



## Renewables Energy Sources - A Business View

**Dr Anastasios Garis Chief Executive Officer** 

South East Europe 2<sup>nd</sup> Energy Conference Thessaloniki, 21 May 2008 ☐ Global Market Overview

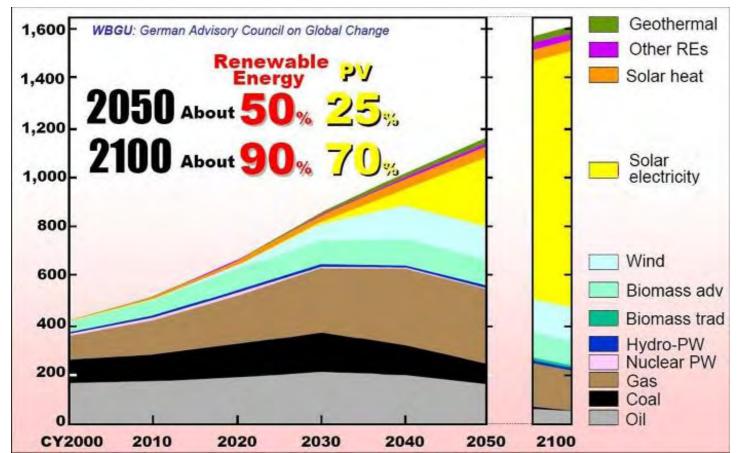
☐ Greek RES Market

**□** PPC Renewables



## International organizations predict drastic growth of RES in order to combat climate change

#### Global Energy Production<sup>1</sup> [EJ<sup>2</sup>]



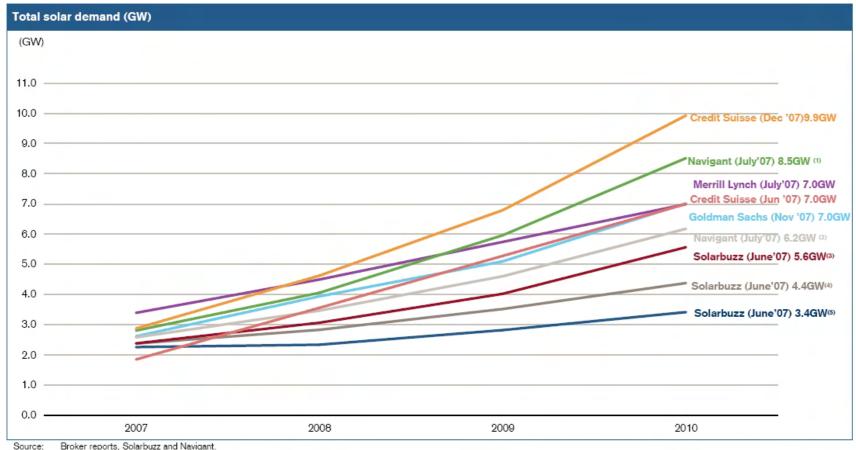


#### **KEY GROWTH DRIVERS**

- Global decisions to promote a cleaner environment
- Environmental conscience and acknowledgment of need to tackle climate change
- Oil independence policies
- Reduction in initial investment cost
- More productive technology



## Demand for solar is accelerating although forecasts differ



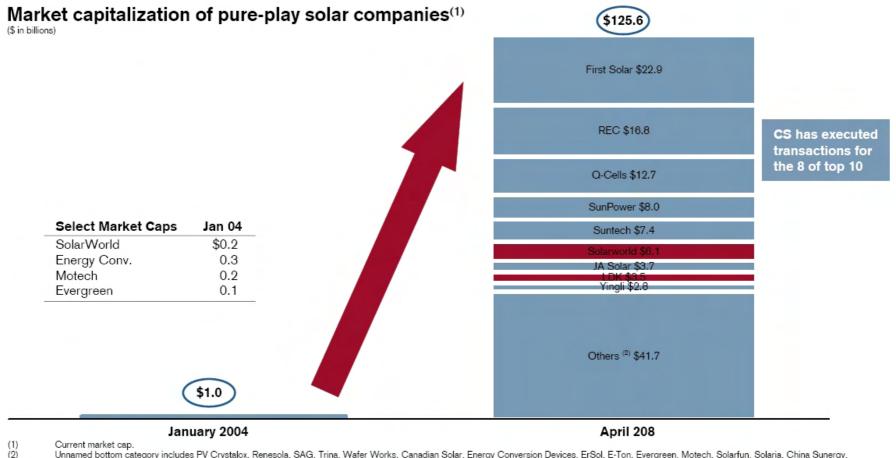
(1) Accelerated scenario.

