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## Solar Cells Hellas S.A.



Open to the future of energy

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# Overview

## The company

- The Group is a vertically integrated PV producer in Southeast Europe, operating state of the art production equipment for the production of high quality crystalline wafers, solar cells and PV modules
- The Group was founded in 2006 and currently owns three plants covering a total area of 19,200 m<sup>2</sup>, with total production capacity of 80MW/year
- Scope of services also include the development of PVs, Engineering, Procurement and Construction (EPC) and Operation and Maintenance (O&M)
- The Group employs around 250 people

### Solar parks

- Solar Cells Hellas is building a substantial network of solar parks in Greece whilst increasing its PV portfolio through the acquisition of additional PV licenses
- The Group already owns a series of solar parks (17.3MW) and also constructs parks for third parties (total of 360MW constructed)



## Business Characteristics

### Track record & Industry expertise

- The Group has established a track record of acquiring, developing and operating renewable energy assets (photovoltaic and wind assets) while dealing with complex regulatory frameworks and local market conditions
- The company is dedicated to the planning, financing, construction and operation of renewable energy (RE) projects in the region
- It has built up considerable expertise and has key relationships, experienced directors and a first mover advantage in the Greek renewable energy market
- Its investments generally involve favorable Government treatment, long in-service contracts and strong free cash flows

### Industrial and construction experience

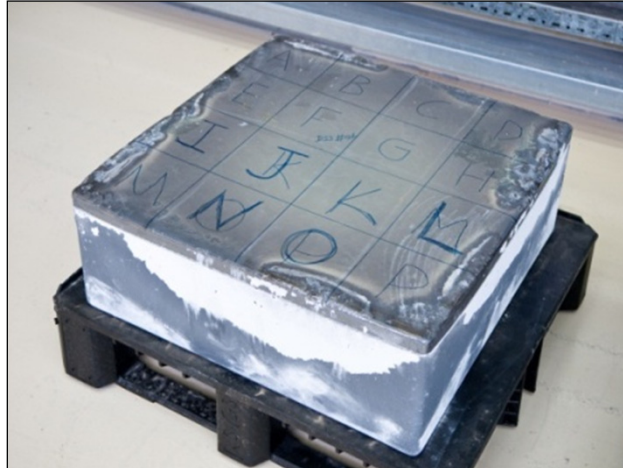
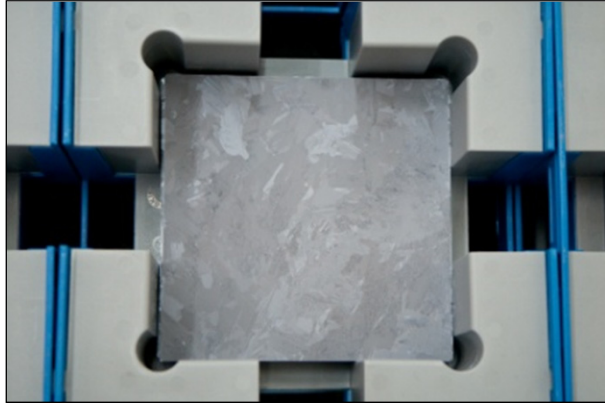
- Full vertical integration is employed: from wafers, cells and modules to PV plants and electricity production
- 49.3 MW of PV parks have been already connected to the grid

### Project Development

- In-house project management team (>20 engineers)
- Privately owned projects
- PV “Fast Track” Projects located in the mainland (central and south Greece)
- 2 technical centers for the O&M services

