

SolarPower Europe O&M Task Force

Guidelines and Best Practices for Utility-scale PV Power Plants in Europe

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Why an O&M Task Force ?

Protect the Return on Investment (ROI)

Secure and Improve the Competitiveness of Solar Power
Generation

Professionalize Operations and Maintenance

O&M is becoming an important pillar



Maximize the ROI

Understand the real costs of Solar Asset Ownership

Ensuring that every kWh produced = optimized kWh



Mitigate the Operational Risk

Reduce the risks of equipment failure

Ensure data quality and analysis to support provision of services to customers, utilities, grid



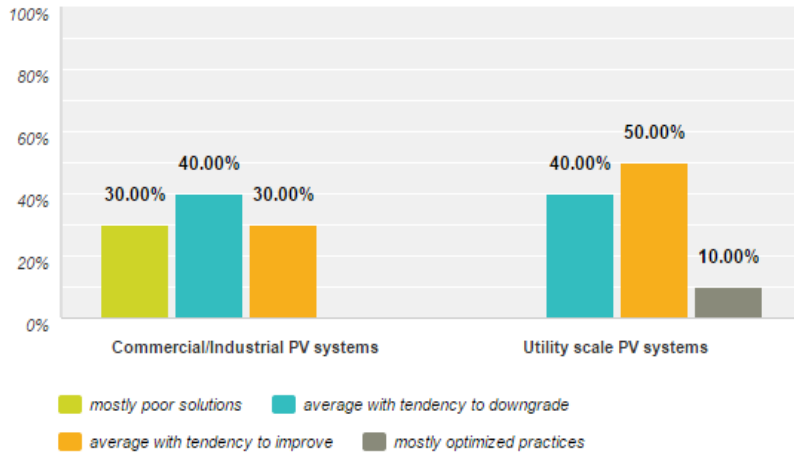
Enhance confidence on solar PV technology

Show to financing and political community the true potential of PV technology in a reduced support scheme era

Service providers to ensure optimal asset performance

The O&M impact on the competitiveness of Solar PV as a serious and reliable energy generation resource is greater than ever

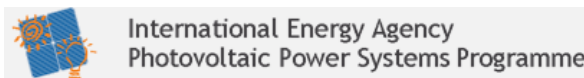
SolarPower Europe steps forward



Main focus:
utility scale projects >1MW

Global O&M market > 130 GW
Europe O&M market > 38 GW source GTM Research

- Services and techniques are changing
- Roles are being updated
- Accountability comes into focus
- Portfolios are changing
- Consolidation but also new players emerge



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What are the objectives ?

Industry – led Guidelines

Ensure professional O&M service provision

- ❑ Create a first version of important industry-led guidelines
 - ❑ Identify minimum requirements for O&M – quality benchmark
 - ❑ Provide best practices
- ❑ Clarify roles and responsibilities of different stakeholders
- ❑ Strive for business relevance
- ❑ Provide a typical maintenance plan
- ❑ Facilitate and stir the discussion among the experts and relevant stakeholders
- ❑ Increase consensus – create de facto standards
- ❑ Adopt best practices
- ❑ Influence relevant discussions
- ❑ **Professionalize our industry**



By SolarPower Europe

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Target Group

Who benefits from this work

Relevant stakeholders

Technology providers

Institutions &
Standardization Institutes

Investors & banks

O&M companies

End users/Owners/IPPs

Component manufacturers

Grid operators

Utilities

Technical Advisors

EPCs

Asset managers

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Members of the Task Force

A unique variety of stakeholders – a considerable representation of EU capacity

Experts from leading companies – November status

Coordinator



Task Force Leader



Members



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First draft ready

Minimum requirements & Best practices

Work based on 2 main pillars



Operations

- Monitoring&Supervision
- Data acquisition and analysis
 - Plant Control
- Alarm Management
- Documentation control
 - Reporting
- Warranty claim management
- Spare parts management
- ...



Maintenance

- EH&S
- Modules
- Inverters
- Transformers
- Mounting
- Cabling
- Landscape
- Cleaning
- Communications
- ...

