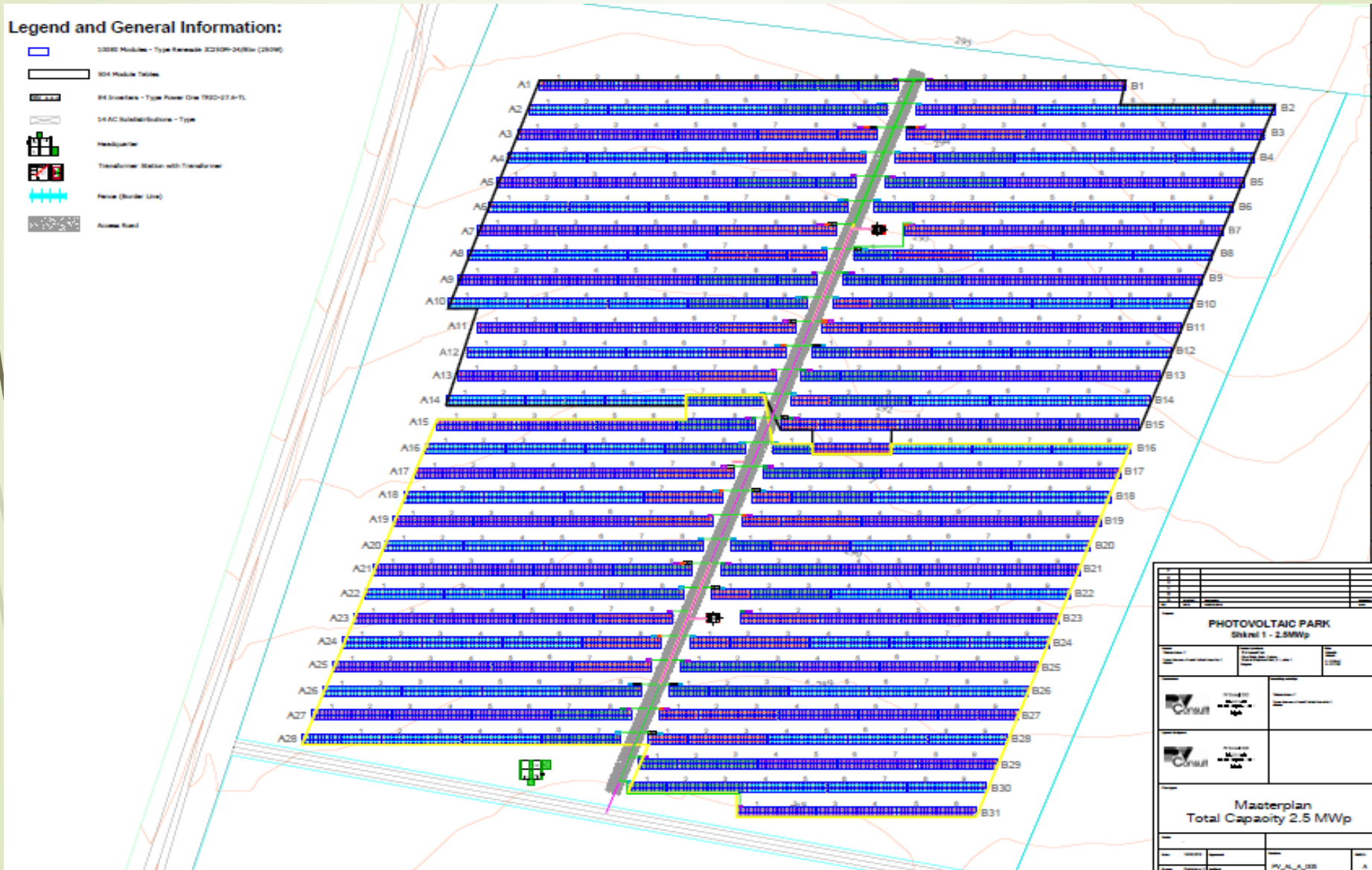
Connection Point



Substation



Shkel 1 – 2,5 MW project



Solar Radiation in Shkel 1, 2,3

Adequate solar radiation is a prerequisite for the development of Photovoltaic systems' investments