- (2) (3) Conservative scenario. Balanced Energy scenario.
- Green World scenario.
- Production led scenario.

Wide range of demand forecasts from industry analysts



## This has resulted in a dramatic market capitalization of the solar sector



Unnamed bottom category includes PV Crystalox, Renesola, SAG, Trina, Wafer Works, Canadian Solar, Energy Conversion Devices, ErSol, E-Ton, Evergreen, Motech, Solarfun, Solaria, China Sunergy, Conergy, Solon, Solar-Fabrik, Sunways, DC Chemical, MEMC Electronic and Centrosolar.

Significant increase in the market value and the number of pure-play publicly listed solar companies



# The RES sector is evolving with utilities entering the sector aggressively...

	Asset holders				Portfolio companies					
Operating capacity (MW)	IBERDROLA RENEWABLES 7,704	SE BABCOCKSBROWN WIND PARTNERS	energies energies 1,218	Leurus Energy	<b>edp</b> 3,918	Gacciona 3,824	Informational Power 1,199	<b>e.on</b> va 1,036	ATTENFALL 🍣	<b>RWE</b> 489
Pipeline (MW)	41,145	610	12,838	NA	12,700	>15,000	6	6,950	2,970	6,794
Pipeline / operating ratio	5.3x	0.3x	10.5x	NA	3.2x	3.8x	NA	6.7x	4.5x	13.9x
Location / No. of countries	Across Europe, NA and SA / 10	US, A Australia, Europe / 5	Across Europe and US / 7	Europe, Asia, US / 7	Across Europe, US / 5	Europe, NA, Australia, Africa / 10	Germany, Italy, France, Netherlands, Spain, Australia / 6	Germany, UK, US, Denmark, Iberia, Sweden / 6	Denmark, Sweden, Germany, UK / 5	Germany, UK, Spain, France, Portugal / 5
Onshore	✓	✓	✓	✓	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>✓</b>	<b>√</b>	<b>✓</b>
Offshore	×	×	×	<b>√</b>	×	<b>✓</b>	×	<b>✓</b>	<b>✓</b>	✓

Source: Company information, broker reports, Credit Suisse estimates, Emerging Energy Research.



## ...leveraging also M&A initiatives

		Т	ransaction	Transaction	MV	N	Transaction		Credit Suisse role
Transaction	Seller	Buyer	date	value (€m)	Oper.(1)	Pipeline	value (€/kW) <sup>(2)</sup>	Comments	
airenergy	airenergy	Eneco	Mar 08	182 <sup>(3)</sup>	81 <sup>(4)</sup>	299	2,248	<ul> <li>Sale of 75% equity stake in the third largest wind developer in Belgium</li> </ul>	-
Airtricity	Airtricity	Scottish and Southern Energy	Jan 08	1,455	494	3,800	2,941	<ul> <li>Sale of UK, ROI, offshore assets and pipeline</li> </ul>	<ul> <li>Adviser to seller</li> </ul>
Airtricity	Airtricity	e·on	Oct 07	970	584	>6,500	1,661	Sale of North American assets Highly competitive auction 370MW is in construction (Future pipeline of >6,500MW)	Adviser to seller
TROVERGY COLUMN	MATRIX	International Power	Aug 07	1,839	648(5)	- 1	2,838	No substantial pipeline attached Interest from both strategic and financial sponsors Benefits from GC regimes	<ul> <li>Adviser to under bidder</li> </ul>
Energi E2 R. I.	DONG	e.on	Aug 07	722	260	560	2,777	<ul> <li>Enables E.ON to greatly expand its wind power business</li> <li>560MW valued at 600 €/kW</li> </ul>	-
Zephyr	ENGCOTELOGRAPHIA.	O <sub>JPMorgan</sub> <b>M&amp;G</b>	Aug 07	345	130	-	2,647	Large operational UK portfolio     33% stake in Zephyr sold     Strong offtake agreements	<ul> <li>Adviser to under bidder</li> </ul>
Horizon Medicer	Goldman Sachs	edp	Mar 07	2,205	1,556(6)	2,100	1,417	Significant interest from US and Europe     Significant near term equity     requirements     Future pipeline of 9,000MW	<ul> <li>Adviser to under bidder</li> </ul>
Levanto	CHRISTOFFERSON ROBE & COMPANY		Nov 06	567	412 <sup>(7)</sup>	24	1,311	Assets located in Germany and France, with favourable regulatory frameworks     Complex securisation structure	Adviser to seller

Source: Public information, Credit Suisse estimates. Foreign exchange rate assumption of 0.704 EUR / GBP and 1.459 USD / EUR.