# Solar Cells Hellas Group

## Wafer Line



### Crucial Factors:

- Production of thicker wafers
- Scrap Reduction
- Secured Si Supply

✓ Continuous Improvement

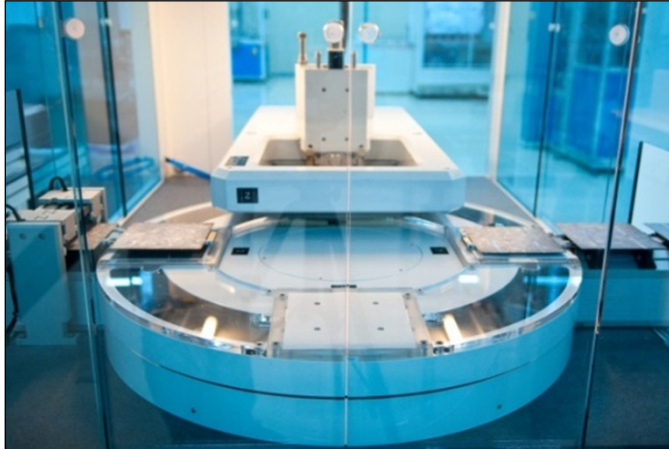
✓ Development of Bigger Ingots

✓ Wafer Thickness Reduction



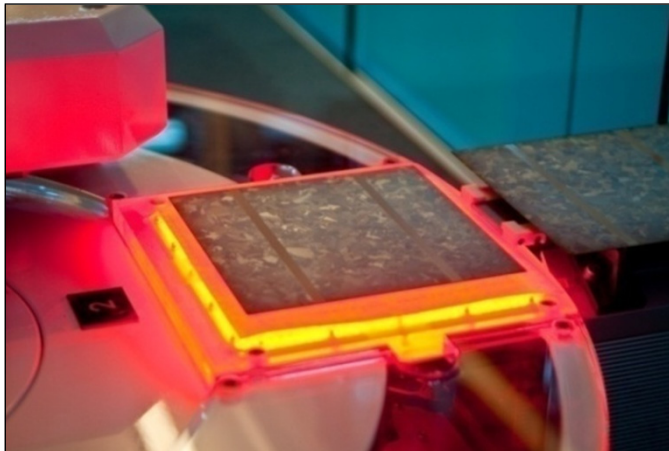
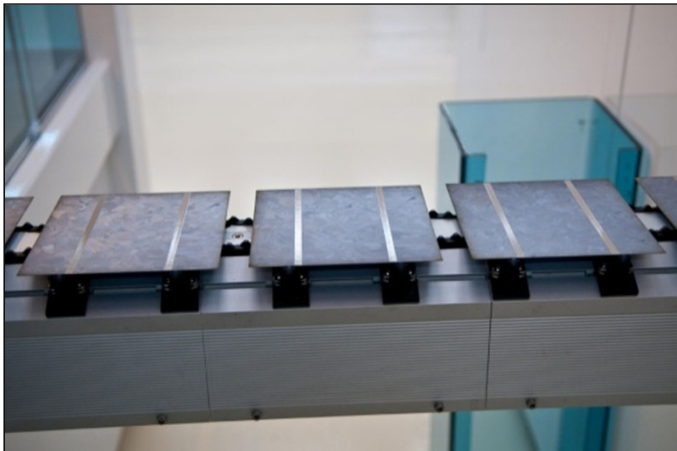
# Solar Cells Hellas Group

Cell Line



## Crucial Factors:

- Highest Quality & Reliable performance
- Homogeneity
- Micro – crack risk minimization



✓ Continuous Improvement

✓ High Efficiency

# Solar Cells Hellas Group

## Module Line



### Crucial Factors:

➤ Highest Quality & Reliable performance

➤ High Mechanical Endurance



- ✓ No micro cracks - no inclusions
- ✓ Continuous Improvement
- ✓ High Efficiency



# Solar Cells Hellas Group

## PV Plant Development



- ✓ Facades
- ✓ Residential
- ✓ Medium to large scale PV parks
- ✓ Commercial & industrial rooftops



### Turn key solutions

- Composition of technical studies
- Engineering works
- Operating and Maintenance

# Solar Cells Hellas Group

Solar Cells Hellas S.A.



- **Founded: Q4 2006**
- **Project Start: Q1 2007**
- **Equipment Move-In: Q2 2008**
- **SOP: Q3 2008**
- **Technology employed: polycrystalline wafer-based PV**
- **Nominal\* Capacity: Wafer line 40MW/yr  
Cell line 40MW/yr**
- **Building Area: 6.918,4 m<sup>2</sup>**
- **Land Area (privately owned): 18.920 m<sup>2</sup>**
- **Manpower: 75 (Q2 2012)**



# Solar Cells Hellas Group

Soltech S.A.



