



**Maschinen & Technik, Inc.**  
**Syntegra Solar International AG**  
**Engagement in PV Power Plant Projects**



## 1. MATEC / Syntegra Solar Owners Engineer/Technical Advisor Services

## 2. MATEC / Syntegra Solar at a glance





**MATEC / Syntegra Solar offers Expert Technical Advisor Services for PV Power Plant projects based on in-depth expertise in PV technology and longstanding hands-on experience**



**MATEC / Syntegra Solar Owners Engineer Services: a powerful process to achieve most favorable conditions in PV EPC contracts**

### Technical Advisor / Owners Engineer Services for PV Power Plant Projects



#### **Key Milestones of a PV Power Plant Project:**

- Concept Development and Decision Support
- Technical Feasibility and Commercial Viability Studies
- Initial PV Systems Design – Simulation of Key Metrics
- Support in obtaining all required Approvals / Permits
- Detailed Energy Harvest and Cash Flow Simulations
- Support in securing Project Financing
- Vendor Due Diligence
- Tender Documents Development and Tender Solicitation
- Bid Evaluation and Expert Recommendation
- Contract Negotiation Support
- Monitoring, Validation, Commissioning/FAT Due Diligences
- Supervision of Plant Performance and O&M Services

#### **Syntegra Solar Services and Support:**

*Develop and provide all data for a Go/No-Go Decision*

*Bankable Reports: Proof of Soundness of Concept*

*Robust quantitative data for Financial Model*

*Providing all required data, information, documentation*

*Energy harvest / cash flow optimization, bankable report*

*Optional service to secure debt financing*

*Pre-Selecting specialized EPC's with proven track record*

*Comprehensive management of Tender Solicitation*

*Bid evaluation process closely attuned with customer*

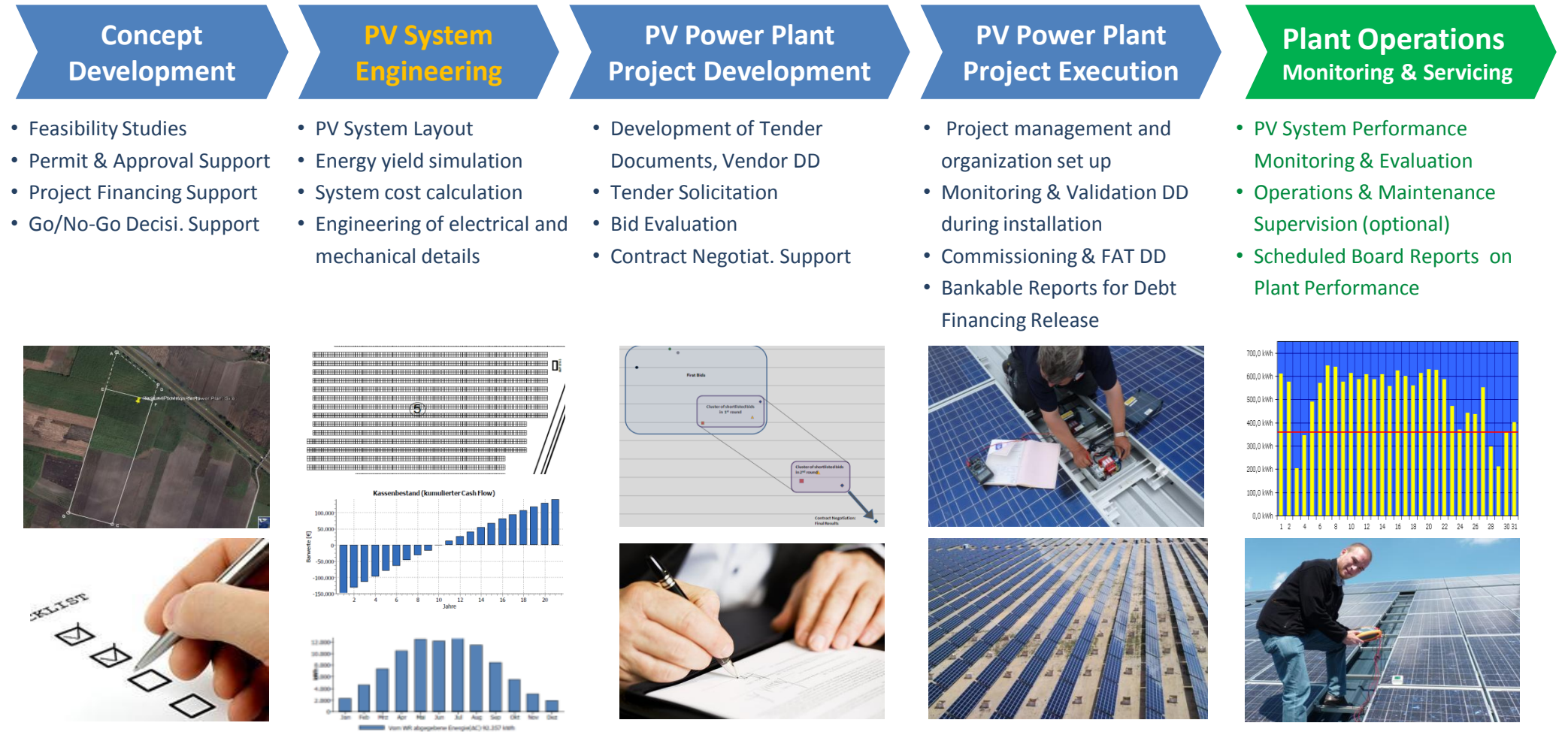
*Focus on guarantees, warranties, and timely execution*