Reflects both operational and construction MW.

Capacity multiple excluding pipeline.

Represents 100% equity stake and net debt of €30m.

Includes 55MW operational, 26MW in construction by March 2008.

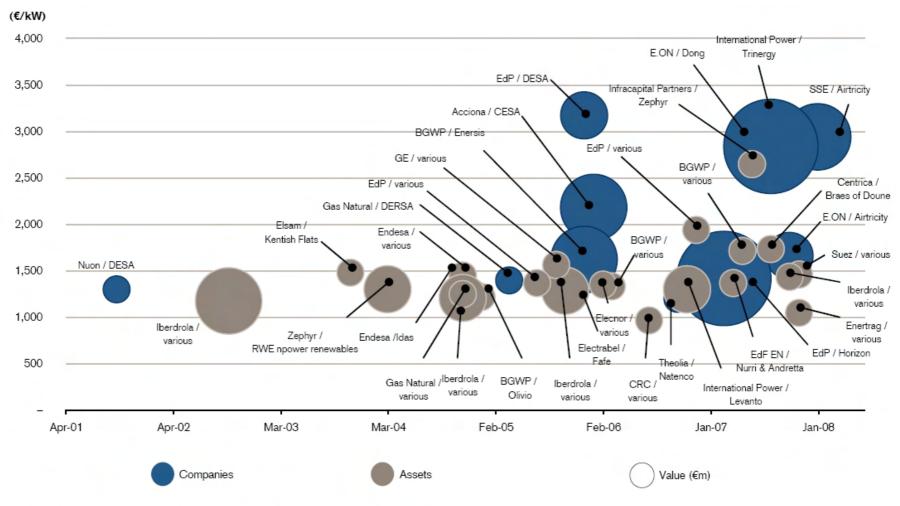
(5) Includes 580MW operational and 68MW in construction due by end of 2007 / early 2008.

(6) Includes 559MW operational and 997MW in construction due by end of 2007

(7) Includes 286MW operational, 126MW in construction due by end of 2007.



## **M&A Map for Wind**



Source: Company information and equity research.

Notes Multiples based on €/kW, in which kW attributable to each transaction is operational and under construction



## **IPO Analysis – Recent Transactions**

Company	IPO date	Listing	Mkt cap. at IPO (€M)	Mkt. cap. today (€M)	% Free float	Share performance <sup>(1)</sup>	Comments
FALCK RENEWABLES	Jan 08	London	NA	NA	c. 40%	NA	■ Failed
IBERDROLA Renovables	Dec 07	Madrid	22,388	19,600	c. 20%	(9.9%) <sup>(3)</sup>	<ul><li>Largest Spanish IPO ever</li><li>Listed in December 2007</li></ul>
FRI-ELGREENPOWER	Nov 07	Milan	c. 900–1,300	NA	с. 25%	NA	■ Failed
TEPNA ENEPTEIAKH	14 Nov 07	Athens	1,144	765	c. 20%	(33.1%)	<ul> <li>Second largest Greek wind player by installed capacity</li> </ul>
energies energies	29 Nov 06	Euronext	1,681	2,668	21.44%	30.4%	■ Majority still controlled by EDF
THEOLIA	31 Jul 06	Euronext	242.7(2)	893	60.5%	77.7%	Recent convertible debt issued to fund growth (€240m)

Company Data, Bloomberg and FactSet.

Based on the share price change from first trading date until 24 April 2008.

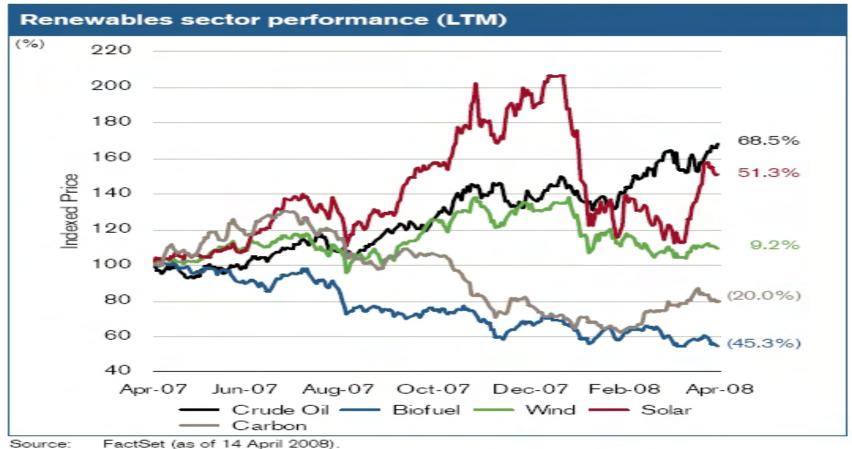
Listed on the Eurenext bourse in Paris, after four years on the Marche Libre.