- **Founded: Q3 2006**
- **Project Start: Q2 2007**
- **Equipment Move-In: Q2 2008**
- **SOP: Q3 2009**
- **Technology employed: polycrystalline wafer-based PV**
- **Nominal\* Capacity: Wafer line 40MW/yr**  
**Cell line 40MW/yr**  
**Module line 35MW/yr**
- **Building Area: 7.218,1 m<sup>2</sup>**
- **Land Area (privately owned): 12.750 m<sup>2</sup>**
- **Manpower: 70 (Q2 2012)**





# Solar Cells Hellas Group

Admotech S.A.

adM<sup>atec</sup> s.a.

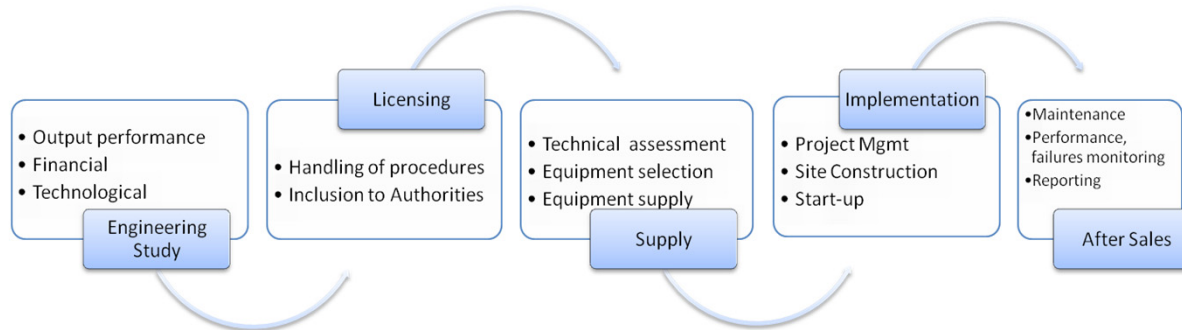
- **Founded: 1998**  
(initially industrial production of optical media products)
- **Project Start: Q3 2010**
- **Equipment Move-In: Q4 2010**
- **SOP: Q1 2011**
- **Technology employed: polycrystalline PV**
- **Capacity: Module line 35MW/yr**
- **Buildings Area: 5.100 m<sup>2</sup>**
- **Land Area (privately owned): 10.000 m<sup>2</sup>**
- **Manpower: 85 (Q2 2012)**



