

# MARKET INTEGRATION OF RENEWABLES

Informal Ministerial  
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# ALFA $\alpha$ FINANCE HOLDING

**Alfa Finance Holding (AFH) is an investment company focused in renewables, financial services and e-mobility**



**Solarpro Holding is an integrated solar group**



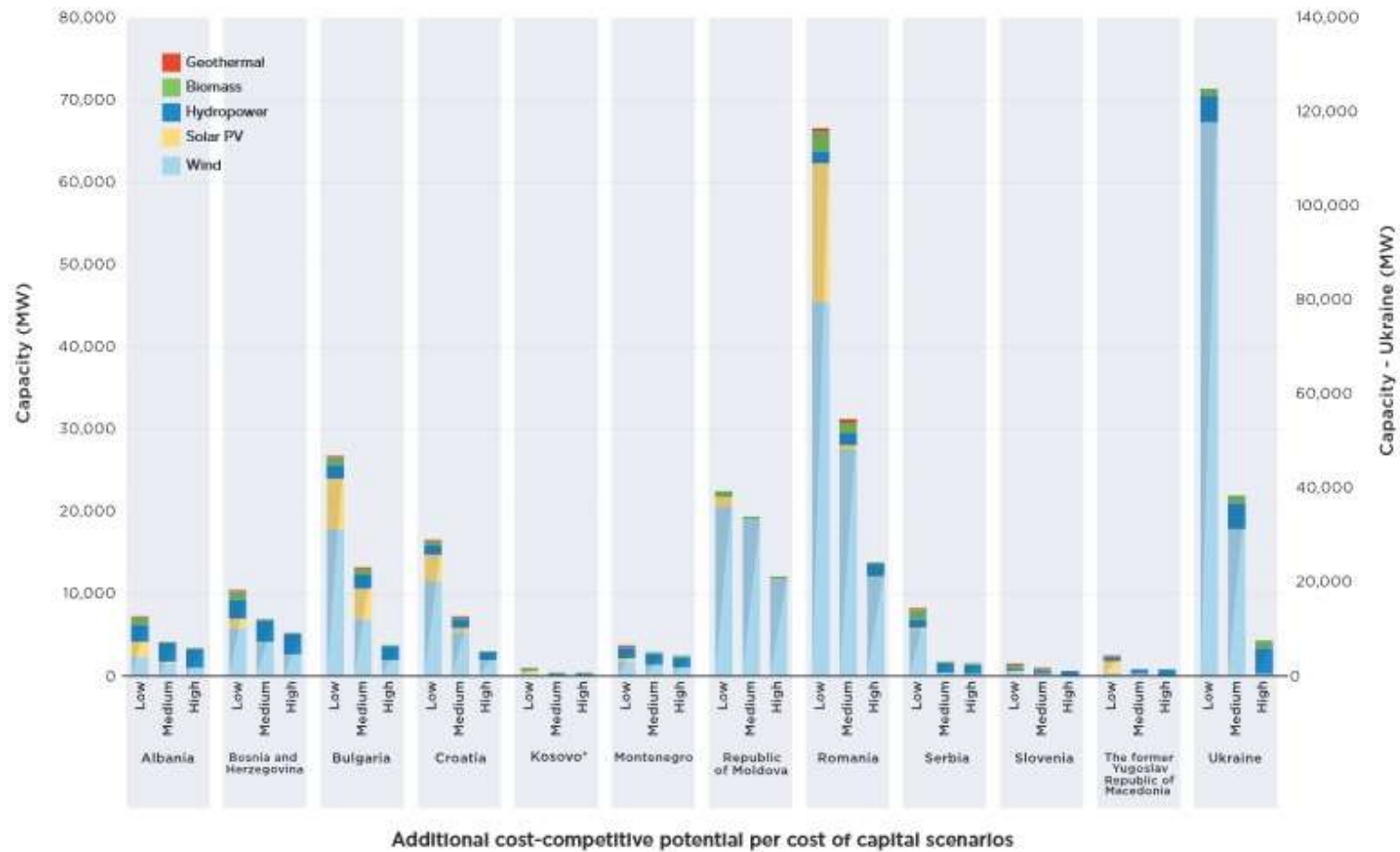
**SPARK is the first and only electric car sharing service in SEE**



**Eldrive is developing an EV charging infrastructure network in the Balkans**

# Cost-competitive potential in SEE

**Figure 3.5 Additional cost-competitive potential in 2016: Overview of SEE**  
 (Due to its magnitude, the potential for Ukraine is shown in the secondary axis).