Definitions

Responsibilities

KPIs

Further design related considerations while developing the first draft



Ensure proper communication & feedback between O&M and EPC, Supply Chain for continuous improvement

Source: pv-magazine (picture 2), maintenance (picture 3)

Operations requirements

Definitions

Power Plant maintenance

- Corrective maintenance
- Preventative maintenance
- Extraordinary maintenance
- Additional services

Personnel and Training

Spare parts management

Environmental Health & Safety

KPIs

- Performance Ratio
- Availability, Energy based availability
- Response time
- ...

Contractual Commitments

- O&M Contractors qualifications
- Responsibility and Accountability
- Liquidated Damages and Bonus Schemes

Power plant operations

- Documentation management system
- Data and monitoring requirements
 - Irradiance and temp. measurements
 - Local meteorological data
 - Inverter measurement
 - String box measurement
 - Configuration
 - Energy meter
 - Alarm
 - Communication
 - ...
- Plant monitoring and supervision
- Performance Analysis & Improvement
- Predictive maintenance
- Power Forecasting
- Reporting
- ...

Claim management

- Warranty claims
- Insurance claims

Security



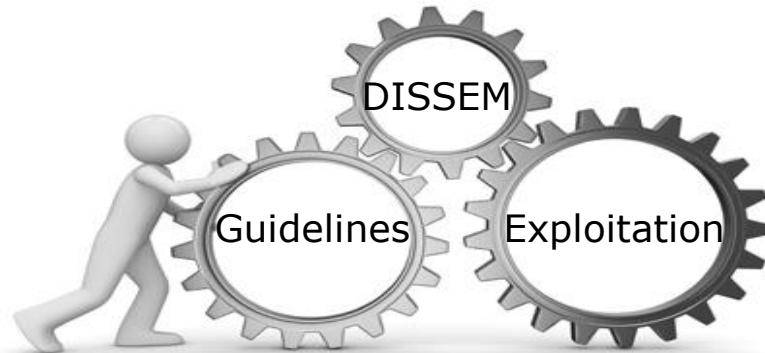
Maintenance - Typical 3-5MW site

Preventive Maintenance | Corrective Maintenance | Additional Services

Equipment sub group	Sub unit	Task	advice SolarPower Europe	
			pace	necessary ?
Documentation	AC-System	Complete and correct of documentation AC-System	initial/ ongoing	necessary
	Auxiliary Systems	Complete and correct documentation of all auxiliary systems (security, monitoring, ICT, energy supply, civil works, etc.)	initial/ ongoing	necessary
	DC-System	Complete and correct of documentation DC-System	initial/ ongoing	necessary
	Plant Audit	Audit of a power plant at take-over by O&M contractor, checking O&M reports, faults, repairs, design conformity and changes, monitoring, performance, etc.	initial + 3-5 yrs	necessary



<ul style="list-style-type: none"> - Inverter - Transformer - Bridge cabinets - Combiner boxes - String cables Panels & frames - Monitoring Systems - Site - Substation - Meter 	<ul style="list-style-type: none"> - Connections - Fuses - Switches - Insulation - Overvoltage protection - ... 	<ul style="list-style-type: none"> - Measure temp & torque of power connections / check are secure - Check integrity - Check functionality and lubrication according to manufacturer recommendations - Resistance measurements - Check functionality - 	<ul style="list-style-type: none"> - Quarterly - Quarterly - Annual - Annual - Quarterly - ... 	
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Dissemination – 2016

- SolarPower Europe tools
- Members' support
- Organize Events / Workshops
- Oral Presentations
- Press releases
- Document readiness

SolarPower Europe Guidelines

- **Revision of first draft**
- **Incorporation of additional comments**
- **Explore synergies with other initiatives**
 - Enlarge the scope (e.g. commercial segment, contract templates)

Exploitation-continuous

- **Adopt SolarPower Europe Guidelines (consortium) – promote it**
- **Increase the consensus of the industry**
 - Participate in relevant discussion tables (investors, standardization bodies etc.)
- **Launch a certification scheme**
- **Continuous update of guidelines**

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