# Solar Cells Hellas Group

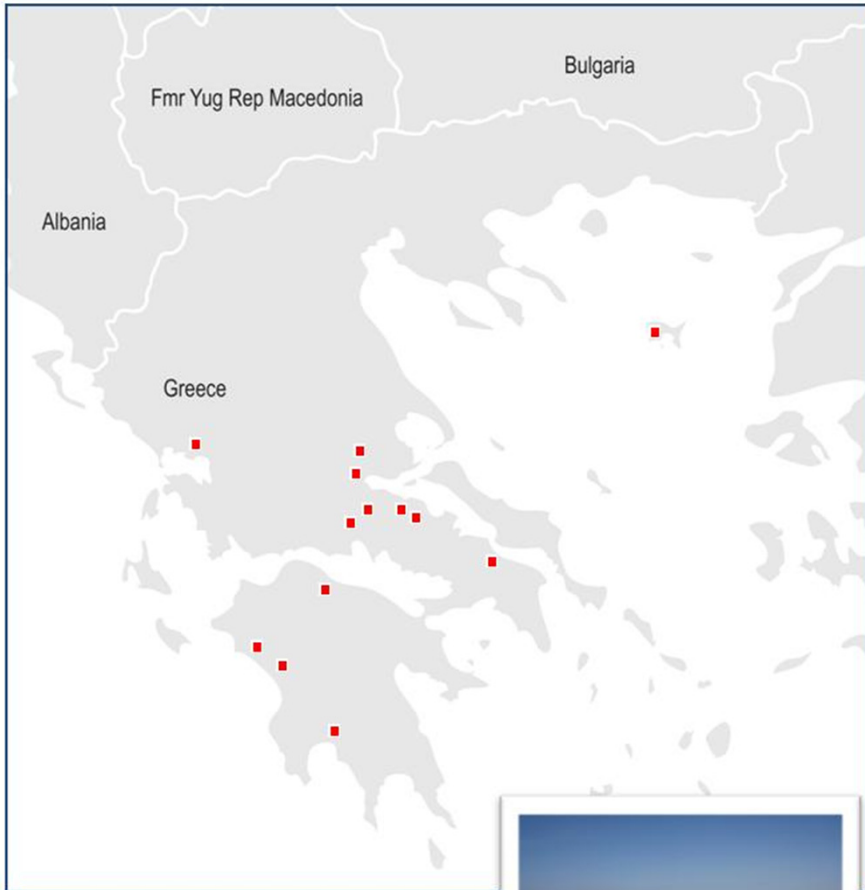
## Core Activities - Services

- **Development of privately owned PV parks (portfolio>350MW)**
- **Engineering, Procurement, Construction (EPC) of PV projects**
- **Composition of technical studies soil survey, excavation works, topographical plan, lodge installation etc**
- **Operation and Maintenance (O&M) of PV parks**



# PV Parks Portfolio

## PV locations



## Solar power generation

- Solar Cells Hellas currently has a portfolio of 17.3MW of advanced solar PV applications in Greece, consisting of 7 parks that are already fully constructed and in operation
- Once the production licenses are granted, the parks will secure 20-year Power Purchase Agreements (PPAs) with the Hellenic Transmission System Operator (HTSO) providing security and visibility on future cash-flows
- New deals are currently being negotiated in order to further expand the solar portfolio of the company by acquiring more licenses (7.7MW of PV licenses acquired in 2012)
- Solar Cells Hellas' ultimate goal is to develop a portfolio of 418.6MW of PV licenses within the next 3 years