(2) In the same period the IBEX 35 index registered a performance of (-11.8%).

#### Institutional investors increasingly selective



#### Financial performance differs across RES sectors



Biofuel: Abengoa, ADM, Aventine, BDI Biodiesel, Biofuel Energy, Biopetrol, Brazil Ecodiesel, B&B Environmental, Cosan, Cropenergies, D1 Oils, EOP Biodiesel, Nova Biosource Fuels,

Oelmuehle Hamburg, Pacific Ethanol, Petrotec, Sterling Biofuels, US BioEnergy, VeraSun

Energy, Verbio.

Wind: Acciona, B&B GWP, Clipper, EDF EN, EnerTad, Fersa, Gamesa, Greentech Energy,

Nordex, Novera, Plambeck, Repower, Rokas, Theolia, Vestas, Viridis, Suzlon.

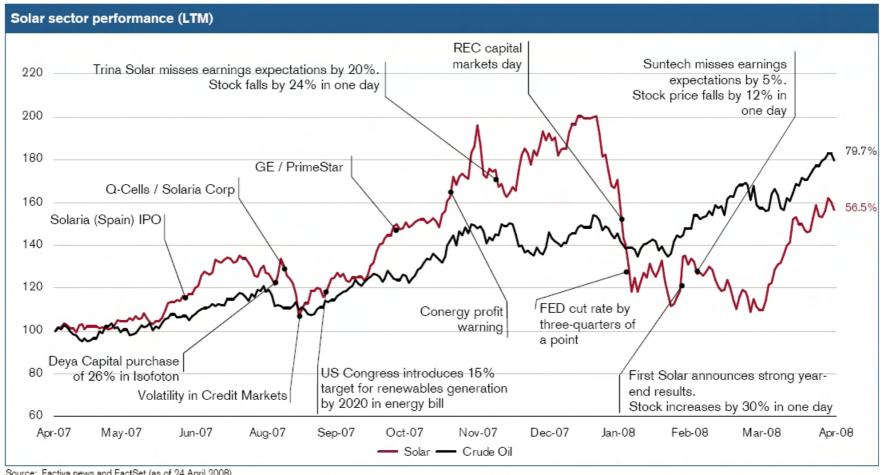
Centrosolar, Centrotherm, Conergy, Energy Conversion, Ersol Solar Energy, Evergreen Solar: Solar, First Solar, Manz Automation, Motech, Phoenix Sonnenstrom, PV Crystalox Solar, Q-Cells, Reinecke & Pohl Sun Energy, REC, Roth & Rau, Solar-Fabrik, Solar Millennium,

Solarfun, Solaria Energia, Solarworld, Solon, Sunpower, Suntech, Sunways, Trina Solar.





## Solar sector stock performance is strong, despite the recent correction



Source: Factiva news and FactSet (as of 24 April 2008).

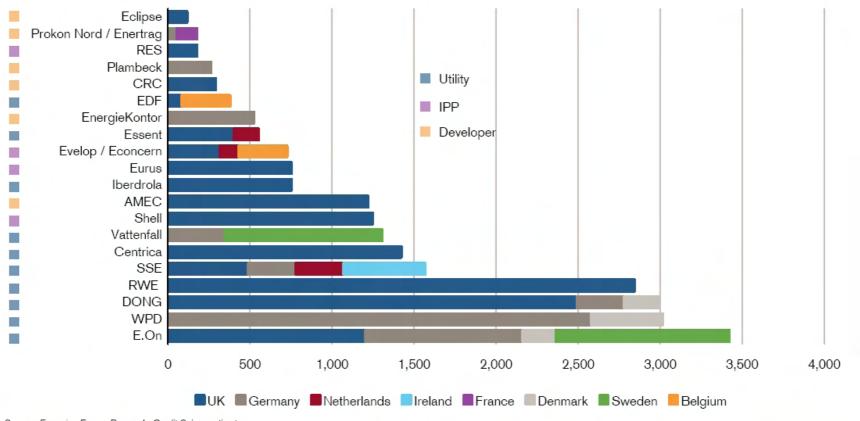
Colexon, Centrosolar, Centrotherm, Conergy, Energy Conversion, Ersol Solarenergy, Evergreen Solar, First Solar, Manz, Motech, Phoenix Sonnenstrom, PV Crystalox, Q-Cells, REC, Roth & Rau, Solar-Fabrik, Solarfun, Solaria, Solar Millennium, SolarWorld, Solon, Sunpower, Suntech, Sunways, Trina Solar.

