

# SOLET

## DRIVEN BY SOLAR ENERGY



Clients in  
>20 countries



Precision  
engineering



Photovoltaic  
technology



MADE IN EU

EU PV module manufacturer:  
common industry standards



Annual manufacturing  
capacity



EPIA  
member



Turnkey solar energy  
project implementation



Powered 1<sup>st</sup>  
Lithuanian satellites



Assembly line: 35 Modultec Swiss Solar  
Systems from Meyer Burger Group



Custom design  
module production



Professional consulting  
and project management



# CHOOSING PHOTOVOLTAIC (PV) TECHNOLOGY

**Less than 90 minutes of sunshine is required to provide the amount of energy that the entire human population needs for one year.** Solar power has so much potential that it would take less than 1 per cent of the world's land area to be covered by solar modules to supply all of our electricity needs.

**We can harness this potential – solar radiation can be transformed into electricity using PV technology.** As photons of light reach the semiconductors, typically made of silicon, the electrons inside the PV cell are caused to flow, generating electricity. This process is known as the photovoltaic effect.

**This source of energy is completely free, purely sustainable, silent and harmless to the environment.** With their extremely low operation costs and easy application, PV installations may be ground-mounted or integrated within housing, transport, various industrial buildings and even space crafts, or used as stand-alone power plants.

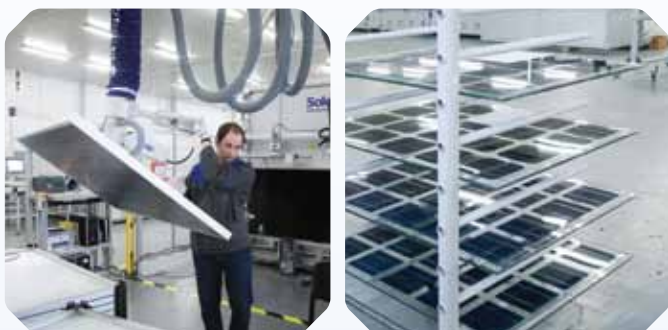


**PV technology is also easily adaptable to various regional needs** as it can be installed and used in complex terrain such as mountain or island areas. It can also be used in remote areas with little population, where typical electricity infrastructures would be too expensive to install and handle. PV technology does not have moving parts and lasts for decades without routine maintenance.

**PV technology is being rapidly developed** and has become even more competitive with other, traditional, energy sources. Various financial incentives, such as preferential feed-in tariffs, net metering or governmental subsidies for solar-generated electricity, support PV installations and technology development in many countries. Solar energy supply boosts energy stability and capacity, solving both environment and energy issues.

**Because of its reliability and potential,** large stakeholders use solar energy to become independent from various economic, political or natural upheavals, making investors from more than 100 countries worldwide choose PV technology.

## INTRODUCING THE SOLET GROUP



The Solet Group is an EU-based set of companies encompassing a wide range of contemporary solar energy competences. The Group offers reliable and technologically-integrated photovoltaic (PV) technology, as well as a vast range of relevant solar energy solutions – products and services – from a single experienced and professional source.

The Solet Group provides services that range from solar panel manufacturing to engineering design and installation of solar power plants. It offers thorough consulting and maintenance in solar energy project development, as well as professional estimation of returns on investment, testing and scientific development.

The Solet Group unites the following specialized companies, which productively cooperate to bring their clients excellent results in quality, pricing and expertise:

- **Precizika** – scientific company of solar module manufacturing and precision engineering
- **Solet** – PV project management and consulting company
- **Solet Technics** – turnkey solar energy project delivery firm
- **Precizika-MET SC** – silicon based solar cell development and research laboratory

The Group actively cooperates and exchanges valuable experience with partners and clients from more than 20 European and Asian countries. The Solet Group has implemented more than 100 solar power plant installations, sold more than 85 MW of PV modules and established close business and partnership ties with research centers all over Europe.

Solet Group is rapidly **developing and growing** – expanding its geography, taking up new challenges, and implementing more ambitious projects – in order to provide the **best possible solar energy solutions for a reasonable price.**



# SOLET PHOTOVOLTAIC MODULES BY PRECIZIKA



**SOLET monocrystalline and polycrystalline photovoltaic modules are manufactured by the scientific industrial company Precizika.** In 2011, with more than 50 years of experience in precision engineering and more than a decade in photovoltaic technology development, Precizika launched the first photovoltaic module production line in the Baltic States, using the innovative technology from the Meyer Burger Group.