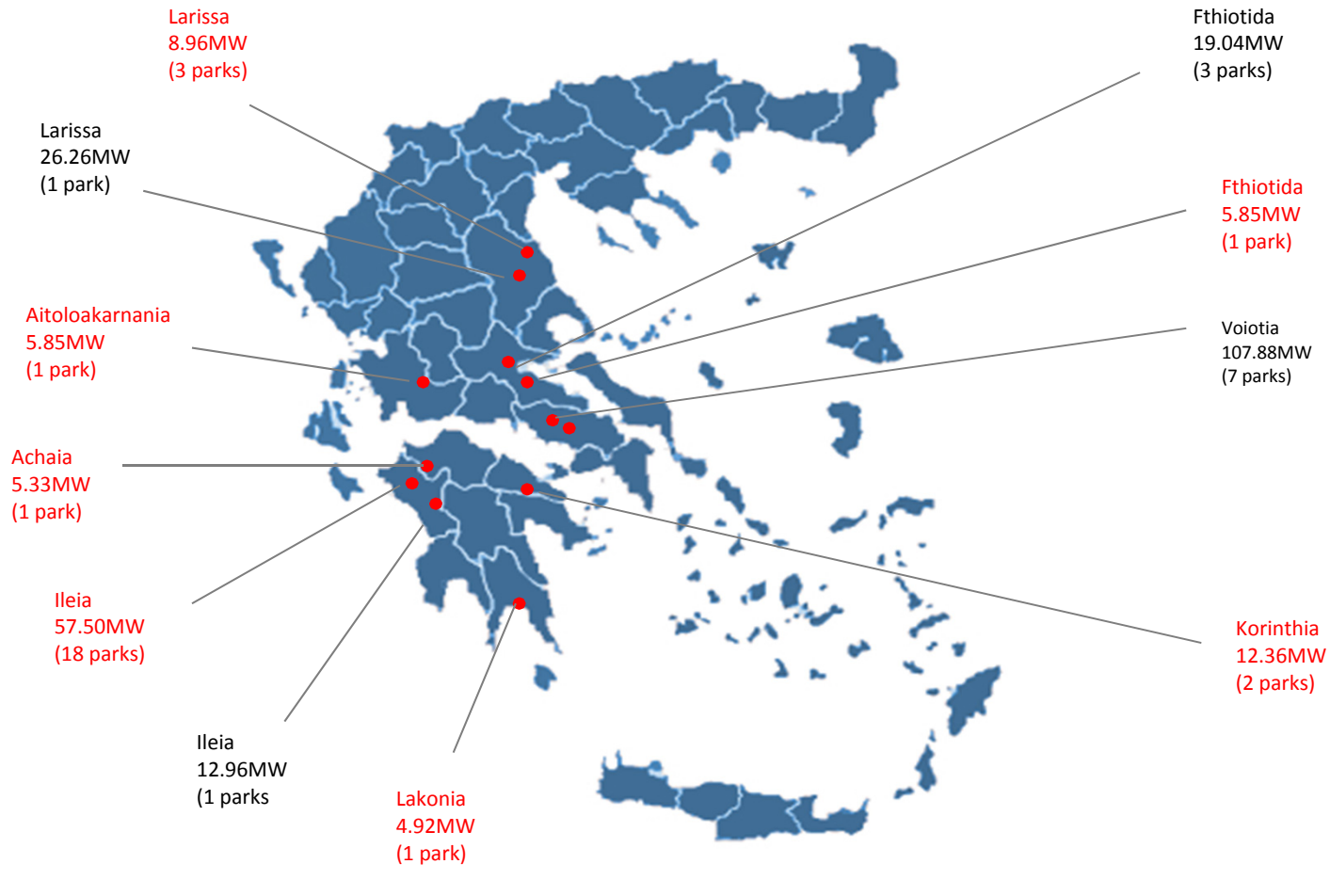
### Development of a 297MW PV Project

- Solar Cells Hellas is developing a grant scale PV project in Greece which includes the operation of a total of 51 PV parks of total capacity of 297MW
- This portfolio has been approved by the Inter-Ministerial committee of strategic investments that facilitates large scale investments in the country through the Invest In Greece agency
- 51 parks have received the regulator's production license and all the environmental approvals



