

Welcome to Solar Cells Hellas Group



SOLAR CELLS HELLAS GROUP

Wafers

Cells

Modules

Project development

System integration

Key Facts about Solar Cells Hellas Group

2

Founded	2005 by a team of professionals with broad experience in renewable energies
Legal Form	SA registered in Athens, Greece
Field of activity	Focus, though not exclusively, on 3 fields: <ul style="list-style-type: none">- Photovoltaic- Solar Projects- Wind parks
Strong points	High flexibility and dynamic, management skills, development in an upcoming market
Quality	<ul style="list-style-type: none">- ISO 9001:2008, Quality Management System- 14001:2004, Environmental Quality Management System- OHSAS 18001, Health and Safety Management System- TUV Intercet/IEC standards conformity
Values	<p>Solar Cells Hellas Group has a firm commitment to solid moral principles and transparency in all fields of activity.</p> <p>Growth and profitability are regarded key factors in our business model. Top quality products and services are offered to our customers.</p>

Current projects of Solar Cells Hellas Group

3

Production

- ❖ Three fabrication lines operation : crystalline silicon solar wafers, cells and modules, total power 80MWp/year
- ❖ Total building space: 14.000 m²
- ❖ Total Investment: 120Mo€
- ❖ Turnkey provider: GT Solar (USA-based company, equipment lines and processing know- how for wafer, cell and module fabrication)
- ❖ Production start up: Aug 2008

Services

- ❖ Design, Feasibility Study, Planning, Installation, Operation and Maintenance of PV parks

Dealer Network

- ❖ Established in the MENA countries

Employees

- ❖ 320 empl (Q4 2010)

Current projects of Solar Cells Hellas Group

4

System Integration

- ❖ 2,5MW of PV parks already connected to the grid
- ❖ 25MW of PV parks with the respective licenses

Project Sales

- ❖ 10+MW contracted sales agreement for cells
- ❖ Total 183MW PV plants, of which:
 - 102+MW PV plants at privately owned land in Greece
 - 81MW PV plants customer's backlog
- ❖ 88MW Wind parks

PV Parks	2010	2011	2012
Capacity	20MW	70MW	
Investment Cost	52MoEuro	150MoEuro	

Wind Parks	
Capacity	88MW
Investment Cost	120MoEuro

Wafer Line

5



Key facts: Production of thinner wafers, reducing kerf loss, recycling cutting slurry in house.

Wafer Line

6

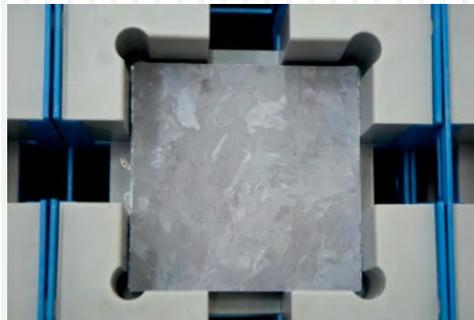
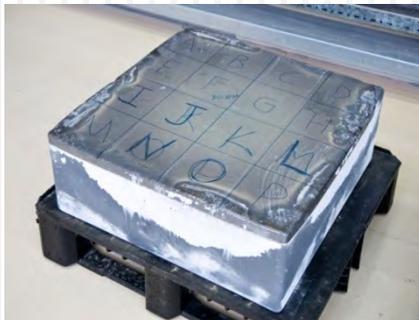
Technology improvement

Casting larger ingot

Time	2008	2009	2010	2011
Weight (Kg)	220	230	270	450 (est)

Wafer thickness Reduction

Time	2008	2009	2010	2011
Thickness (μm)	240	220	180	170 (est)



Cell Line

7



Key facts: Diffusion uniformity, contact resistance reduction, higher cell efficiency