Using this reliable and advanced technology, **along with standard modules, the company is able to produce unframed, glass-back sheet, glass-glass modules** that can be designed in different colors and size parameters.

The company supplies photovoltaic modules to European and Asian clients – state-owned energy companies and private businesses, PV production distributors, installers, and project developers who value the highest quality and innovative products, that uphold current European standards (ISO 9001, ISO 14001, IEC 61215, IEC 61730, OHSAS 18001 and others).

The global safety and quality certifier TUV Rheinland annually inspects the Precizika factory and its production.

Precizika's annual module manufacturing capacity is 65 MW. Quality warranties of PV products include a 25-year linear performance warranty and a general 12-year product warranty.

- **Module guarantee** 12 years
- **Module performance guarantee**  
**90 % max output** 10 years  
**80 % max output** 25 years



## SOLET PV module features

- Monocrystalline module efficiency – at least 16 %, polycrystalline module – at least 15 %
- High resistance to temperature variations (-40 °C to +85 °C)
- High efficiency on small surface: up to 150 W per m<sup>2</sup>
- Maximum wind load: 2400 Pa
- Maximum snow load: 5400 Pa
- European quality materials with European certificates
- Vertical packaging improves safety during transportation, with larger amounts of carriage

# MODULE ASSEMBLY LINE

The Solet Group PV module manufacturer Precizika employs a modern assembly line, based on the 3S Modultec Swiss Solar Systems technology from the Meyer Burger group.

The Solet Group solar PV module assembly line is capable of fully manufacturing 40 modules per hour. Each module contains up to 92 solar cells for a maximum power capacity of 400 Wp.

## 1. GLASS WASHING AND DRYING

An Italian Triulzi horizontal washing and drying machine washes the glass in two stages – initial washing and cleaning.

- Reverse-osmosis filtering is used for water purification and softening
- No reagents are used during the process



## 2. AUTOMATIC SOLDERING AND LAY-UP EQUIPMENT

German Somont cell connecting soldering technology safely forms even the most sensitive photovoltaic cells into perfect strings.