Strong performance of the solar sector in 2007 but weak start in 2008 with recent recovery



## Currently, offshore plays a minor role in wind energy production However revamped interests indicates that substantial growth will take place

#### Offshore pipelines by player



Source: Emerging Energy Research, Credit Suisse estimates.

Note: Does not include lberdrola's recently announced plans of 6 offshore wind farms totalling approximately 3GW due to its very early stage of development.

#### Substantial offshore wind planned



Confidential

## **Key Uncertainties**

- Continuous growth for the solar industry or boom-bust cycles?
- Tightness or abundance of supply from wind turbine manufacturers?
- The government dilemma: What incentives, how much and when?
- How can Network absorption impede or facilitate RES expansion?



	Glo	bal	Mar	ket (	O	verv	/iew
--	-----	-----	-----	-------	---	------	------

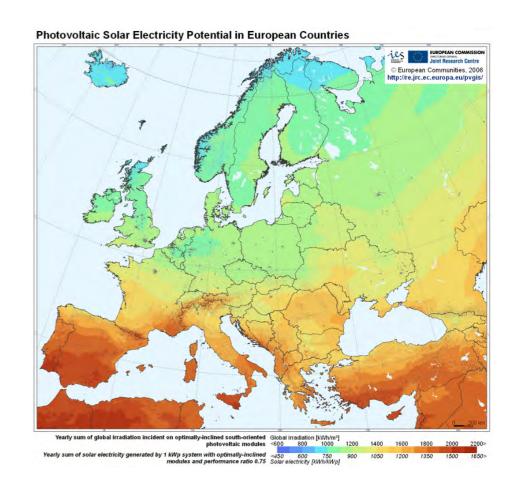
- ☐ Greek RES Market
- **□ PPC Renewables**



# Greece has significant natural wealth for Renewable Energy Sources

- Some of the highest solar irradiation rates in Europe
- Wind potential for some 14.000 MW
- Geothermal fields with production potential of ~350 MW (equivalent to 1.500 MW of wind power)

 Many springs and rivers for hydroelectric power

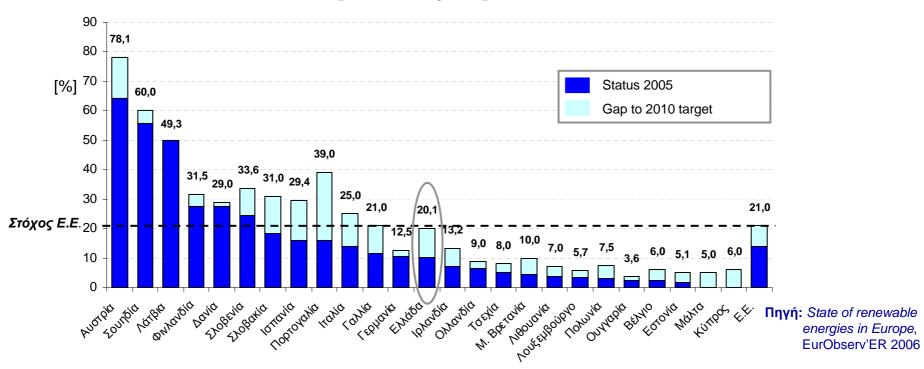




## The EU has set environmental improvement targets based on RES use which as a rule are not being met yet

2001: All EU member states adopt national targets for the proportion of electricity consumption that should come from RES (Directive 2001/77/EU)

## Electricity produced from RES in Europe, by country [% consumption]



2007: EU member states decide to increase total energy produced from RES to 20% by 2020