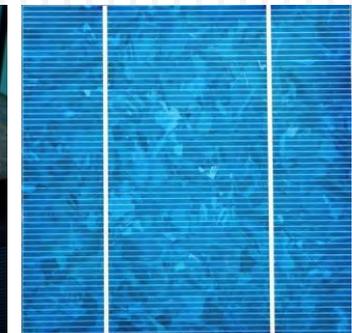
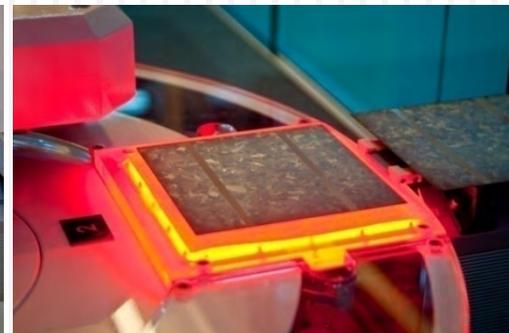
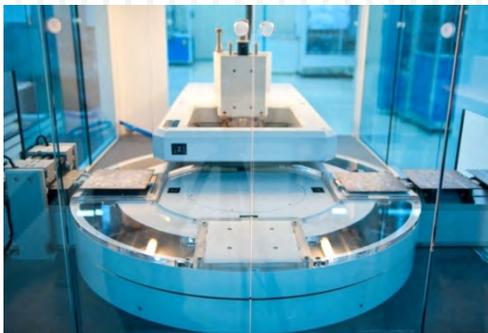
Cell Line

8

Technology improvement

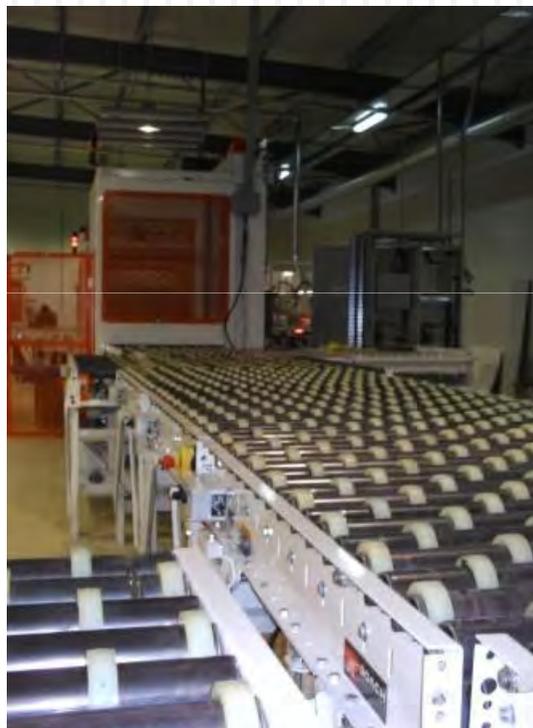
Higher Solar Cells Efficiency

Time	2008	2009	2010	2011
Average Efficiency	14.7%	15.3%	16.14%	16.3% (est)