*Timely on-site supervision of Power Plant installation*

*Know-how transfer during first years of operations*

One-Stop-Shop service provision: one partner, one interface, one to take responsibility for supervision of on-time / on-budget project completion

### Phases of a PV Power Plant Project, from initial concept development to commissioning and operations





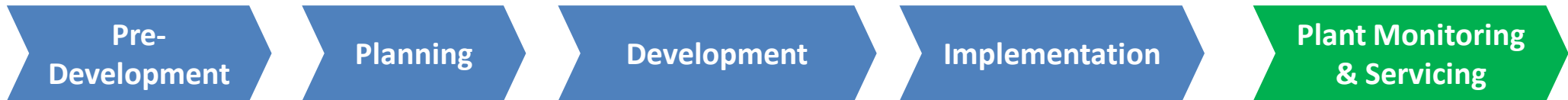


## Technical Advisor Services for PV Power Plant Projects: Providing comfort to Owners, Banks and Lenders through all project steps



CONSULTING &  
ADVISORY SERVICES

Technical Advisor Services provide comfort and ensure quality throughout all project steps



### Customized Technical Advisor Service Packages

- |  |  |
|--|--|
| A) Technical & Commercial Evaluations:     | Technical Feasibility Studies;<br>Advisory on initial PV Power Plant Layouts and PV technologies deployed<br>Energy Yield & Cash Flow Simulations, Assessment of Economic Viability  |
| B) Tender Solicitation & Bid Selection:    | Development and Solicitation of Tender Documents for selected EPC firms, based on Vendor DD<br>Systematic, unbiased expert evaluation of bids received, independent recommendation<br>Contract negotiation support with a focus on technical matters, warranties & guarantees, O&M contracts |
| C) Technical Due Diligences & Supervision: | During installation: Incoming goods control, hardware quality assurance, hardware vendor DD if requested<br>Supervision of Installation, Supervision of Commissioning and Final Acceptance Test  |
| D) PV Power Plant Monitoring & Checks      | On-line Performance Monitoring and Performance Checks<br>Optimization Audits   |

#### Syntegra Solar Advantages:

- Owners Engineer Service covers all technical issues from Project idea to Solar Power Generation
- Over one decade of Know How and Experience gained in key PV markets in Europe and Asia
- Syntegra Solar Owners Engineer services save costs, ensure quality and advance progress
- Syntegra Solar translates complex technical issues in a comprehensible basis for decision- making