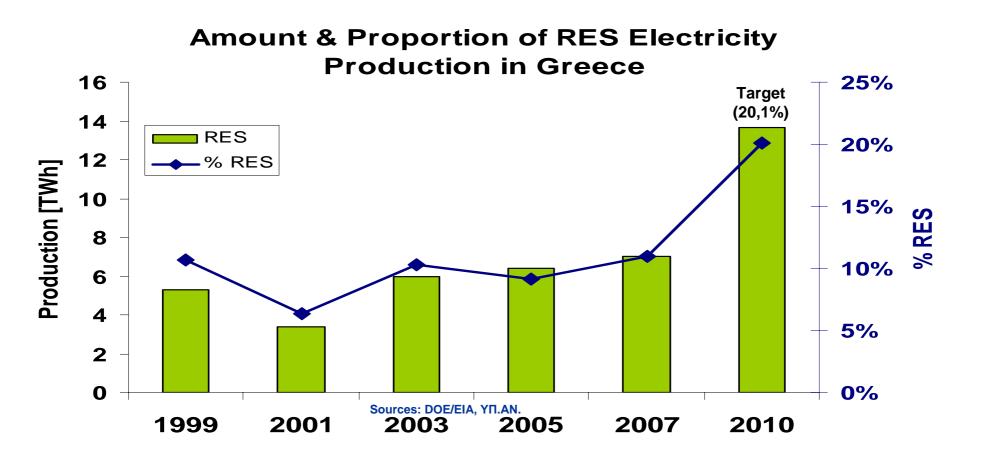


# National Targets for Energy Generation from RES have been extended from the latest "20-20-20" binding resolution

- For 2020, the European Commission proposed the binding targets known as «20-20-20»
  - 20% of the European energy production portfolio to be RES
  - 20% reduction in Greenhouse Gas emissions, compared to 1990
  - 20% energy savings
  - 10% of fuel used in transport to be biofuel
- Greece's target for total <u>energy</u> consumed to come from RES has been set at 18%; hence RES have to account for 30-35% of electricity generation (this means some **10,000 MW of RES production by 2020)**



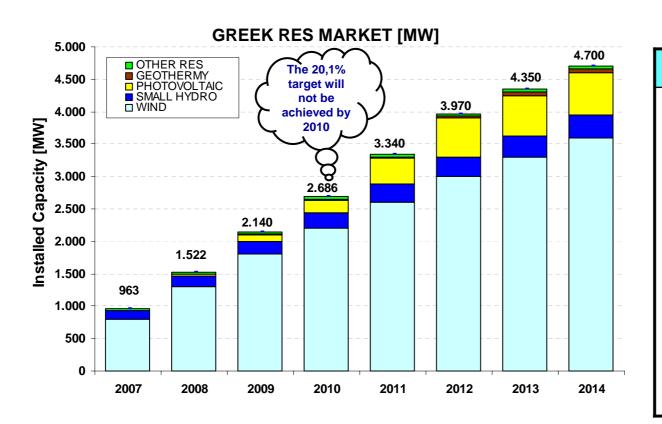
## Implementation of RES projects must be accelerated in order to achieve the 20,1 % target following the 77/2001/EC directive





Wind will be the main driver for Greece to meet her RES targets

### We hope that the 20,1% target will be achieved by 2012



#### **Drivers**

- Financially attractive environment for investments
- Annulment of production permits that show no progress after 2 years
- Passage of a Land Use Plan for RES

	2007	2008	2009	2010	2011	2012	2013	2014
TOTAL DEMAND [TWh]	60,8	62,8	64,8	67,0	68,7	70,5	72,3	74,2
RES PRODUCTION* [TWh]	7,2	8,6	10,2	11,6	13,1	14,5	15,7	16,6
% RES PRODUCTION	12%	14%	16%	(17%)	19%	21%	22%	22%

\* Includes 4,5 TWh from large HPP

Sources: Dept. of Energy/EIA, MinDev, RAE, PPCR estimates



#### **Attractive Feed-in Tariffs**

Μορφή Παραγωγής	Feed-in Ta	ariff* (€MWh)
Ηλεκτρικής Ενέργειας	Mainland Grid & Connected Islands	Non-Connected Islands
Onshore Wind	75,82	87,42
Offshore Wind	9	2.82
Small Hydro <15 MWe	75,82	87,42
Photovoltaic <100 kWp	452,82	502,82
Photovoltaic >100 kWp	402,82	452,820
Other Solar Technologies <5MW	252,82	272,42
Other Solar Technologies >5MW	232,82	252,42
Geothermy	75,82	87,42
Other RES	75,82	87,42

<sup>\*</sup> According to RES Law 3468/06, increased by €2,82 in July 2007

These prices may be altered by the Ministry of Development following a proposal from RAE