Module Line

9



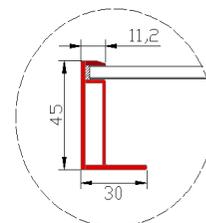
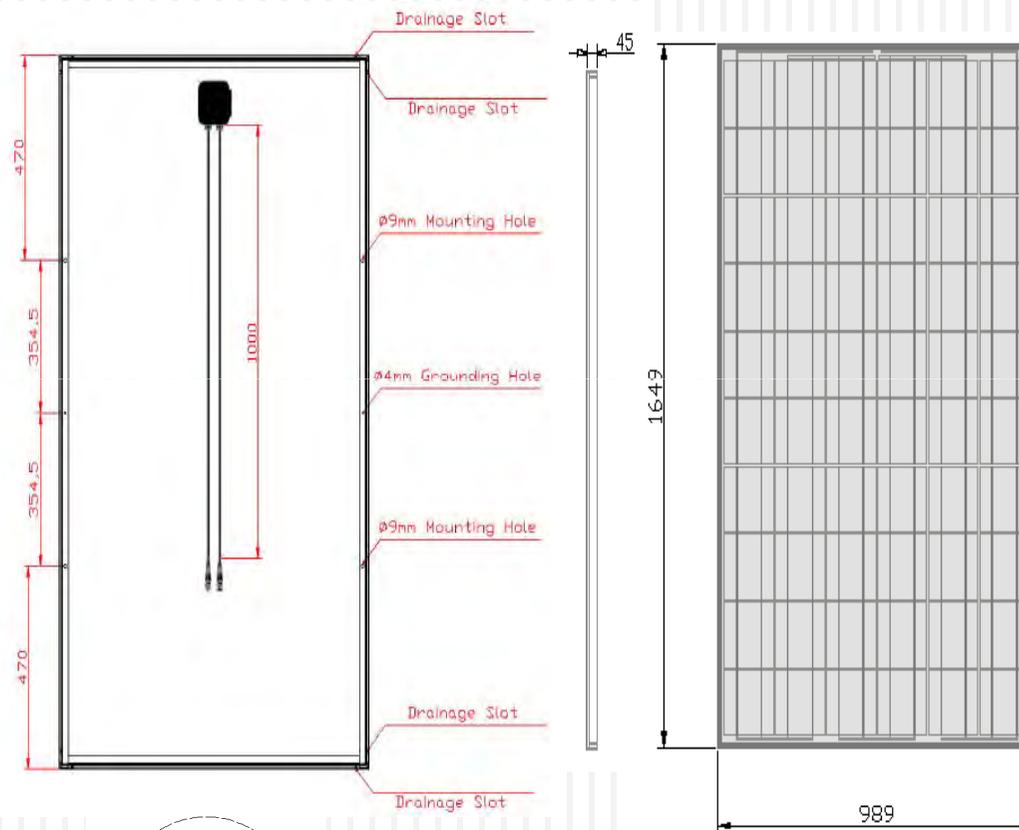
Key facts: Automated production, mechanical load up to 5400Pa