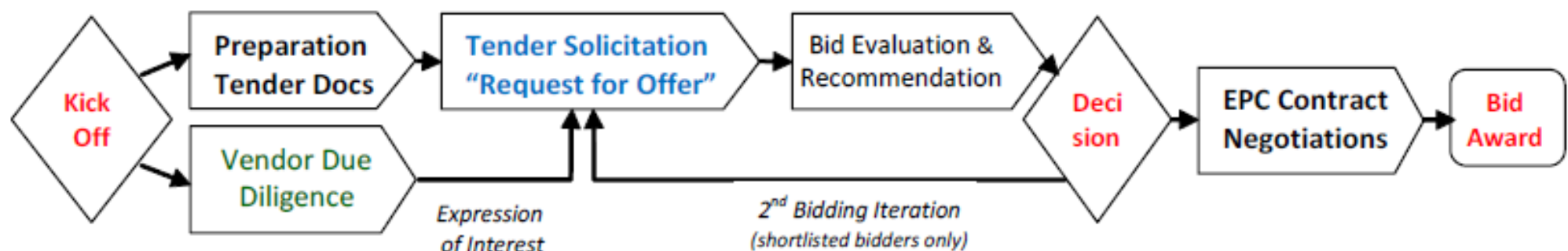
**Comfort based on in-depth technology expertise and longstanding references**

The Tender Solicitation, Bid Evaluation and Contract Negotiation Process is a powerful element of Syntegra's Owners Engineer Services



The organization of the Tender Solicitation process will follow a defined set of steps and involves continued communications of expert levels, covering all technical and legal aspect of a PV Power Plant project, as well as professional project management, to assure a fully transparent tendering process:

- Preparation of Tender Documents according to owners specification and legal requirements
- Vendor Due Diligences – Identification of experienced EPC contractors with ample references
- Solicitation of Tender Documents to PV EPC firms
- Systematic, unbiased expert evaluation of bids received, according to customized Evaluation Matrix
- Independent Recommendation => Bid selection and award



**MATEC / Syntegra Solar provides comfort throughout the entire PV Power Plant Project and assures superior results**

Selected References:	Project Profile
<b>Customer: Utility</b> Philippines 2013 – 2014 Construction in summer 2014	<b>8 MWp PV Power Plant, connected to utilities' grid under FIT scheme</b> Full Owners Engineer Service package: <ul style="list-style-type: none"> <li>• Technical and Economical Feasibility Studies</li> <li>• Tender Solicitation, Bid Evaluation and Contract Negotiation</li> <li>• Construction Supervision and Final Acceptance Test</li> <li>• Monitoring Due Diligence during operation</li> </ul>
<b>Customer: CEPALCO</b> Mindanao, Philippines 2010-2011	<b>2 x 10 MWp, grid connected Solar Photovoltaic Plants</b> Owners Engineer Service: <ul style="list-style-type: none"> <li>• Technical and Economical Feasibility Study, Tendering</li> <li>• Qualification of EPC contractors</li> <li>• Bid evaluation and recommendation</li> </ul>
<b>Customer: Project Developer,</b> BULGARIA 2012	6,5 MWp, grid connected Solar Photovoltaic Park <ul style="list-style-type: none"> <li>• Owners Engineer Services from concept evaluation to Tender Solicitation</li> <li>• Technical and economical Feasibility Study</li> <li>• Bidder qualification, Tender Solicitation process</li> </ul>
<b>Customer:</b> <b>Investors, EPC Contractors</b> Europe 2008 - 2014	<b>Several Solar PV Power Plants in Europe, totaling 100 MWp +</b> Syntegra Solar Services: <ul style="list-style-type: none"> <li>• Feasibility Studies, Investors Advisory, TA for MLA Mandated Lead Arranger</li> <li>• Tender Solicitation, Recommendation and Contract Negotiation support</li> <li>• Construction Supervision, Final Acceptance Test and Reporting, Monitoring Due Diligence, System Optimization</li> </ul>
<b>Customer: EPC Contractor</b> GERMANY 2009 + 2011	<b>72,4 MWp PV Power Plant, Germany under German FIT regime</b> Syntegra Solar TA Services: <ul style="list-style-type: none"> <li>• Construction Supervision and Final Acceptance Test</li> <li>• Commissioning and Grid interconnection Due Diligence</li> </ul>



MATEC / Syntegra Solar provides in-depth PV technology and PV manufacturing process expertise for PV production plant investments