# PV Parks Portfolio

## PV locations

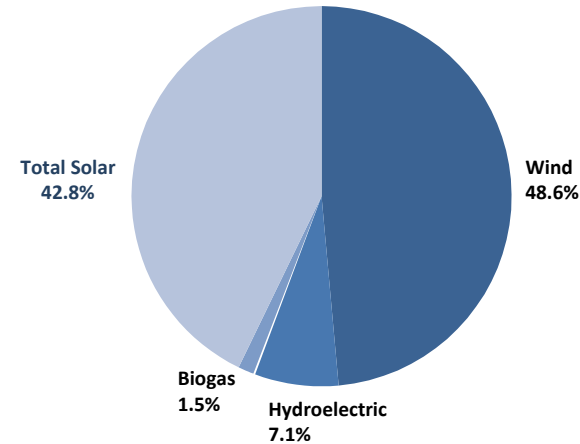


# Overview of the Greek RES market

## Market Highlights

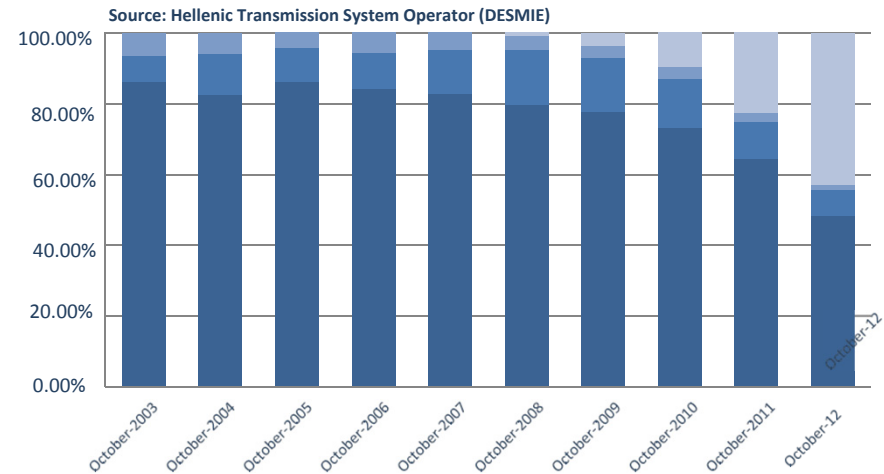
- Attractive renewable energy trends in the region are supported by the requirements to achieve EU established targets for RE production
  - Greece has a commitment towards the EU to produce 20% of gross national electricity consumption from RES by 2020
  - Currently, Greece has some 2,992MW of installed RES capacity and is expected to reach 4,500MW by 2020, creating a significant investment opportunity in the RES sector
  - The Greek Government has repeatedly stated its “Green” initiatives and its willingness to simplify the administrative procedures, significantly reduce the licensing/approval time, eliminate bureaucracy and promote continued investments in RES
- Highly compelling incentive dynamics given a high level of Government subsidies and long-term Power Purchase Agreements (PPAs)
  - Feed-in tariffs (FITs) guarantee cash flows for a period of 20 years
- Further favorable market dynamics include a fragmented market with numerous weak players looking to sell their licenses, given lack of capital and inability to raise financing

## RES - Installed capacity per market (October 2012)



Source: Hellenic Transmission System Operator (DESMIE)

## RES - Installed capacity per market (October 2006-2012)



# Attractiveness of Greek renewable energy market

## Drivers

## Impact

**1. 20-year PPAs with guaranteed Feed-in-Tariffs**



➤ Attractive Government incentives:

- ✓ 20 year PPAs with guaranteed feed-in-tariffs
- ✓ Tariff inflation adjustment guaranteed for the project period (20yrs)

**2. The Kyoto Protocol**



- Commitment to the EU and Kyoto CO2 emission targets
- 20% of gross national electricity consumption from renewable energy sources by 2020
- Renewable energy production to increase to 4,500MW by 2020
- Requires that Greece speeds up renewable energy penetration and investment

**3. Supply Deficit Market**



- Demand growth rate 4% per annum; 77.2TWh by 2020
- Production growth less than 1% per annum
- High cost of electricity imports makes renewable energy sources more attractive



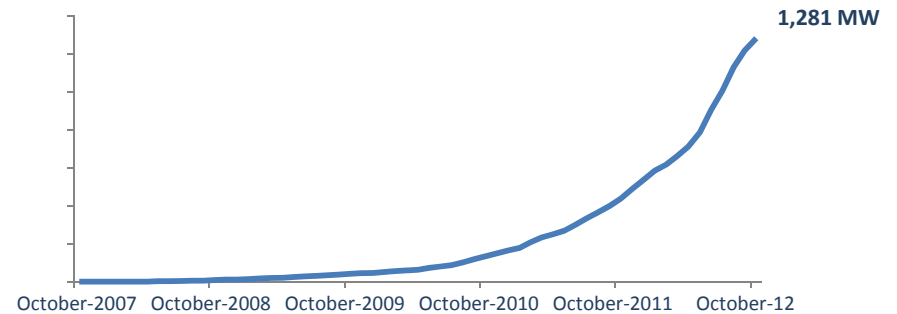
# Greek PV landscape

Given its high potential for growth, the Greek solar PV market is expected to present significant investment opportunities in the near future

## Overview

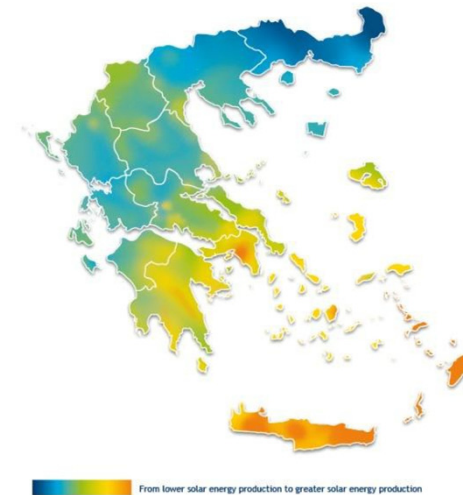
- One of the core components of Greece's energy profile will be solar
- Greece has a superb sun radiation capacity and in a theory it could sustain one third of Greece's energy requirements with solar energy
- Today's capacity in installed PVs has reached 1,280MW
- The Greek government goal is for 2.2GW by the year 2020 (through the EU-mandated NREAP1)
- It is estimated that in 2013, new installed capacity will be above 500MW, despite the economic crisis and the oversupply
- Existence of local manufacturers (Solar Cells Hellas SA, Soltech SA, Admotec SA)