Module Characteristics

10

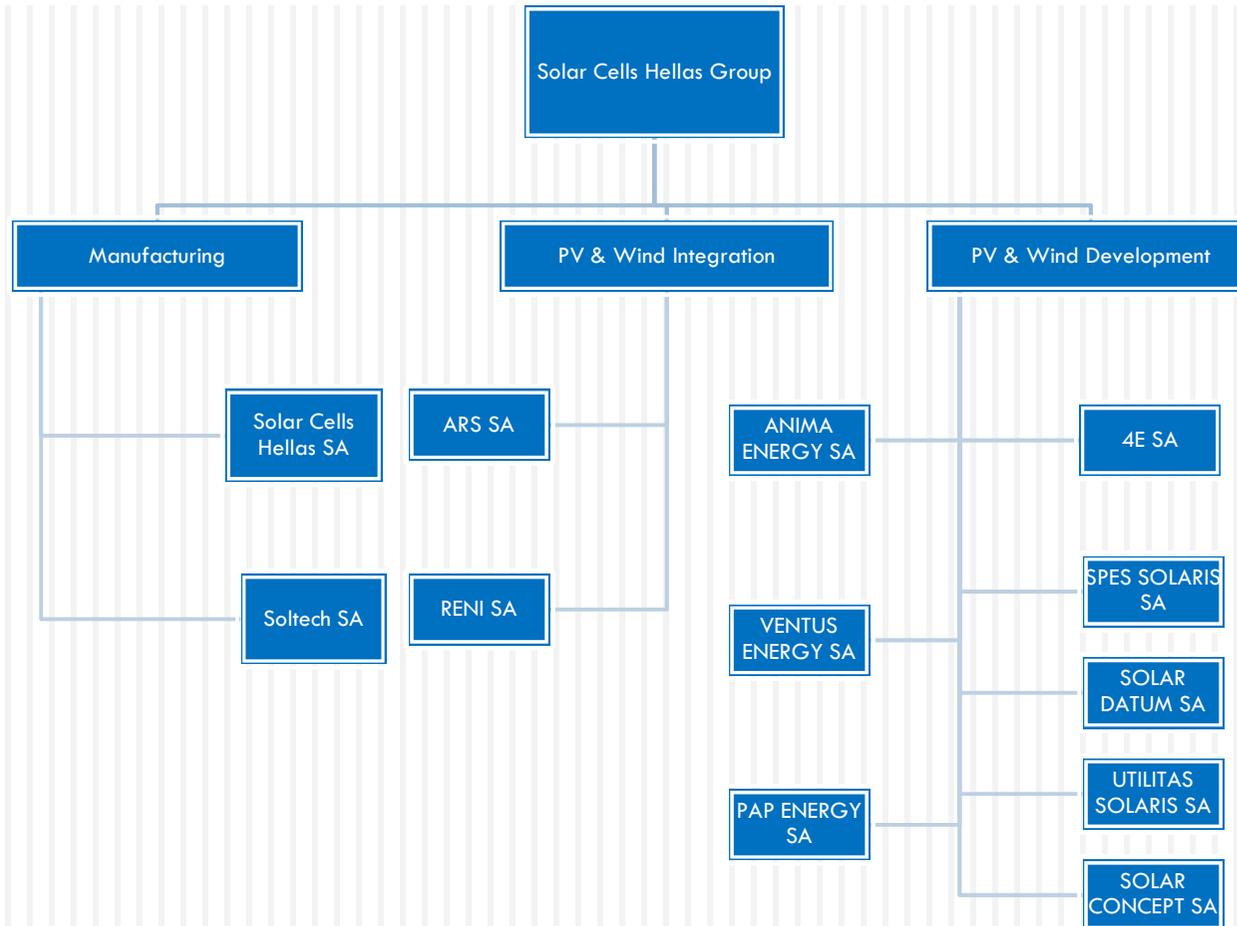
Mechanical Characteristics

Dimensions	1.649 x 989 x 45 mm (SLT/660P framed) 1.642 x 981 mm (SLT/L660P frameless)
Cells	60 poly-crystalline cells 156 x 156 mm (square)
Frame	Anodized Al profiles
Junction Box	3 bypass diodes, IP65, TÜV&UL approved, Protection class II
Cabling	IP68 LC4 connectors, 1000mm, 4mm ² cables, TÜV&UL approved
Weight (framed)	~21 kg
Weight (frameless)	~18 kg
Solar Glass	Tempered, Class U1, SPF certified, matt, prismatic



Organization Chart

11



EQUIPMENT	QUALITY	PRODUCTION
<p>FEEDSTOCK PREPARATION</p> <ul style="list-style-type: none"> ✓ Recycling poly-Si ✓ Perpetual usage of recycled Si 	<p>QUALITY SYSTEMS</p> <ul style="list-style-type: none"> ✓ ISO 9001 ✓ ISO 14001 ✓ OHSAS 18001 ✓ IEC standards 	<p>SLURRY RECOVERY</p> <ul style="list-style-type: none"> ✓ Decrease of breakage rate ✓ Reduce of consumables ✓ 1.5tn/day to be recovered
<p>LARGE MULTI INGOT SIZE</p> <ul style="list-style-type: none"> ✓ Up to 450Kg ingots 	<p>BRICK PRODUCT CONTROL</p> <ul style="list-style-type: none"> ✓ Resistivity ✓ Lifetime ✓ IR imaging 	<p>TAPPED FINGERS</p> <ul style="list-style-type: none"> ✓ Increase of active surface ✓ Reduce of Silver usage
<p>THIN WAFERS</p> <ul style="list-style-type: none"> ✓ Multi wafers thickness in 180µm ✓ Cells 180/200/240µm 	<p>WAFER PRODUCT CONTROL</p> <ul style="list-style-type: none"> ✓ Thickness ✓ TTV, Lifetime ✓ BOW, Resistivity 	
<p>DATA ANALYSIS</p> <ul style="list-style-type: none"> ✓ MES platform in final testing 	<p>CELL PRODUCT CONTROL</p> <ul style="list-style-type: none"> ✓ Reflectance ✓ Sheet Resistance ✓ AR thickness & Index ✓ Fingers width, height 	
	<p>MODULE PRODUCT CONTROL</p> <ul style="list-style-type: none"> ✓ Gel content test ✓ Pulling test, dark IV ✓ Macro crack inspection 	