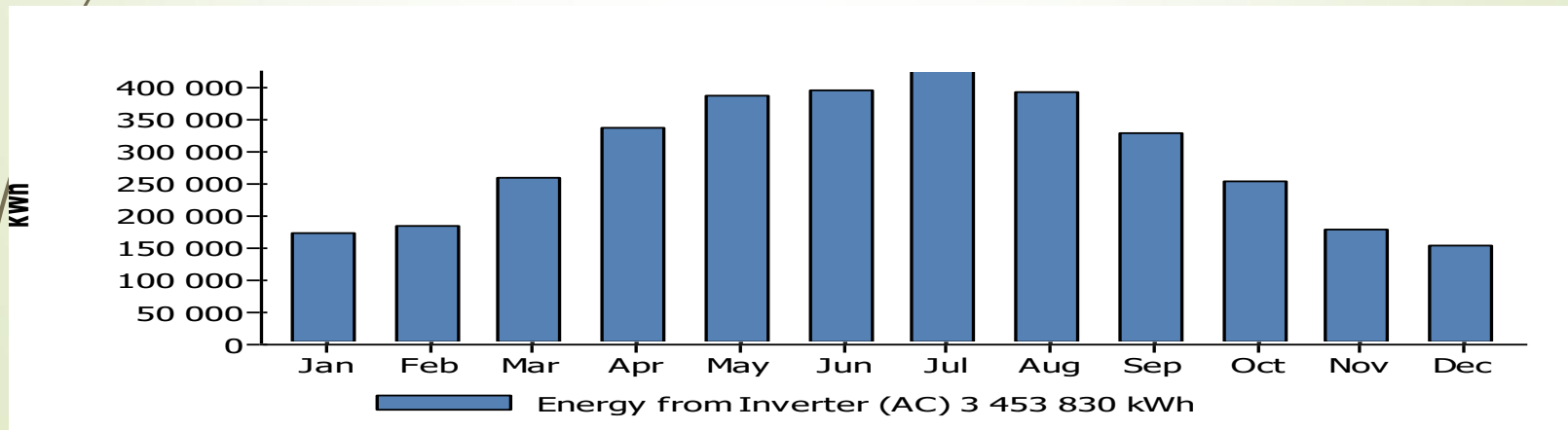
Overview

- **Solar radiation database used:** PVGIS-CMSAF estimated at the following coordinates: 42°13'35" North, 19°26'44" East, Elevation: 100 m a.s.l
- **Nominal power of the PV systems:** each about 2,5 MW (crystalline silicon)
- Shkel 1, 2, 3 each park is 2,5 MW

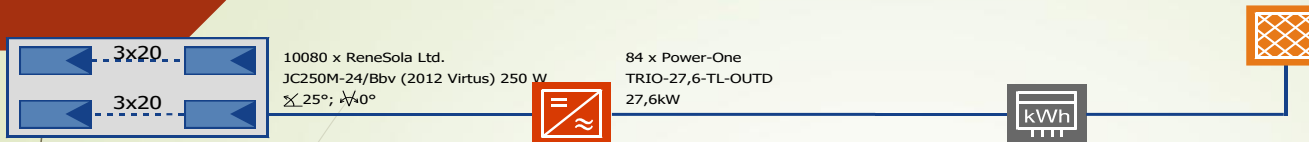
System information – 2,5MW solar plant

Array Gross Surface	16,387.1 m2
Array Solar Surface	18,042.69 m2
PV Output	2520.0 kWp
PV Array Irradiation	27,399,824 kWh
Energy Produced by PV Array (AC)	3,453,830.0 kWh
Grid, Feed-in	3,453,830.0 kWh
CO2 Emissions	3 059 053 kg/a
System Efficiency	12.6%
Performance Ratio	81.9%
Specific Annual Yield	1,370 kWh/kWp
PV Array Efficiency	13.0%
Inverter Efficiency	97.1%