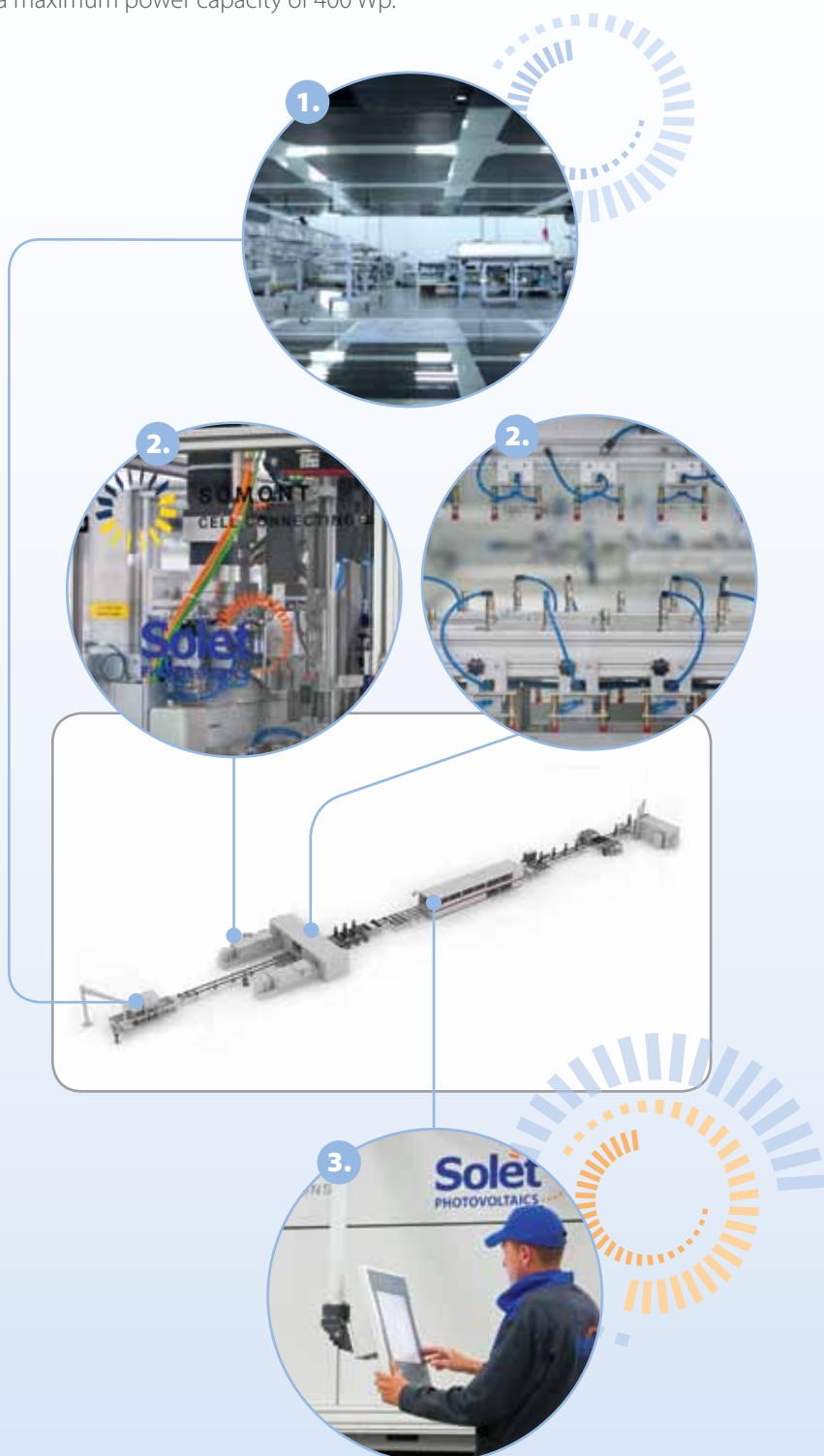
- “Soft-touch” soldering technology
- Soldering temperature (220-250 °C, depending on the soldering type and solar panel) is increased and reduced step-by-step to avoid damage from rapid temperature change
- Soldering tolerance  $\pm 0.5$  mm
- Soldering quality checked by visual monitoring cameras
- Fully automated string lay-up into a matrix



## 3. LAMINATING

The 3-chamber 3S Swiss Solar system (Meyer Burger Group) machine ensures precise laminating process of the PV module layers into one durable unit.

- Laminating area up to 3.6 m X 2.2 m
- Laminating temperature variance  $\pm 1$  °C
- Gradual cooling process: modules leave the lamination area at 18°C



#### 4. FRAMING

A semi-automatic German Minitec framing station frames the PV modules with anodized aluminum frames that prevent environmental impact.

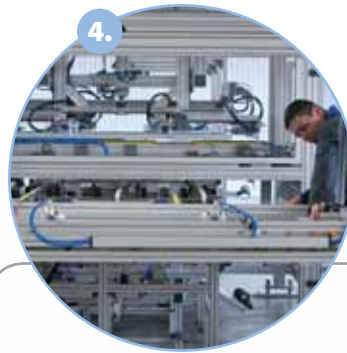
- Frames are covered with protecting film to avoid damage during the assembly
- Two different frame connection types: fishbone or crimping



#### 5. TESTING

Stress and processing tests are performed at the completion of each manufacturing step.

- Visual glass check after washing for every module
- Dark current measurement testing for every module
- High Potential testing (adding 3.6 kV voltage) for every fifth module
- Power measurement testing for every module with Sun Simulator at 0+2.5 % tolerance
  - pulse duration: 10 ms
  - non-uniformity of irradiance  $\leq 1\%$
  - spectral irradiance distribution  $\leq \pm 12.5\%$
  - stability 1.0 %
  - uncertainty of solar simulator power measurement results 1%
- Sun Simulator testing with Swiss Pasan Measurement Systems technology for every module
- Electroluminescence procedure to identify any micro cracks, finger defects or malfunctioning parts of solar cells, invisible to the naked eye, for every fifth module
- Visual check to find any misalignment possibilities, bubbles or other visual defects for every module
- Soldering peeling test (Precizika reaches 4-6 N value, while the standard is  $> 2.5$  N) carried out twice per day
- Weekly Gel Content test (Precizika reaches 88-90 %, while the standard is 75 %)
- Weekly EVA-back sheet peeling test
- Weekly EVA-glass peeling test (Precizika reaches 120-250 Nm, while the standard is  $> 60$  Nm)