## Selected References: Project Profile

**Customer/MLA:** NORD LB and LBBW, various Landesbanken Germany  
2008 – 2010

**Sunfilm a-Si Thin-Film PV Module Manufacturing Factory, 400 MWp, €150 Million Financing Vol.**

**Owners Engineer Services with a focus on:**

- Technical Feasibility Studies on AMAT a-Si/ $\mu$ c-Si Thin Film Cell Technologies
- Monitoring and Validation Due Diligences during Construction and Equipment Move-In
- Due Diligences during Run-Up and Ramp-Up to nominal production capacity
- Due Diligence on Commissioning, Supervision of Final Acceptance Testing
- Operations Due Diligence during operation

**Customer:** BTA Bank / EURASIA Investment Corporation Kazakhstan and Russia  
2008 – 2010

**EURASIA Solar CIGS Thin-Film PV Module Manufacturing, 220 MWp, €165 Million Financing Vol.**

**Owners Engineer Services with a focus on:**

- Technical Feasibility Studies on all relevant Thin Film PV Cell Technologies with a focus on CIGS TF-PV
- Commercial Viability Analysis for > 200 MWp CIGS TF-PV Module Production Plants in Germany and Russia
- Consulting and Advisory on available EU-wide subsidies for investments in new industry establishments
- Contract Negotiation Support for large Investment in novel high-efficiency CIGS TF-PV Technology, focus on manufacturing equipment, advanced production processes, CIGS TF-PV cell technology innovation

**Customer:** MASADR PV and SCB Standard Chartered Bank Germany and UAE (Abu Dhabi)  
2009 – 2011

**MASDAR PV Thin-Film PV Module Manufacturing Factory 360 MWp, \$220 Million Financing Vol.**

**Owners Engineer Services with a focus on:**

- Validation on Technical Feasibility Studies on AMAT a-Si/ $\mu$ c-Si Thin Film Cell Technologies
- Commercial Viability Analysis for MASDAR PV production in challenging market environment
- Contract Negotiation Support on investment in production equipment and TF-PV cell technology innovation
- Monitoring/Validation Due Diligences during R& and Engineering of AMAT a-Si/ $\mu$ c-Si Pilot Production Plants
- Due Diligences during Run-Up of Pilot Production and initial Ramp-Up to nominal production capacity

**Customer:** IFC / World Bank China  
2010/2011

**Suntech PLUTO High-Efficiency Mono-Crystalline PV Cell Technology, \$ 103 Million Financing Vol.**

**Consulting and Advisory Services with a focus on:**

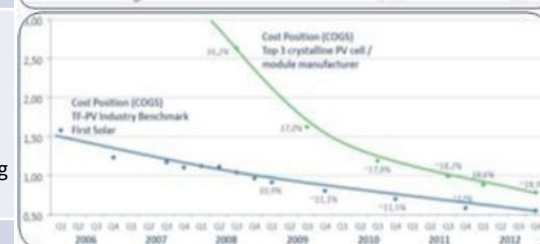
- Technical Feasibility and commercial Viability Analysis and Studies
- Process analysis and cost position validation on PLUTO High-Efficiency PV Cell Technology
- Presentation of Bankable Reports to Investment Committees, Recommendation
- Implementation Monitoring and Result Validation

**Customer/MLA:** HSH Nord and LBB, other Landesbanken Germany  
2009 - 2011

**Signet Solar Thin-Film PV Module Manufacturing Expansion to 200 MWp, €72 Mil Financing Vol.**

**Owners Engineer Services with a focus on:**

- Monitoring and Validation Due Diligences during Construction and Equipment Move-In
- Due Diligences during Run-Up and Ramp-Up to nominal production capacity
- Due Diligence on Commissioning, Supervision of Final Acceptance Testing
- Operations Due Diligence during operation







**MATEC / Syntegra Solar actively develops and invests in PV power projects, “walking the talk” sets us apart from most other Consultants and Advisors**