Solar Radiation and system efficiency

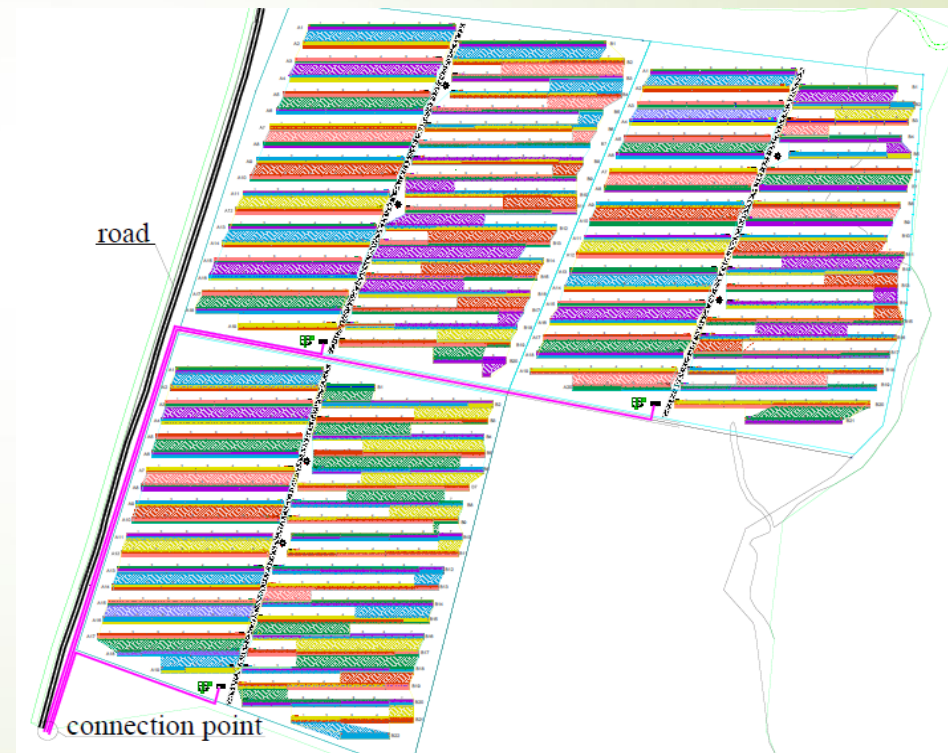


System in grid connection operation and connection schema



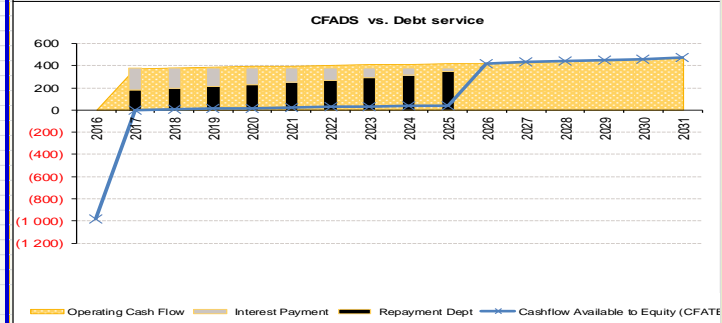
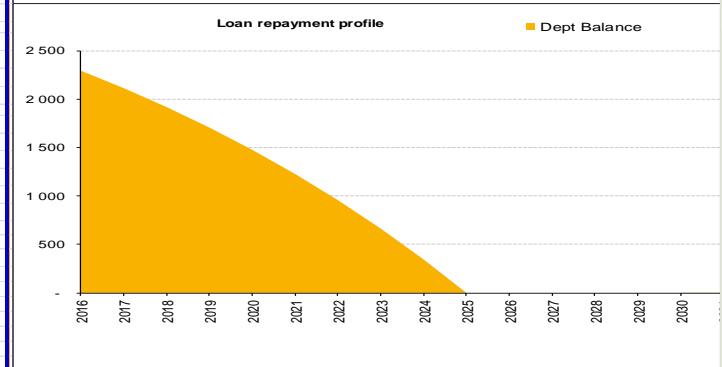
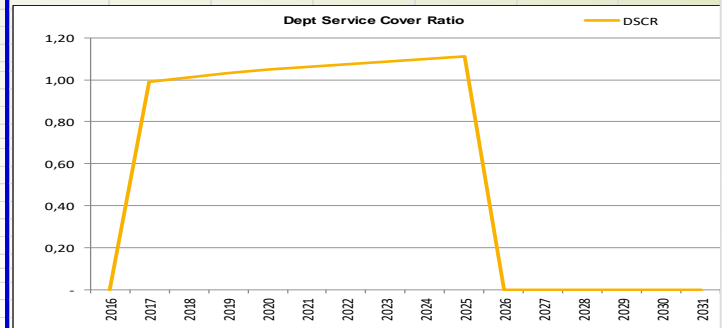
Array 1: Shkel 1			
Output:	2520,00 kW	Ground Reflection:	20,0 %
Gross/Active Solar Surface Area:	16399,0 m / 16387,1 m	Output Losses due to...	
PV Module	10080 x	deviation from AM 1.5:	1,0 %
Manufacturer:	ReneSola Ltd.	deviation from Manufacturer's Specification:	2,0 %
Model:	JC250M-24/Bbv (2012 Virtus)	in Diodes:	0,5 %
Nominal Output:	250 W	due to Soiling:	0,0 %
Power Rating Deviation:	0 %	Inverter	84 x
Efficiency (STC):	15,4 %	Manufacturer:	Power-One
No. of Modules in Series:	20 20	Model:	TRIO-27,6-TL-OUTD
MPP Voltage (STC):	604 604 V	Output:	27,60 kW
Orientation:	0,0 °	European Efficiency:	98,0 %
Inclination:	25,0 °	No. of MPP Trackers:	2
Mount:	with Ventilation	MPP Tracking:	200 V To 950 V
Shade:	No		