Further expansion

13

+35MW/yr

Completion time: end of Jan 2011

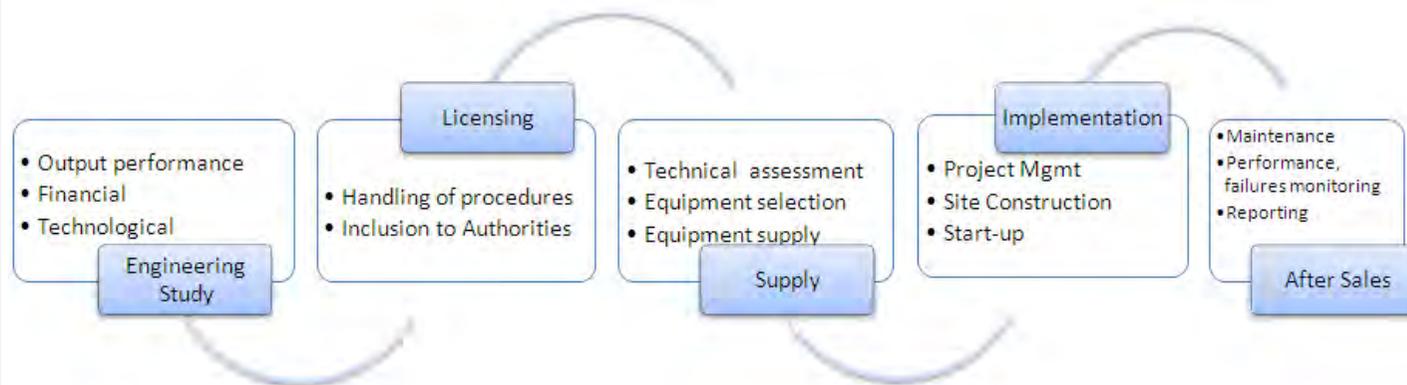
- ❖ Low breakage rates (even for 160-180um cells)
- ❖ Soft touch soldering
- ❖ Lower thermal stress
- ❖ Modular design
- ❖ 2+3 bus bars
- ❖ 15% shorter cycle time in laminator process
- ❖ Adaptable heating plate
- ❖ Adjustable membrane clamping system



System Integration

14

- ❖ **Consultancy** on investment opportunities
- ❖ Pre-investment **feasibility study** project and financial assessment,
- ❖ **Inclusion** of investment projects for authorization,
- ❖ Handling of **approval procedures** for PV parks
- ❖ **Technical assessment** and consultancy on equipment selection
- ❖ **Supply** of electrical and mechanical equipment
- ❖ **Project Management**; site and construction management of photovoltaic parks
- ❖ **Site supervision** of photovoltaic power stations and technical failures recovery
- ❖ **Monitoring Performance and Maintenance**, reporting



System Integration

15



- ❖ Residential buildings
- ❖ Malls
- ❖ Commercial rooftops
- ❖ Facades
- ❖ Ground mounted
- ❖ Industrial rooftops