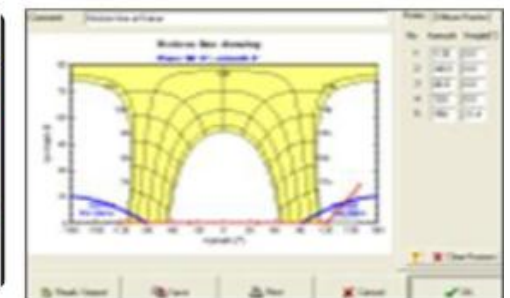
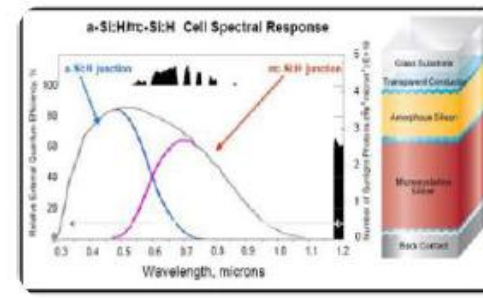
CONSULTING &  
ADVISORY SERVICES

**MATEC / Syntegra Solar is founder and investor in operational firms active in the development and installation of PV power plants / systems**

## PV Project Development and Realization PV



## Expert Due Diligences and Consulting



**Syntegra Solar, as a specialized PV Consulting and Advisory firm, has advised and is actively engaged in the development of a large number of PV Power Plant Projects.**

**In this role, Syntegra Solar enjoys an excellent track record with (strategic) investors, corporations and financial institutions.**

**Deep expertise along the entire PV value chain translates to superior services for PV Power Plants**

Selected References: General Contractor/Owners Engineer for state-of-the-art PV roof top systems



IBC 2 MWp Pilot PV Plant, 2005



Holzguenz 6 MWp Solar Park, 2010



Allmannshofen 7 MWp Solar PV Plant, 2011



Aerial views and photos of the Lieberose 73 MWp PV power plant, Germany (2008 – 2009).

PV power plants of this size require substantial expertise in PV technology, installation, logistics and project management

**MATEC / Syntegra Solar provides comprehensive Advisory & Consulting services for PV Power Plant projects**





**Selected References:**  
**General Contractor/Owners Engineer for state-of-the-art PV roof top systems**



CONSULTING &  
ADVISORY SERVICES

Development incl. all permits & licenses, Design, Installation, Grid-Connection, Commissioning/ FAT, and Monitoring & Servicing



**OPTOTECH 200 KW  
PV roof-top system**

*Lower left  
St. Lucia, small 9 KW  
residential PV system*

**GSI 120 KW  
PV roof-top system**

*Lower right  
Grenada, small 12 KW  
residential PV system*

**140 KW PV roof-top system on  
small stadium, rural Germany**



**MATEC / Syntegra Solar develops, designs and delivers turn-key PV roof-top power systems in selected regions**



**Selected References:**  
**General Contractor/Owners Engineer for state-of-the-art PV roof top systems**



CONSULTING &  
ADVISORY SERVICES

Development incl. all permits & licenses, Design, Installation, Grid-Connection, Commissioning/ FAT, and Monitoring & Servicing



**11.76 kWp**  
**PV roof-top system**  
**Orphanage**

*Lower left*  
*Alabang, small 7.6kWp*  
*residential PV system*

**4.32kWp**  
**PV roof-top system**  
**Elem. School**

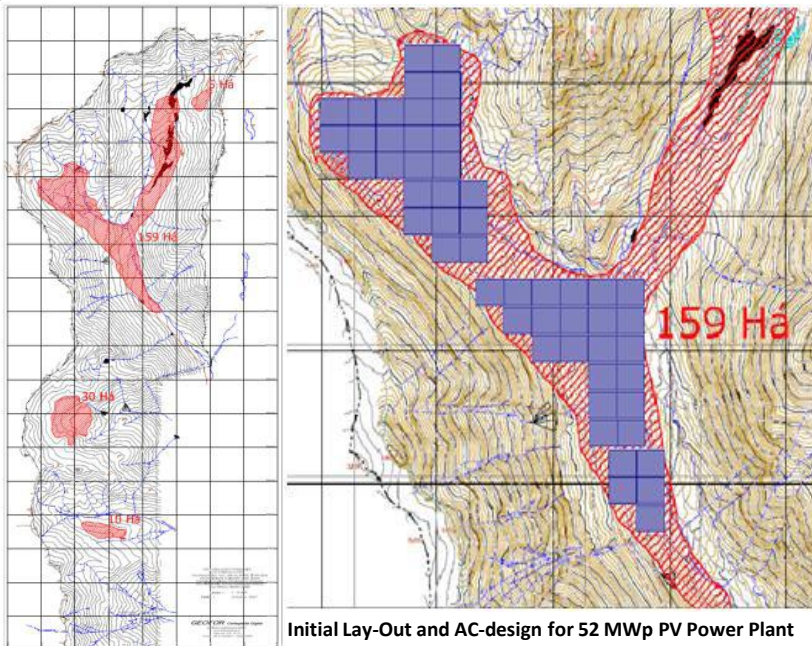
*Lower right*  
*Alabang, small 12.74 KW*  
*residential PV system*

