WIRA GRUP SA

Adresa: 136 Mihai Bravu, Sect. 2, București - ROMANIA, CP 021337

TEL : **+40-21-252.56.64 ; FAX** : **+40-21-252.31.84 CUI RO2095 ORC J40/1625/1991**

E-MAIL : wira@wira.ro

PV PROJECT OVERVIEW - 9.77 MWp - MERENI, ROMANIA

2016

Strictly Private & Confidential

WIRA GRUP SA

Adresa: 136 Mihai Bravu, Sect. 2, București - ROMANIA, CP 021337

TEL : +**40-21-252.56.64 ; FAX** : **+40-21-252.31.84 CUI RO2095 ORC J40/1625/1991**

E-MAIL : wira@wira.ro

PROJECT SUMMARY

The Romanian Project is located in the south part of Romania, which is one of the parts of the country with very good sun conditions. The project comprises the development of a 9.77 MWp PV Park and it is ready for construction. The PV Park project developed by WIRA Grup consists of 38.940 PV modules, each with a peak power of 250 Wp. All the project rights are held by the project company. The PV Park was planned for construction approx 70 km south of Bucharest, in the vicinity of town Videle. The map below presents Romania's PV map.

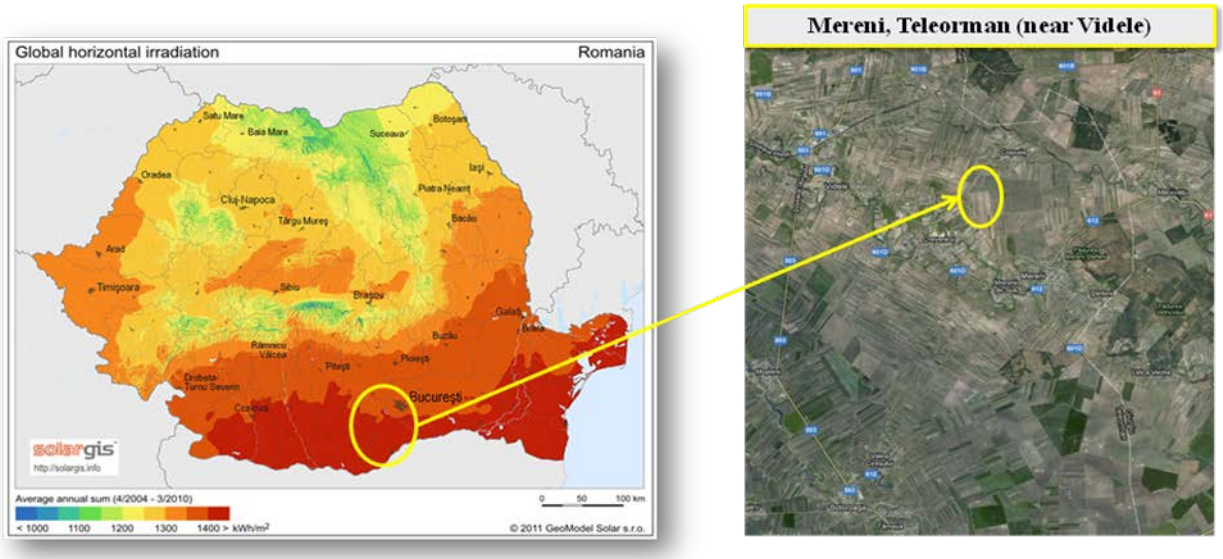

Fig.1 – Global horizontal irradiation and Site Location

PV POTENTIAL

Analysis performed by Wira Grup S.A. with the PVGIS database indicates an annual average park energy yield potential of 12000 MWh. It confirms that the site has PV potential with a good production capacity factor.

SELECTED EQUIPMENT

The main characteristics of the technical solution adopted is described in brief below:

- Photovoltaic module with 250 Wp nominal power with increased efficiency. Frames used to mount modules are rigid to avoid breaking them by tension. 38.940 panels will be used;
- Inverters of 875 kW power each, located behind the rows, with a total of 11 inverters. By using small inverters is very easy to instal and replace in case of failures. Also, in case of failure of one inverter, only a fraction of energy produced is lost beside large amounts of energy as in the case of larger inverters. Inverters used have a higher yield of 93% at 10% of nominal power;
- The structure that suports the PV panels is mounted on a concrete base that provides support for greater stability;
- Protection system against atmospheric discharges;

- Remote monitoring. The main parameters (radiation, energy production, history) can be seen, with restricted access, on the official website of the plant;
- Ensuring the connection to the national energy system SEN. Bringing electricity to the medium voltage network parameters will be made through five power transformers 0.4/20 kV with a nominal power of 2000 kVA each.
- The house of the photovoltaic power plant is completely built and equipped;
- Complete security system. Plant security will be provided by security personnel shifts, the protective fence surrounding the whole objective, video surveillance tape recording, access control in plant building;

PARK LAYOUT

According to the current layout plan, a number of approx. 38.940 PV modules will be mounted at proper distances and angle in order to avoid shading effects, Fig. 2.