## The interest for RES projects in Greece is significant

Technology	With Operation Licenses <sup>(1)</sup> [MW]	With Installation Permits [MW]	With Production Permits <sup>(2)</sup> [MW]	Applications for Production Permits <sup>(3)</sup> [MW]
Wind	773,8	916,4	6.492,4	35.495,5
Biomass	32,1	23,5	94,8	451,6
Geothermic	0,0	0,0	8,0	335,5
Small Hydroelectric	101,9	103,9	514,3	1.864,5
Solar P/V	0,8	2,2	80,4	3.061,9
Total Capacity [MW]	908,6	1.046,0	7.189,9	41.209,0

- 1) The above mentioned Operation Licenses include RES projects from the Combined Production Permits of PPC
- 2) These include the projects with Operation Licenses, Installation Permits and do not include Revoked Licenses
- 3) These include the projects with Production Permits as well as Revoked Licenses



Source: RAE

# The Greek RES market is fragmented but there is a concentration amongst the largest five players

#### **Percentage of Project in Operation and with Production Permits**



	Top 5	Next 50
Wind	40%	40%
SHP	38%	62%
PV	100%	0%
Other	100%	0%
Total	46%	39%

Top 5 in each Sector, by Operating Assets							
WIND [MW]		SMALL HYDRO [MW]					
ROKAS	193	PPC RENEWABLES	47				
EDF EN	170	YHΣ KERKINIS S.A.	7				
TERNA	78	TECHNIKI ENERGEIAKI	7				
ENELCO	70	HYDRILEKTRIKI	6				
PPC RENEWABLES	44	DIEKAT	4				



## Some key steps to accelerate RES expansion in Greece

- Review of Installation and Production Permits (and Grid connection terms) for wind parks that haven't yet begun construction
- Different regulatory regime for PV installations <150 kWp
- Broader scope for subsidizing RES projects, without allowing excess profits
- Further improvement of the Permit Issuance process and the Land Use Plan



☐ Global Market Overview

☐ Greek RES Market

**□ PPC Renewables** 



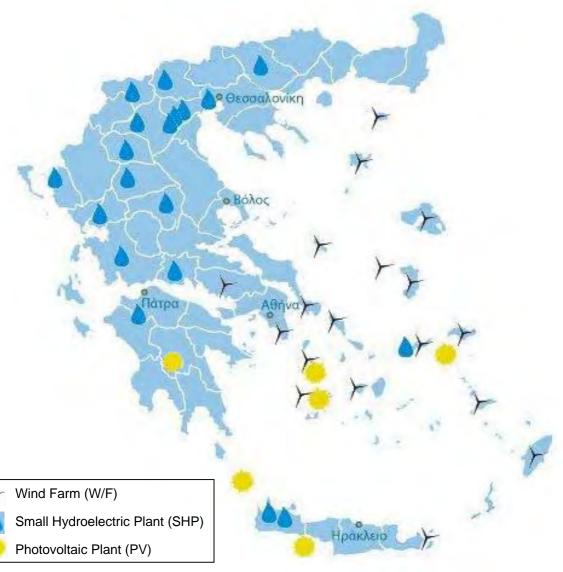
### PPC has a long history of activity in Renewable Energy Sources

#### **MAJOR MILESTONES**

- 1954: Construction of its first Hydroelectric Power Plant (HPP Louros)
- 1973: Beginning of exploratory drilling for **Geothermy**
- 1980: Founding of the Directorate for Alternative Energy Sources (DEME)
- 1982: Construction of the first **Photovoltaic (PV)** plant (Kythnos, 100 kW)
- 1983: Construction of the **first Wind Farm in Europe** (Kythnos, 100 kW)
- 1998: Founding of PPC Renewables S.A.
- 2001: First JV's with ROKAS, TERNA, ELLINIKI TECHNODOMIKI, DIEKAT
- 2007: JV with EDF Energies Nouvelles for the development of wind farms (122 MW)
- 2007: Award of Production Permit for a 50 MW PV plant in Megalopolis, Peloponnesus
- 2007: Alliance with S&B Minerals for the exploitation of the geothermic field of the island of Milos