#### OTHER PARAMETERS:

- **Glass:** Shatterproof tempered glass of 3.2 or 4.0 mm thickness
- **EVA film:** Ethylene and vinyl acetate copolymer of 0.5 mm thickness, which is scentless, transparent, glossy, UV-ray resistant
- **Solar elements:** 180 - 200  $\mu\text{m}$  thick, soldered by Sn/Ag stripes
- **Back sheet:** Tedlar, Polyester, Tedlar Fluor polymer protects both sides of the polyester from photo-degradation

#### THE SOLET GROUP COMPANY PRECIZIKA HOLDS AND CONTINUOUSLY UPDATES INTERNATIONAL QUALITY AND SAFETY STANDARDS CERTIFICATES:

- Quality management system ISO 9001
- Environmental management system ISO 14001
- Occupational health and safety management system OHSAS 18001
- PV module design qualification and type approval IEC 61215
- PV module safety IEC 61730
- MCS (standard for solar products and installers, Great Britain)
- GSE (a standard, developed with Italian public interest group of companies operating in the energy sector GSE)

# PROJECT MANAGEMENT AND CONSULTING



**“Solet” manages solar energy projects of different complexities and volumes.** The company provides professional consulting and project management for high-scale solar energy development projects in various international locations. Solet’s exclusivity is its ability to gather different relevant practices and unite them under a single enterprise unit – the Solet Group.

The enterprise team of highly-skilled experts manages solar power plant building installations – from drafting technical content, defining plant design and revenue possibilities, to manufacturing and providing Solet PV solar modules, finding strategic international partners, managing complex partnership relations or legal framework matters, as well as solving and coordinating relevant solar power plant installation issues.

During 2011-2013, the Solet Group implemented PV technology projects from designing to building solar power plants and parks in various European countries (Poland,



Bulgaria, Lithuania, etc.), ranging from very specific micro power plants to very complex solar energy stations of 70 MW. Over the years, Solet has participated in various PV projects with a total capacity of more than 180 MW with partners and clients from Italy, Germany, Belgium, Spain, Switzerland, Belarus and Russia.

Solet uses reliable and technologically-advanced solar modules manufactured by Precizika, and tightly cooperates with leading international producers of complementing PV technology equipment – REFUsol GmbH, PLATINUM, Power-One, SMA, Schletter, Renusol, PUK-SOLAR GmbH, Victron Energy, K2-systems and many other companies from the USA and the EU.

With current developments in the field, Solet is taking up more and more ambitious projects, testing not only the limits, but also the possibilities of solar energy. This allows Solet to offer the best possible solar energy solutions right from the experts of its field.