**22kWp Commercial PV roof-top system on**  
**Quezon City (3 phase)**



**MATEC / Syntegra Solar develops, designs and delivers turn-key PV roof-top power systems in selected regions**





Initial Lay-Out and AC-design for 52 MWp PV Power Plant

A 52 MWp PV Power Plant being developed in Phase I on a high-altitude property located 40 km north-east of Santiago de Chile, adjacent to large Mining Strip areas operated by two mining companies (Anglo American, Codelco). The property and all property rights are owned by a privately held Investment Group "Toro Blanco".

#### Specific Characteristics

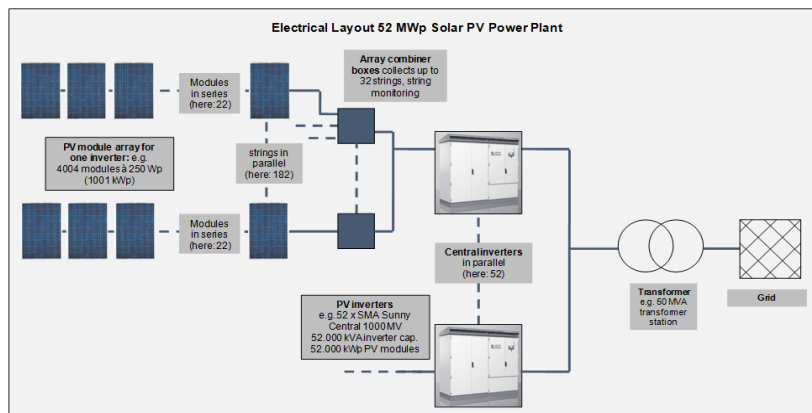
The Toro Blanco property covers 4942 acres at an altitude of 1800m - 2900m. The area enjoys excellent solar radiation all year round with more than 2.240 KWh/m<sup>2</sup>.

Key parameters are:

- 4942 Acres (app. 2000ha) at an altitude of 1800 m - 2700 m.
- Excellent conditions for very high daily energy yield at 6,15 kWh/m<sup>2</sup> average, peak of 9,2kWh/m<sup>2</sup>, which translates to a simulated energy yield in excess of 2000 KWh/KWp (10 year average).
- Infrastructure readily available: a high-voltage power line runs through property allowing for comparably easy grid-connection.
- Toro Blanco PV Power Plant(s) are to be connected to the Chilean Central Grid, where favorable PPA's and power rates apply. . The option to serve the Santiago de Chile Metro Region, where peak power prices in excess of 300 US\$/MWh currently apply, is being discussed.
- Due to extensive Mining Operations in the area, road infrastructure fully available

#### Status

- PV Power Plant project approved by Toro Blanco Investment Group.
- Lead investor and Project Financer in Toro Blanco identified, MOU signed
- For Phase I of the Toro Blanco Project, a PV system lay-out for a 52 MWp Power Plant has been designed.
- Technical feasibility and environmental assessment studies confirm suitability for a larger PV power plant installation.
- Grid connection Study commissioned – negotiations with grid operator under way
- Kick-off for installation of PV Power Plant in Summer 2014





2014

## 1. MATEC / Syntegra Solar Owners Engineer/Technical Advisor Services

## 2. MATEC / Syntegra Solar at a glance





## Syntegra Solar at a Glance



For details and references please visit our website [www.Syntegra-solar.com](http://www.Syntegra-solar.com)