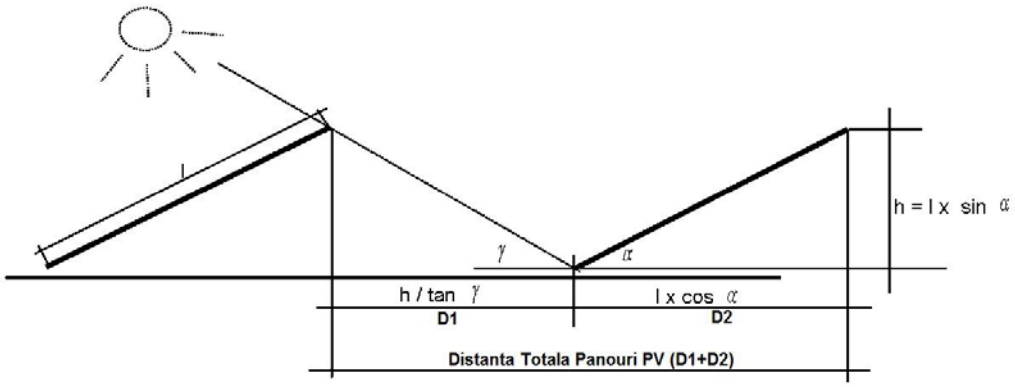

Fig. 2 – PV Panels Positioning

Lungime suport panouri PV - [l]	**4 m**	**h = l x sin α**	**2 m**
α	**30º**	**Distanta dintre randuri** **D1 = h / tan l**	**4,5 m**
γ	**24º**	**D2 = l x cos α**	**3,5 m**
Distanta Panouri PV **l x cos α + l x sin α / tan l**		**8 m**	

Tab. 1 – PV Panels ditances

The following map shows the current park layout.