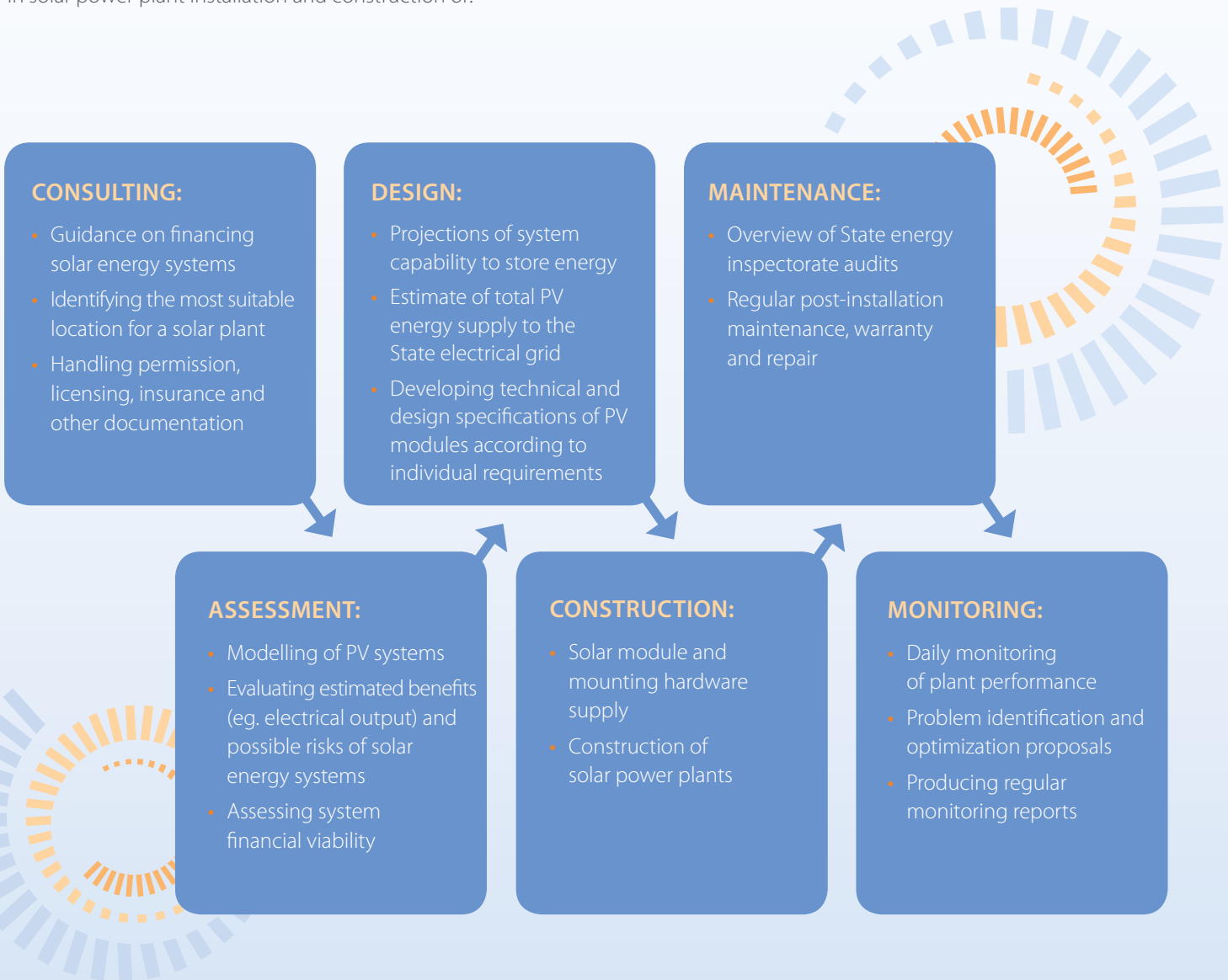
# DELIVERING TURNKEY SOLAR ENERGY PROJECT SOLUTIONS

**Solet Technics** unites a team of reliable, highly qualified and experienced project managers, electrical engineers, electrical fitters, designers and maintenance specialists who **oversee the smooth turnkey solar energy project implementation and take responsibility for all of its aspects and stages.**

Over its history – dealing with various client expectations and elaborate legal system frameworks, cooperating with international distributors and manufacturers, as well as thoroughly implementing PV technology installations – the company has accumulated extensive professional experience in solar power plant installation and construction of:

- Ground solar power plants
- Sloped and flat roof (tile, metal, wood chips, slate or bitumen coating) solar power plant installations
- Building integrated solar power installations
- Micro power plants for transport units, street and rail-crossing lightning, water heating

With its professionalism and experience, Solet Technics offers reliable services with maximum revenue and minimal risks at every stages of any solar power plant project implementation:



# IMPLEMENTED BY SOLET

The Solet Group of companies design, manufacture and install a wide range of solar energy plants which can be grouped into three main categories depending on client needs – industrial, architectural, and ecological. These are only a few of more than 100 projects already implemented by the group's companies.



## LANDSCAPE AND TERRAIN UTILIZATION

### Situation

A business client in Lithuania with extensive rural land unsuitable for agriculture or other activities decided to explore the benefits of solar energy.

### Solution

Solet Technics designed and installed a 1 MW solar power plant of polycrystalline modules with German Diehl PLATINUM inverters.

### Benefits

The investment now provides energy and generates profit. Societal benefit – increased percentage of solar energy in the country's renewable energy policy spectrum.