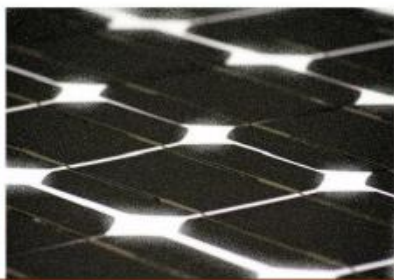
**Syntegra Solar is a specialized Consulting & Advisory and Project Development firm recognized for its focus and expertise in renewable energies and clean technologies**

**Its partners are previous industry executives, investors and entrepreneurs with a proven track record of a long-standing, direct experience in the clean technology sector, namely in Photovoltaics**

**Syntegra has build an extensive network in the RE/PV industry, enjoying an excellent reputation with corporations, strategic investors and financial institutions, as well as government agencies**



**PV Industry Value Chain**



**Power Generation Systems**



**Electricity Market**

**DUE DILIGENCE SERVICES**

**CONSULTING AND ADVISORY SERVICES / *Owners Engineer Services***

**TRANSACTION ADVISORY**





## MATEC Solar at a Glance

For details and references please visit our website [www.matec.com.ph](http://www.matec.com.ph)

**MATEC is a Philippine company with a multi-disciplinary staff of Electrical and Mechanical Engineers and industry specialists with extensive experience in solar power system design and installation. Our capabilities range from small residential solar system all the way to a commercial and industrial grid-tied PV plants. We will strive to find the most optimal PV power systems for each customers need.**



**PV Industry Value Chain**



**Power Generation Systems**



**Electricity Market**

**DUE DILIGENCE SERVICES**

**CONSULTING AND ADVISORY SERVICES / *Owners Engineer Services***





MATEC /Syntegra enjoys an excellent track record with PV Industry Players worldwide as well as with strategic investors and financial institutions, with ample references



CONSULTING &  
ADVISORY SERVICES

Founded in 2001 as an Expert Consulting & Advisory firm servicing the Renewable Energy Industry Sector

Industry

Suppliers

Installers

Operators

Corporates

Financial Institutions

**SUNTECH**

**centrotherm**

**juwi**  
Die Energie ist da

**SIEMENS**

**IFC**  
International  
Finance  
Corporation  
World Bank Group

**kfw**  
ENTWICKLUNGSBANK

**SHARP**

**APPLIED  
MATERIALS**

**phoenix**  
SOLAR

**Shell**

**BASF**  
The Chemical Company

**SOLARWORLD**  
THE SUNPOWERED COMPANY

**SCHMID**



**CONERGY**

**Masdar**  
A MUBADALA COMPANY

**مصدر**  
إحدى شركات مبادلة

**SARASIN**

**Standard  
Chartered**

**SOLARWATT**

**SINGULUS**  
Smart Solutions to Drive the Future.

**WIRSOL**  
SOLAR ENERGY

**Millinet**  
Solar Energy & Business

**NORD/LB**

**EQUITYGATE**  
FINANCIAL ADVISORS

**SolarMax**  
SWISS QUALITY

**komax**

**IBC**  
SOLAR

**LAHMEYER  
INTERNATIONAL**



**MACQUARIE**

**Good Energies**  
POWER FOR A BETTER WORLD

**sunfilm**



**CEPALCO**  
CAGAYAN ELECTRIC POWER  
& LIGHT CO., INC.

**GRUPO ORMAZABAL**

**IDEA**

**NEM SGR**  
Gruppo Banca Popolare di Vicenza

**signet solar**

**abakus**  
solar AG

**DnB NOR**

**LB=**

**WestLB**

**First Solar**

**Konarka**

**abound**  
solar

**NorSun**

**HSH NORDBANK**

**Deutsche Bank**

**IKB**  
Deutsche Industriebank



**MATEC / Syntegra Solar partners are previous industry executives, entrepreneurs and Investors with a long-standing, direct experience in the clean tech industry**



CONSULTING &  
ADVISORY SERVICES

**Seasoned PV Experts and Entrepreneurs, with decades of proven track record**



**Mathias G. Kothe**

Age 57  
Four children  
German, English

**Photovoltaics  
Solar Thermal**

**20+ years of experience as entrepreneur, consultant and executive in the PV industry**

- MSc Engineering, MBA MIT Sloan School
- Founder/CEO of Grenada Solar, Solar Arabia
- VP, Siemens Solar GmbH
- Department Head, BMW
- Senior VP, Deutsche Flugsicherung