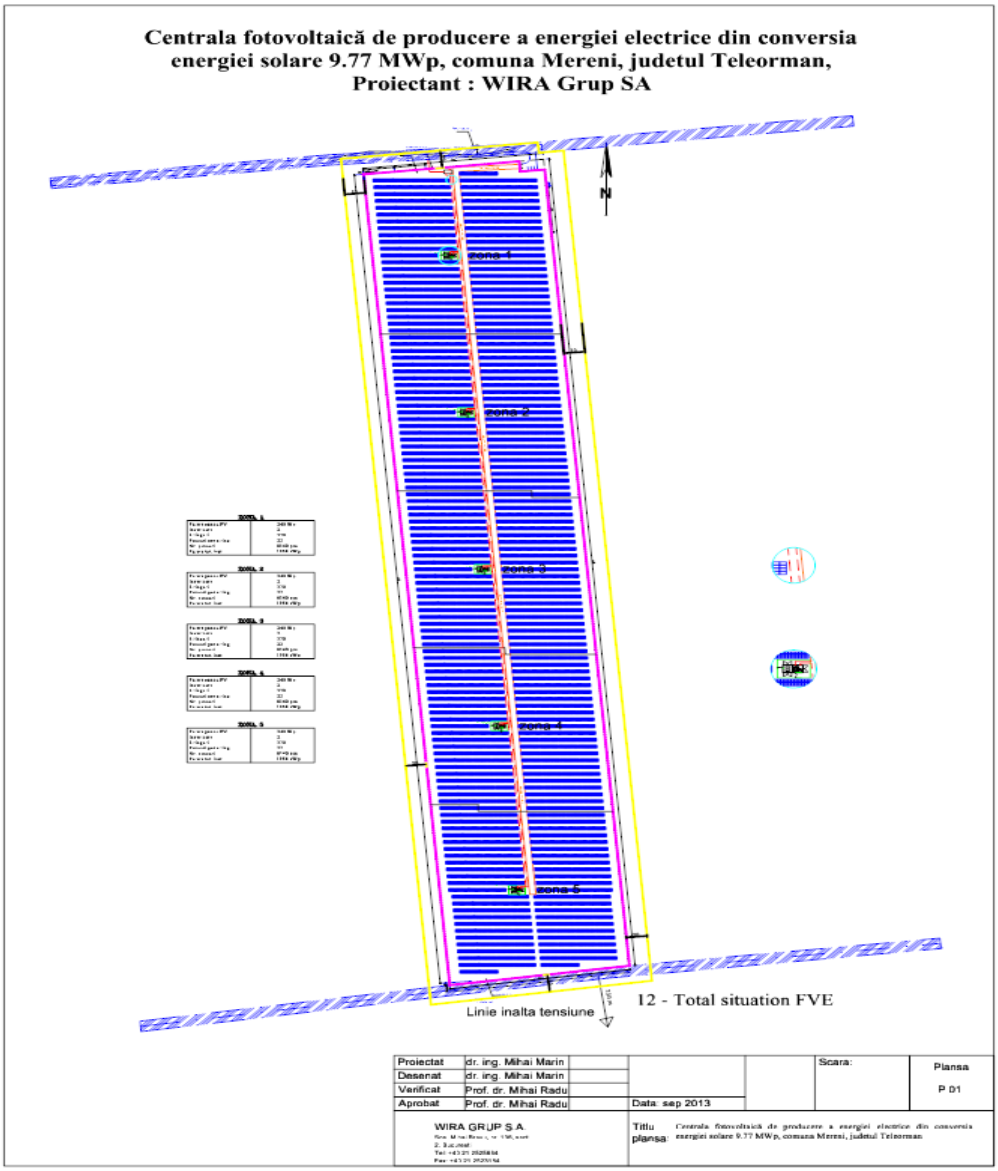

Fig. 3 – Layout PV Plant Mereni 9.77 MWp

LICENSES, PERMITS AND AUTHORIZATIONS

Development progressed as scheduled and Romanian Company secured all permits and licenses. The land where the PV Park will be installed consists of 16.4 hectares. The land is secured and belongs to project company. The project developer has secured the grid approval and the environmental approval as well. The site is not located close to an airport or in any special restricted area. The following table shows the current status of permits, licenses and authorisations that are legally required for commencing the construction of the PV Park.

The developer has secured the grid connection approval from the local grid operator, **the ATR (technical connection approval) tax was already paid and has a validity of 25 years**. It is proposed that the site should be connected to the hight voltage station Videle, at a distance of around 8000 m from the site through an underground cable with a section of

185 mm^2. One grid impact study has been prepared and approved by local grid operator. The project company has received the final grid approval.

No.	Document no / date	Issued by	Type
1	95 dated 20 November 2014	Teleorman County Council	**Building Permit** for PV Plant
2	96 dated 20 November 2014	Teleorman County Council	**Building Permit** for underground cable 20 kV
4	001500000097 dated 17 October 2012	CEZ Distributie SA	**Technical connection permit** for PV Plant(9.77 MW)
5	3200007845 dated 12 November 2012	CEZ Distributie SA	**Connection Contract** for PV Plant(9.77 MW)
6	943 dated 06 November 2013	ANRE - Regulatory Authority for Energy	**Authorization Establishment**for PV Plant (9.77 MW)
7	2652 dated 5 November 2010	NPO Etica	**Sale-purchase agreement for the plot of land** registered with Mereni Land Book no. 20109, having cadastral no. 20109, with a total surface 163,759 sqm

Tab. 2 – PV Plant Mereni 9.77 MWp Permitting Status

THE BUSINESS PLAN

The business has been prepared in nominal Euro terms and considers an average flat Eurozone inflation rate of 2% over the entire planning period. It is further assumed that the current corporate tax rate of 16% will remain over the entire planning period. Electricity and green certificate price remain stable for the whole reference period of project life.

Under the Romanian renewable legislation, PV projects are eligible for 3 green certificates for each MWh of electricity fed into the grid. The total allocation period is 15 years. The regulators limit the downside risk of producers with a price floor set to 38 EUR/MWh. Upside potentials are also capped at 55 EUR/MWh.

OPERATING ASSUMPTIONS

The project is expected to generate a net annual power output over 12000 MWh.

The table below provides a summary of the operating expenditures at 2015 price levels. Prices are inflated by the Euro inflation rate.

OPEX summary	
	Mereni
Operations and Maintenance (O&M)	€ 60,574
Insurance	€ 23,741
Employment	€ 42,988
Accounting	€ 10,000
Total OPEX	€ 137,303

Tab. 3 – Operating expenses at 2015 prices

Financial summary realistic scenario P50	
Project name	Mereni
P.P.A.tariff per kWh	0.042
P.P.A. Years	25
P.P.A. Index	2.00%
Tradable Green Certificates (TGC)	3
Value per TGC per MWh	38
Total incentives per kWh	0.114
Certificates Years	15
Certificates Index	0.00%
Total Construction (EPC)	€ 10,780,050
Total Investment (CAPEX)	€ 14,681,903
Total loan request	€ 14,681,903
EBITDA 25 years	€ 30,453,976
EAT 25 years	€ 9,034,071
IRR before taxes 25 years	7.8%
IRR after taxes 25 years	9.2%
DSCR 25 years	1.4
NPV 25 years	€ 18,318,642

Tab. 4 – Financial summary realistic scenario P50

President

Prof. Dr. Radu Mihai

President – Wira Grup S.A.

E-mail : wira@wira.ro

Technical Director

Dr. Eng. Marin Mihai

Technical Director – Wira Grup S.A.

E-mail : tehnic@wira.ro