\*IRENA: COST-COMPETITIVE RENEWABLE POWER GENERATION: Potential across South East Europe 2017



# Solar case

**Capacity:**

**15 MWp**

**Location:**

In the same area of an existing large scale PV park to secure prove of the yield data.

**Similar cases across EU**

**Cost of land:**

**0.07 Euro/Wp**

**Contingency:**

**0.01 Euro/Wp**

**EPC Cost:**

**0.60 Euro/Wp**

**Electricity sale price:**

**44 EUR/MWh, IBEX\* solar peak price**

**O&M Cost:**

**5 Euro/kWp/p.a**

**Certificates of origin:**

**1.0 EUR/MWh**

\*IBEX=Independent Bulgarian Energy Exchange

# Renewables market integration

## 15 MWp Project - Bulgaria

Major Assumptions		
Installed Capacity	kWp	15 000
Specific Yield	kWh/kWp/p.a.	1 500
Annual Output	MWh/p.a.	22 500
Annual Degradation	% p.a.	0,7%
Electricity Purchase Price - IBEX peek price	EUR/ MWh	44
Project Life	years	30
Project Residual Value	Not assumed	

Project Cost			EUR
EPC and Grid Connection	EUR/Wp	0,60	9 000 000
Land	EUR/Wp	0,07	1 050 000
Contingency	EUR/Wp	0,02	300 000
Development Cost	EUR/Wp	0,02	-
Total Cost	EUR		10 350 000
Average, land included	EUR/Wp	0,69	
Average, land excluded	EUR/Wp	0,62	

Operating Expenses		
O&M Expenses	EUR/kWp/p.a.	5,00
Balancing Cost Rate	%	2%
Electricity Generation Fee (EGF)	%	0%
Insurance	EUR/kWp/p.a.	2,00
Grid Access Fee (GAF)	EUR/kWp/p.a.	1,28
Other	EUR/kWp/p.a.	1,00
Cost Indexation	%	2%
Depreciation	years	20

Revenue Certificates of origin		EUR
Gurantees of origin	EUR/ MWh	1,0

Project Finance			EUR
Equity	%	30%	3 105 000
Loan Financing	%	70%	7 245 000
Interest Rate (all in)	%	2,50%	
<b>IRR to Project</b>	%	<b>6,5%</b>	
<b>IRR to Equity</b>	%	<b>10,4%</b>	

## Barriers

- Export tax: **4.72 euro/MWh**
- Grid access fee surcharge for renewables: **2.14 euro/MWh** (3.42 renewables access fee - 1.28 access fee for all other technologies)
- 5% revenue levy for all energy producers: **2.20 euro/MWh** (5% of 2017 Day Ahead Market price)
- Total renewables barriers: **9.06 euro/MWh**

**20.59% from 2017 Average Day Ahead market price for Solar. IRR goes down to 3%. Project destroys value.**

**IRR < WACC**



# Weighted average cost of capital (WACC) - Photovoltaic



## Renewables market integration - Financing

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- Project finance is difficult to obtain, pricing and leverage are still an issue
- Construction phase considered risky by the banks, lack of instruments for construction financing
- Regulatory and political risk
- Long term renewables products and instruments on electricity exchanges
- Private PPA's
- Guarantees of Origin (GO's) market



# Solar product

Solar power produced per hour during the day in different months of the year

Hour/Month	January	February	March	April	May	June	July	August	September	October	November	December
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	7	5	9	10	8	6	3	0	0	0
9	3	12	21	18	23	25	23	20	15	8	12	6
10	13	26	35	36	39	41	41	38	32	22	25	20
11	22	38	46	50	51	53	55	53	46	35	34	34
12	27	46	51	60	58	62	65	63	56	44	40	41
13	30	47	51	64	60	65	69	68	60	49	40	43
14	29	45	47	62	58	63	68	67	59	48	36	39
15	23	39	42	60	55	59	65	63	55	44	28	28
16	14	28	32	54	49	52	57	55	46	36	15	12
17	4	13	20	42	39	43	47	44	35	23	0	0
18	0	2	7	28	28	31	34	30	20	9	0	0
19	0	0	0	12	14	17	18	14	6	0	0	0
20	0	0	0	0	4	6	6	3	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>165</b>	<b>296</b>	<b>359</b>	<b>491</b>	<b>487</b>	<b>527</b>	<b>556</b>	<b>524</b>	<b>433</b>	<b>318</b>	<b>230</b>	<b>223</b>

# **MARKET INTEGRATION OF RENEWABLES**

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