Connection schema

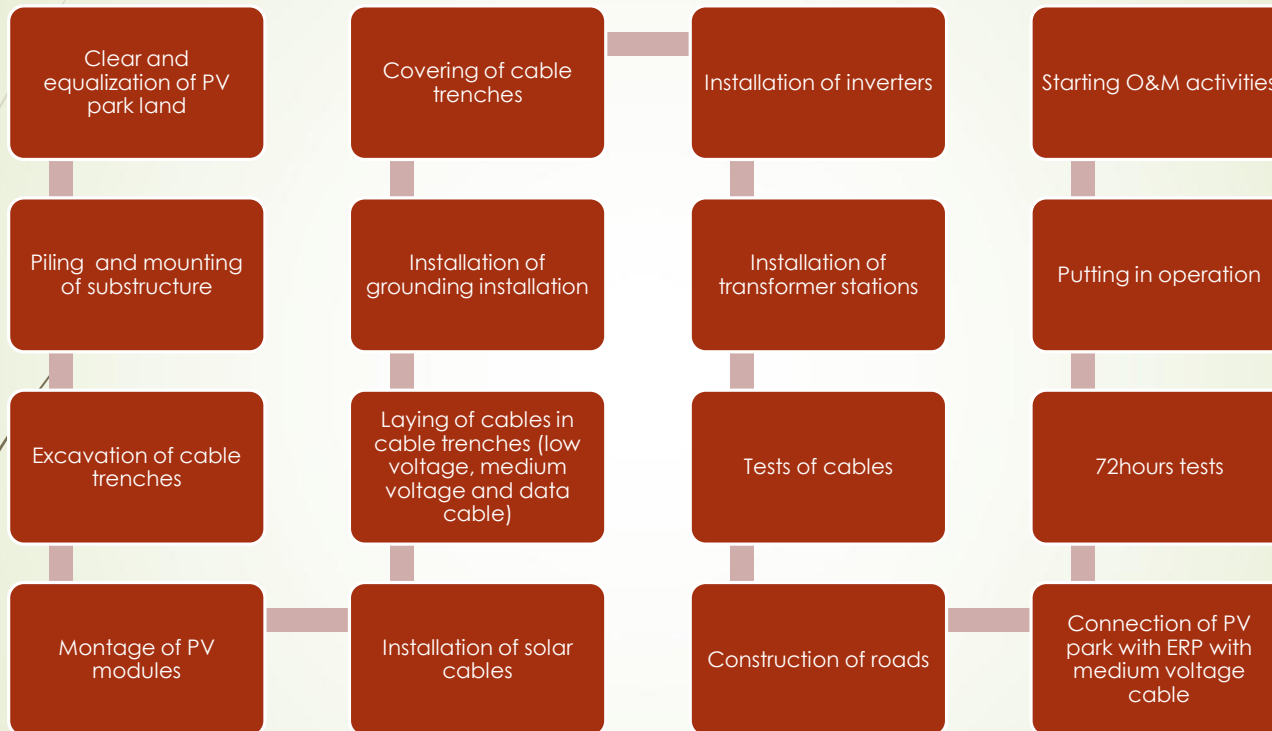


Financial and Investment Data

Basic Project Data				
2,520 MW PV Albania				
Project	2,520 MW PV Albania			
Typ	Ground Mounted			
Country	Albania			
Results				
IRR flow to equity (CFATE) - DEPT financed				9,38%
IRR CFATE - EQUITY financed				8,39%
DSCR min.				0,99
DSCR average				1,05
Repayment Duration (Years)				
Financial Data				
Currency				EUR
Corporate Tax Rate (in %)				16,0%
Leverage				70%
Project Life (Years) - max. 35 years				15
Depreciation (Years) - max. 35 years				15
Depreciation Portion	in total	per MW		
	3 276 000	1 300 000	100%	
Cost of debt before tax				8,5%
				7,1%
Repayment Period (Years)				9
Grace Period (Years)				0
Repayment Method				Annuity
DSCR Target				
Project Data				
Rated Output	kW	2 520,00		
Area	m ²	0		
Irradiation	kWh/m ² /y	0		
Productivity		Degradation		
		0,995		
Production per kWp per year	kWh/kWp	1 370		
Production per year	kWh	3 452 400		
Green Certificates	c/kWh	1,000		
Price for the Sale of Electricity	c/kWh	12,00		
Revenue per year	Euro	414 288		
Operating Expenses (yearly)				
O & M, Security, Insurance	Euro	in total	per MW	Escalation
		42 840	17 000	1,03
- Insurance	Euro	12 600	5 000	8,000pa
- O & M, Security	Euro	30 240	12 000	1,500pm
Others	Euro	in total	per MW	Escalation
		0	-	1,00
Investment - Onetime				
Project Rights incl. Real estate purchase	Euro	in total	per MW	
Rent	Euro	378 000	150 000	
		0	-	
Equipment Costs	Euro	in total	per kW	(inkl. Erection)
		2 898 000	1 150	
Infrastructure Cost		in total	per MW	
Connection Cost	Euro	0	0	
Others	Euro	0	0	
Investment Sum	Euro	in total	per MW	
		3 276 000	1 300 000	



Construction process



3D of Malsia project



Infrastructure of the project



Model of Project



Thank you for your attention !

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