RES Parks Development

16

Privately owned wind parks under application procedure

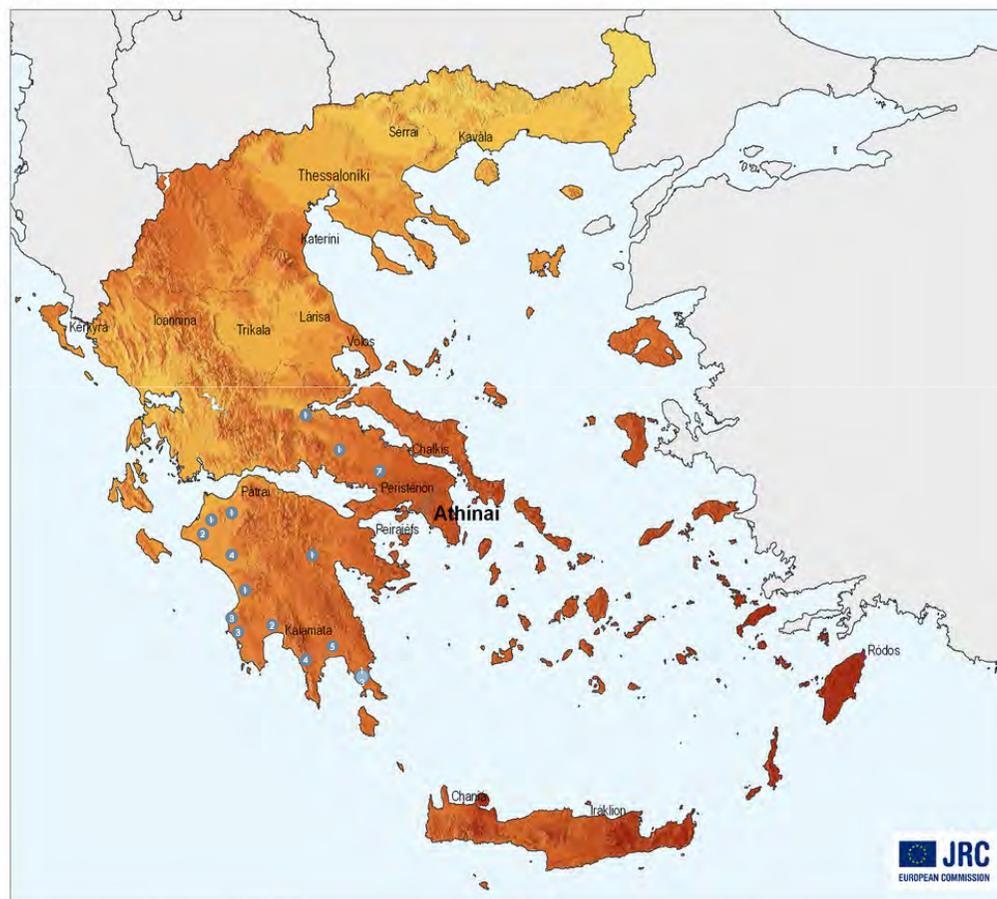
- 88MWp

Customer's pipeline 49 PV PARKS (total capacity appr 81 MW)

- 27 PV parks >100 KWp
- 22 PV parks ≤100 KWp

Privately owned PV parks under application procedure and/or in construction phase (total capacity appr 102MW)

- Solar Datum SA
- SCH/SLT/ODT
- 4E Ενεργειακή SA
- Solar Concept SA
- Spes Solaris SA.



Yearly sum of global irradiation [kWh/m²]

<1500 1600 1700 1800 1900 2000>

<1125 1200 1275 1350 1425 1500>

Yearly electricity generated by 1kW_{peak} System with performance ratio 0.75 [kWh/kW_{peak}]

Authors: M. Šúri, T. Cebecauer, T. Huld, E. D. Dunlop
 PVGIS © European Communities, 2001-2008
<http://re.jrc.ec.europa.eu/pvgis/>

0 50 100 200 km

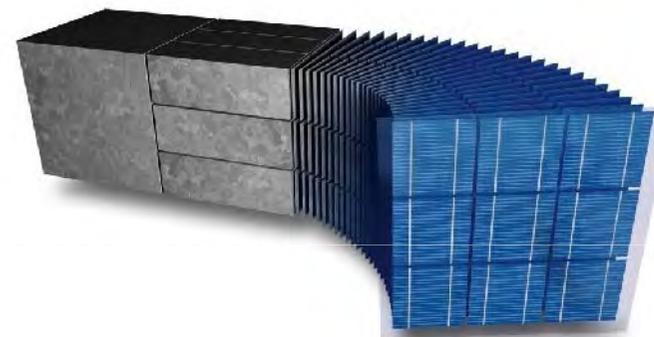
Integration

17

We are one of the Europe's located largest vertically integrated PV manufacturer's and are also manufacturing through almost the complete PV value chain, from the wafer to the assembly of PV modules all at one site.