## Solar Energy – Total capacity installed (MW)



Source: Hellenic Electricity Market Operator (LAGIE)

## Greece - Solar Map

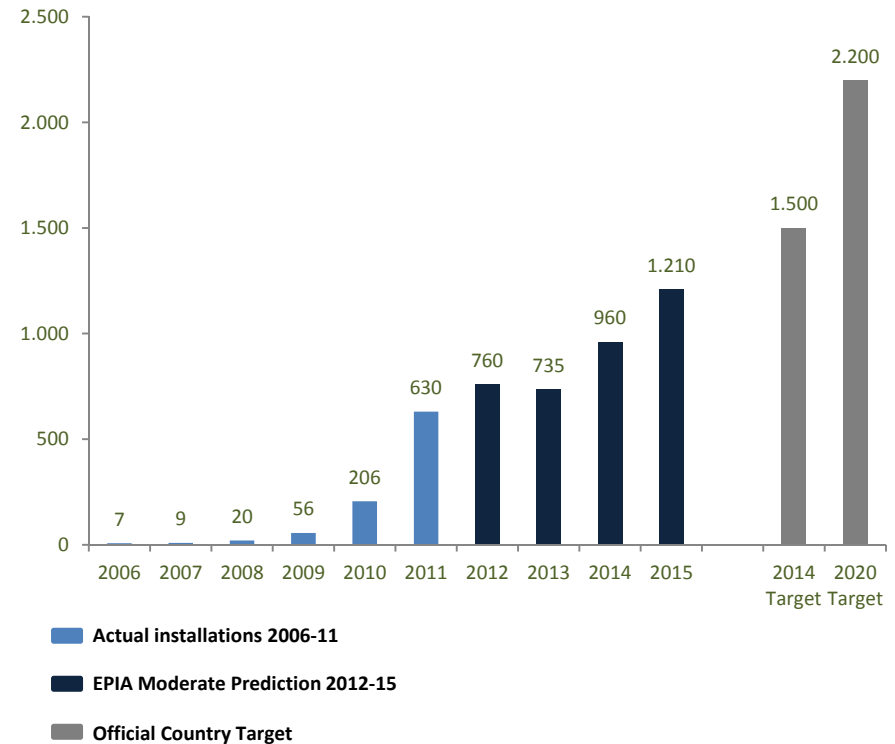


# Greek PV landscape

## Greek solar PV market characteristics

- The PV sector follows a growth path globally, even during periods of economic recession
- The market is at an early stage of its development. Rapid consolidation is expected as many investors have applied for licenses speculatively or will not be able to raise the required finance on their own
- Greece has a very attractive framework for PV investments and 500MW per year are anticipated
- This will present significant opportunities for investors that want to enter the market in this phase
- 630MW of installed PV capacity in 2011
- High estimated growth in the next 5 years
- Projects under the Fast Track law are excluded by the Greek Energy Target (2020)

## Projected annual installed capacity (in MW)



Source: Hellenic Association of Photovoltaic Companies & EPIA (European Photovoltaic Industry Association)

# Membership

**EPIA**  
(European Photovoltaic Industry Association)



**AHK**  
(Greek-German Commercial and Industrial Chamber)



**SEV**  
(Hellenic Federation of Enterprises)



**HELAPCO**  
(Hellenic Association of Photovoltaic Companies)



**HAPVI**  
(Hellenic Association of Photovoltaic Industry)



**HMA**  
(Hellenic Management Association)





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