**Christoph Biedermann**

Age 57  
Three children  
German, English, French

**Photovoltaics, Wind Energy,  
High Power Semiconductors**

**20+ years of experience in management positions and top management consulting**

- MSc Engineering, MBA INSEAD
- Turn-Around Management as CEO and in interim CEO position
- Global head and member of the EC, ABB Group
- Senior VP and member of the EC, Ciba



**Dr. Guido Agostinelli**

Age 44  
Three children  
Italian, English, French

**Photovoltaics, Storage, Smart Grids,  
e-mobility, Energy Efficiency**

**18 years of experience as manager in the clean technology vertical in R&D, industry and finance**

- MSc Physics, PhD Engineering, EMBA Bocconi
- Co-founder, RERA Solutions
- Venture Capital, Good Energies
- Team Leader, IMEC
- Freelance, AMS Ingenieurbüro



**Tobias Preuss**

Age 31  
German, English, Spanish

**PV Power Systems  
PV Power Plants**

**Certified expert in PV system design and engineering, due diligence, damage appraisal**

- Dipl.-Ing. Power Engineering, Certification Expert for PV Systems TÜV Rheinland
- Commercial/Industrial PV rooftop systems
- Supervision and Quality Management of 50+MWp ground mounted solar parks



**Gianni Operto**

Age 58  
Four Children  
German, English, Italian, French,  
Spanish, Portuguese

**Cleantech, Renewable Energies**

**17 years in senior management positions and 13 years of experience in Cleantech Venture Capital**

- MSc Mech. Engineering
- Venture Capital, Good Energies, Emerald, NexTech
- Vast Board Experience
- CEO Zurich Electric Utility
- VP, ABB Power Generation



**MATEC / Syntegra Solar partners are previous industry executives, entrepreneurs and Investors with a long-standing, direct experience in the clean tech industry**



CONSULTING &  
ADVISORY SERVICES

**Seasoned PV Experts and Entrepreneurs, with decades of proven track record**



**Dr. Guenter Matschuck**

Age 72  
Five children  
German, English, French

**Power Plant Engineering**  
**Thermal, Hydro, Solar PV**

**45+ years experience in Eng. & Marketing Power Generation (Fossil & RE), 35 years in Philippines**

- Ph.D./Ass. Prof. Engineering, Tech. Univ. Aachen
- Member of the Mgmt. Board, Krupp Iran
- CEO/Partner, Maschinen & Technik (MATEC)
- Co-Founder /President German-Phil. Chamber of Commerce & Industry, Phil. Solar Power Alliance



**Jose S. Tadlas**

Age : 48  
Four children  
English

**PV Power Systems**  
**PV Power Plants Interconnection**

**23 + years experience in Electrical Utility Systems & Designs. Career Civil Service professional**

- Assistant Electrical Engineer license holder
- Master Electrical Engineer – Western Institute of Technology
- Bachelor of Law at University of St. La Salle
- Planning & Design, Analysis of utility grid
- Engineering service of utility from generation, transmission, distribution & utilization of electric power
- Evaluation of economic of major capital expenditure projects



**Caldwell S. Hoey**

Age 30  
English

**PV Power Systems**  
**PV Design for on grid and off-grid**

**4 + years experience in Marketing of Renewable Energy projects, feasibility studies**

- Bachelor of Science in Business Administration & Economics – University of Nevada, USA
- Financial Analysts, Merrill Lynch, UNLV Financial Management Association
- Procurement of electrical & PV components
- Five years in Jr. Management position



**Neil E. Capistrano**

Age : 25  
English

**PV Power Systems**

**3 + years experience in Design of PV system and implementation**

- Bachelor of Science in Electrical Engineering – Technological Institute of the Philippines
- Registered Electrical Engineer with the Philippine Regulation Commission
- Member of Institute of Integrated of Electrical Engineer
- Supervision & Installation of various PV rooftop installation
- Design, supervision of PV rooftop for on-grid and off-grid





Contact



CONSULTING &  
ADVISORY SERVICES

## *35 Years Experience in Philippine Energy Sector*



**Maschinen & Technik, Inc.**  
(Since 1979)

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