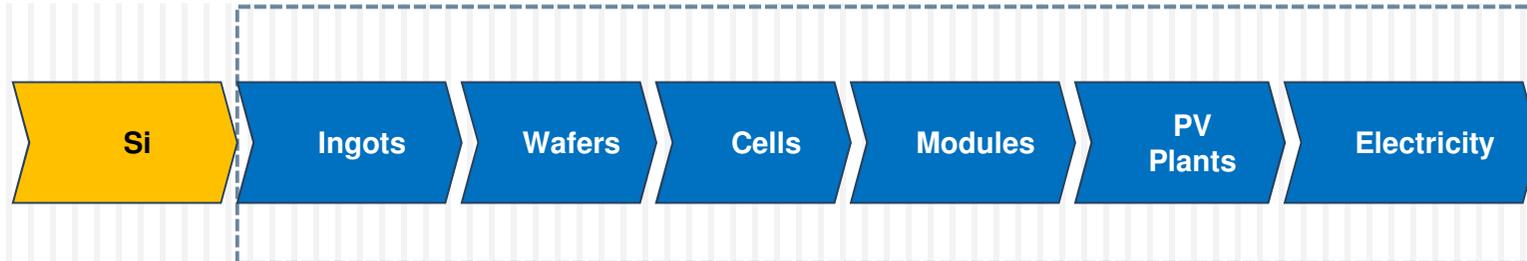
We are able to

- Optimize our **cost structure**
- Adopt **cutting edge technologies**
- Develop most **advanced manufacturing methods**
- Consistently build **high quality** and reliability
- Provide **prompt services** to all kind of clients



Integration

18



- ❖ Largest **vertically integrated** PV Industry in SE Europe
- ❖ **Turn-key** solution provider
- ❖ After sales **services**
- ❖ Diversified **energy portfolio**
- ❖ **Representation** at the EU and Eastern Asia markets
- ❖ Multiple **market entry points** (residential users, wholesalers, EPC contractors, consultant companies, PV industries, distributors, system developers)

R&D infrastructure

19

Solar Cells Hellas Group receives continuous advice from widely acknowledged and prestigious institutions, companies and universities.

❖ **National Technical University of Athens**

Solar Cells Hellas Group finances PhD programs in cooperation with the School of Applied Mathematics and Physics (National Technical University of Athens).

❖ **CRES**

CRES is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation. The last two years a consulting agreement has been established between CRES and SCH Group.

❖ **University of Patras**

❖ **National Center of Research**



Membership

20

Solar Cells Hellas Group certifies its scientific and technological presence in national and international level as member of:

EPIA
(European Photovoltaic Industry Association)



HELAPCO
(Hellenic Association of Photovoltaic Companies)



AHK
(Hellenic-German Commercial and Industrial Commerce)



EPVTF
(European Photovoltaic Technology Platform)



HAPVI
(Hellenic Association of PV Industry)



Contact Information

21

Headquarters:

Solar Cells Hellas Group

170 Sygrou Avenue

GR 115 21 Athens

Greece

Tel.: + 30 210 9595159

Fax: + 30 210 9537618



Factory:

Industrial Zone of Patras, 25200

Ag. Stefanos, Block 3A

Greece

Tel: +30 2610 241958

Fax: +30 2610 647129

E-mail: info@schellas.gr

Web page: www.schellas.gr



SOLAR CELLS HELLAS GROUP

Higher. Closer to the sun!