# PPC Renewables has 91 MW of RES plants in operation and a strong pipeline of projects under development



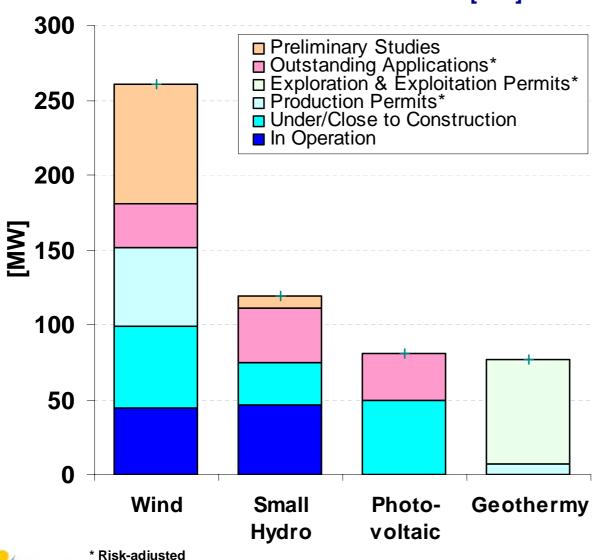
Phase	MW
In Operation	91
Close to / Under Construction	133
Production Permits*	60
Exploration & Exploitation Permits*	63
Outstanding Applications *	97
Preliminary Studies*	93
Total	537

<sup>\*</sup> Risk-adjusted



## PPC Renewables is a pioneer in the Greek RES sector with long-term experience and the most diverse portfolio of assets



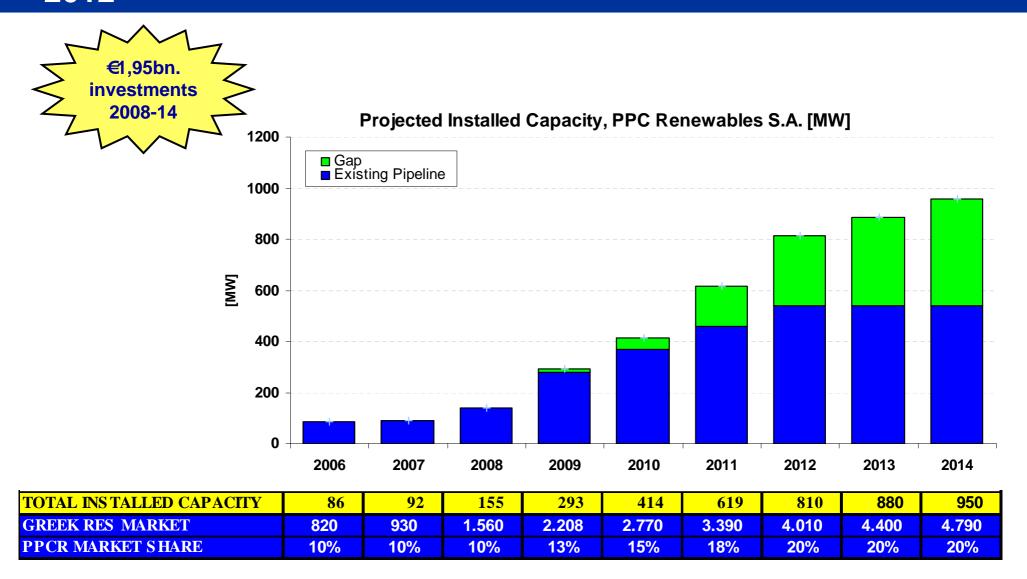


## A significant position in the Greek RES sector

- The only company with activity in Geothermy
  - Holder of the only Production Permit in Greece (Lesvos, 8 MW)
  - >150 MW in Exploration & Exploitation Permits
- Leader in the SHP sector both in market share and know-how
- Holder of a production permit for the first major PV project as well as a strong pipeline
  - 50 MW at Megalopolis
  - 87 MW in outstanding applications
- Pioneer in the wind energy sector and 5<sup>th</sup> largest market share in 2007



# Our strategic target is to gain 20% of the Greek RES market by 2012

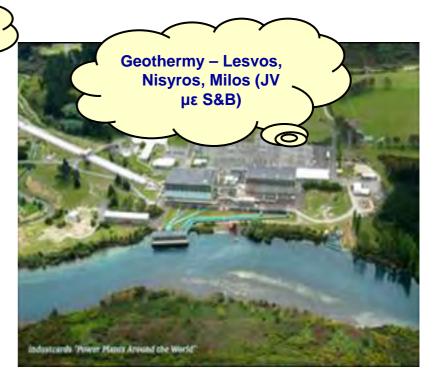




## We have a number of significant projects in our pipeline







29

## Thank you for your attention!