## INDUSTRIAL SOLAR PARK

### Situation

A business customer in Bulgaria wanted to employ a plot of land for sustainable solar energy technology expecting a reasonable return on investment.

### Solution

Solet designed and installed a Solet polycrystalline module solar plant of 1.5 MW power capacity.

### Benefits

State-supported solar parks increase the country's energy independence and the percentage of renewable energy sources.



## EXCLUSIVE DESIGN

### Situation

A private customer was seeking to utilize renewable energy source with architectural benefits for a building in Lithuania.

### Solution

Solet designed and implemented a project with custom-manufactured glass-glass modules. A transparent roof plant with 4.5 kWp installed power generates over 4 MWh per year.

### Benefits

Exclusive architectural solution with a demonstrated usage of sustainable energy as proof of the owner's attitude toward environmental issues. In addition, the roof reduces electricity energy costs for the household and has increased property value.



## ARCHITECTURAL APPLICATION

### Situation

The Precizika factory in Lithuania initiated its premises renovation project in order to replace a part of the ordinary façade decoration with solar modules.

### Solution

The Solet polycrystalline modules equal to 10 kWp. These frameless modules with Schletter mounting construction ensure proper ventilation and increased performance.

### Benefits

Urban architectural design and electricity generating façade, as well as direct solar PV technology promotion.



## INNOVATIVE GREEN FARMING

### Situation

An agricultural business in Belarus needed to reduce its dairy farm energy expenses by adding an ecological and economical solar solution.

### Solution

Solet designed and installed a 70 kW polycrystalline module power plant on the farm's rooftop.

### Benefits

The farm provides sufficient electricity for itself with solar power and sells additional surplus to distributors. It is the first farm in the country to solely use solar energy.



## ENVIRONMENTALLY-FRIENDLY BUSINESS

### Situation

An international fast food restaurant chain business values self-sufficiency, cost-saving and has a sustainable approach towards the environment.

### Solution

Solet Technics designed and installed custom-designed polycrystalline solar modules for external façade louvers.

### Benefits

Besides architectural attractiveness, the active restaurant façade produces electricity from solar energy for self-consumption.

# SCIENTIFIC RESEARCH AND DEVELOPMENT

The first Lithuanian satellites **Lituanica Sat-1** and **LitSat-1** that were launched into space by NASA in 2014 are powered by the Solet Group solar panels.

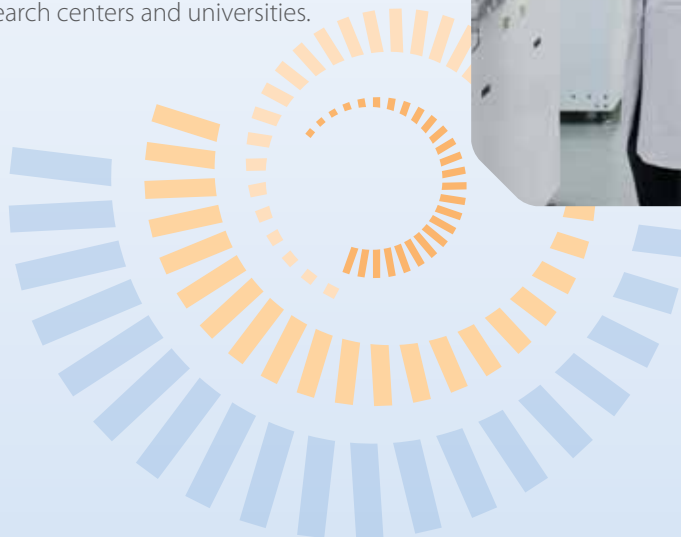


electronics and over 20 years of research and development experience in photovoltaic technology. The laboratory is a member of the European Photovoltaic Industry Association (EPIA) and cooperates with various international solar research centers and universities.

The Solet Group is committed to offering its clients products, known for their quality, durability and excellent performance. In order to ensure this, the Group employs and cooperates with EU-based laboratories and research centers, dedicated to PV technology testing and development.

The Group member **Precizika-MET SC** – a fully-equipped scientific **laboratory** which focuses on **silicon-based solar-cell research and development**, creates and tests advanced photovoltaic technologies in order to achieve cheaper, more efficient, advanced PV technology application.

