



Minimizing Financial Risks throughout Design, Construction and O&M

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Highlights Enerparc Group



1.500 MWp connected since 2009

- Enerparc connected globally more than 200 projects with over 1.500 MWp capacity of PV - project sizes range between 500 kW to 80 MWp.

950 MWp own power plants as IPP

- With an own portfolio of more than 950 MWp, Enerparc is one of the leading PV energy producers in Europe.

1.100 MWp under operation and maintenance services

- With long-term contracts of approximately 1.100 MWp, Enerparc is one of the leading O&M service providers in Europe.

1.100 MWp under daily energy trading

- Enerparc has integrated more than 950 MW of own assets in the energy trading mechanism of the energy stock exchange.

Today's dynamic PV market environment



EPC prices under pressure due to auction schemes

- EPC prices already below 1 USD with gross margins of 5-6%
- Recent FiT bids in the range of 0.03 – 0.04 USD/kWh

Bank requirements in new markets very high

- High guarantee requirements
- Ongoing consolidation and market dynamics do not change this

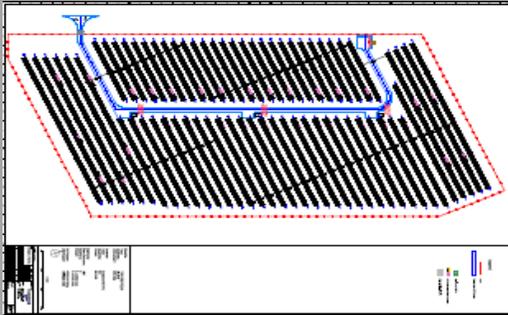
Importance of smart financial engineering increasing

- Financing too slow and still dedicated to “traditional” power economy
- Upcoming emerging markets with higher risk profile

Sustainability of governmental support programs questionable

- Mega-scale projects in remote areas with weak grid infrastructure
- Complicated tender processes and insufficient information basis lead to significant execution delays

Risk factors along the value chain



Design & Layout

- Soil conditions
- Component selection
- LCOE optimized design
- O&M friendly design

Construction

- SCM
- Quality assurance
- Grid connection
- Time span

Operation & Maintenance

- Preventive maintenance
- Monitoring & data quality
- Outsourcing
- Claim management

Design & Layout – Risk mitigation



Soil conditions

- Geotechnical survey and static expertise are most essential for choosing right type of substructure and lengths of piles
- Ramming tests to detect weak areas in the soil

Component selection

- Standardized products (tier 1 quality) make replacement during operations easier
- Local regulations carefully to be taken into account (e.g. fence)

LCOE optimized design

- Tracker vs. fixed tilt, central vs. string inverter concept
- “Replicable” design (e.g. block, table types) allow for faster construction

O&M friendly design

- Accessibility within the site reduces maintenance costs
- State-of-the-art monitoring systems do not only optimize failure analyses but also enables O&M to improve plant performance

Construction – Risk mitigation



Supply chain management

- Customs clearance & coordination of supply most critical points during construction
- Professional in- & outbound logistics to avoid chaos at site

Quality assurance

- Ongoing third party audit to ensure timely fault correction
- Pre-defined acceptance procedures avoid COD delays

Grid connection

- Knowledge of Grid Code to avoid long commissioning procedures
- Clearly defined Scope of Works and early involvement of grid operator to assure timely COD

Time span

- Consider pre-investments to avoid long construction time
- Training of local staff, local environment to be taken into account

O&M – Risk mitigation



Maintenance

- Preventive maintenance is costlier today but saves money later on
- “On demand” services carefully to be balanced

Monitoring & data quality

- State-of-the-art measurement equipment and software to ensure data quality
- Plant improvement due to comparison of performance evaluation

Outsourcing

- In-sourcing saves costs and dependency from “suppliers”

Remote monitoring

- 24/7 monitoring to reduce reactive time
- Defined workflows for repair and maintenance and control mechanisms for site performance reduce replacement time



Enerparc AG

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