The laboratory employs a team of 15 scientists with PhD and Master degrees in Chemistry, Physics and Engineering, that has more than 40 years of research experience in



The Group closely cooperates with **Protechlab** – a laboratory, focusing on solar energy research and development, as well as testing, required to ensure successful application of PV technology and verification of PV module manufacturing processes. The laboratory manages testing, characterization and certification of photovoltaic modules, as well as characterization of solar cells and Photovoltaic-Power Plant Quality assurance and testing of lamination processes.

The laboratory is currently working on a solar energy technology development project with the independent IEC-accredited testing laboratory Photovoltaik-Institut Berlin and the University of Applied Sciences and Arts of Southern Switzerland (SUPSI).

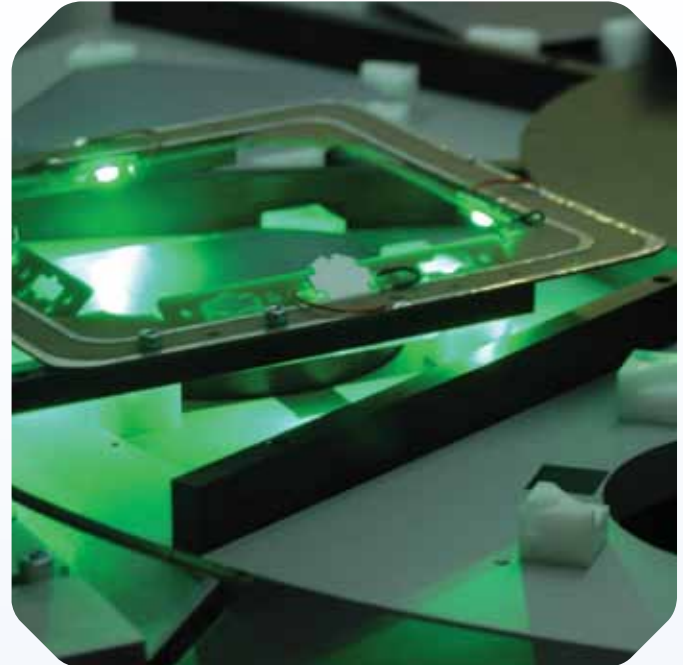
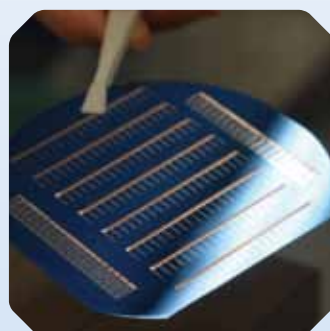
**Characterization and testing** done by Protechlab in order to ensure the current PV technology would be of the highest quality:

## SOLAR CELLS:

1. I-V measurement
2. Spectral response and optical transmission measurement
3. Mapping profile of wafer and texturing surfaces
4. Inspection of Si wafer
5. Electroluminescence analysis
6. P-n transition measurement
7. Grid contact resistance determination
8. Ellipsometry (coat thickness, refractive index)

## PV MODULES:

1. Light soaking & preconditioning
2. Visual inspection and surface microscopy
3. Power measurement at STC (Standard Testing Conditions)
4. Power measurement at NOCT (Nominal Operating Cell Temperature)
5. Performance at low irradiance
6. Outdoor exposure test
7. UV exposure test
8. Mechanical load test



9. Thermal cycling test
10. Humidity-freeze test
11. Damp-heat test
12. Electrical insulation measurement
13. Wet leakage current test
14. Hi Pot test (up to 6 kV)
15. Bypass diode thermal test
16. Electroluminescence mapping of cracks and defects
17. Thermography & Hot-spot analysis
18. Ground continuity testing
19. Reverse current test

## PV-POWER PLANT QUALITY ASSURANCE

1. Inspection of planning
2. Inspection of components
3. Specification check for tenders
4. Measurement after transportation
5. Performance tests for PV modules at the laboratory
6. PV-plant thermography
7. Electroluminescence mapping of cracks and defects
8. I-V measurement in the power plant

All the staged and repeated testing for highest quality control ensure that that Solet PV technology meets all common EU standards and provides long-life solar modules and other technological solutions to the market.







#### CONTACT AND COOPERATION

Contact Solet to employ modern, cost-effective, sustainable photovoltaic products and solutions for your personal or business use.

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