

ATA INSIGHTS WEBINAR

PV DESIGN OPTIMIZATION FROM A TECHNICAL POINT OF VIEW

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PV DESIGN OPTIMIZATION PROCESS

PROJECT BOUNDARY CONDITIONS

— AVAILABLE AREA

- COORDINATES
- SHAPE
- TILT

— SOLAR RESOURCE

- SolarGIS
- LOCAL METEOROLOGICAL STATION
- ALBEDO

— INTERCONNECTION

- EVACUATION LINE LENGTH
- VOLTAGE
- STEP-UP SUBSTATION
- UTILITY SUBSTATION
- GRID CODE REQUIREMENTS
- INTERCONNECTION LOSSES

— CLIMATE

- WIND SPEED
- TEMPERATURE
- SOILING/DUST
- HUMIDITY

— GEOTECHNICAL/HYDROLOGICAL CONDITIONS

- SOIL TYPE
- SOIL CORROSIVITY
- FLOODING RISK
- UXO RISK

— TENDER/AUCTION PARTICULAR CONDITIONS

- ELECTRICITY PAYMENT TERMS
- PARTICULAR SEASONAL/HOURLY WEIGHT FACTORS

PV DESIGN OPTIMIZATION PROCESS

EPC/OPEX ESTIMATED COST INPUTS

— FIXED COST

- **INTERCONNECTION**
- **UTILITY FEES**

— COST PROPORTIONAL TO NOMINAL POWER

- **STEP-UP SUBSTATION**
- **INVERTERS / POWER STATIONS**

— COST PROPORTIONAL TO DC PEAK POWER

- **MODULES**
- **STRUCTURES**
- **REST OF BOS**
- **LAND LEASE COST [\$ /ha]**

— OPEX

- **SKILLED LABOR COST**
- **UN-SKILLED LABOR COST**
- **SPARE PART COST**
- **MODULE CLEANING CONCEPT**

PV DESIGN OPTIMIZATION PROCESS MODELING OPTIMAL DC/AC AND GCR

— ITERATIVE PROCESS SCANNING DIFFERENT PARAMETERS/OPTIONS

- **FIX TILT**
- **ZIG-ZAG**
- **SINGLE AXIS TRACKER**
- **TILT SCANNING**
- **AZIMUTH**
- **DC/AC SCANNING**
- **GCR SCANNING**

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- ABOVE 100 ITERATIONS IN SOME SPECIAL CASES (ADWEA 1177 MWp)

— SOME KEY POINTS

- ENERGY ESTIMATION FOR LONG TERM SCENARIOS 25-30 YEARS
- CURTAILMENT VS YEAR DEGRADATION IN THE LONG TERM
- MODULE WATTAGE FOR A LOWER AREA USAGE
- INNOVATIVE OPTIONS FOR SPECIAL TENDER CONDITIONS

PV DESIGN OPTIMIZATION PROCESS

PROCESSING AND EVALUATING SIMULATION RESULTS

EVALUATION PARAMETERS AND POSTPROCESSING

- CAPEX
- OPEX
- FINANCIAL MODEL PARAMETERS
- ENERGY MWh 25/30 YEARS

The image shows a detailed spreadsheet from a PV simulation software. The top section contains input parameters such as 'Location', 'System Size', 'Inverter', 'Module', and 'Mounting'. Below this, there are multiple columns representing years from 1 to 30. The rows are organized into sections: 'Financial Parameters' (including CAPEX, OPEX, and various financial ratios), 'Energy Production' (showing annual and cumulative energy output in MWh), and 'Financial Results' (including Net Present Value, Internal Rate of Return, and Payback Period). The data is color-coded, with green for positive values and red for negative values, indicating the financial viability of the project over time.

BEST SCENARIO CRITERIAS

- COST / PRODUCTION
- LCOE
- ANY PARTICULAR EVALUATION FORMULA

PV DESIGN OPTIMIZATION PROCESS

FINE-TUNING TECHNICAL SOLUTION

— TECHNOLOGY

- **MODULE WATTAGE**
- **GLASS-GLASS WITH LOW DEGRADATION**
- **BIFACIAL MODULES**
- **CENTRAL / STRING INVERTERS**

— O&M CONCEPT

- **IN-HOUSE / OUTSOURCED**
- **MODULE CLEANING ROBOTS / SEMI-MANUAL**
- **WET/DRY CLEANING**
- **WATER COST**

— LAYOUT

- **ACCESSIBILITY**
- **CENTRAL / STRING INVERTERS**

PV DESIGN OPTIMIZATION PROCESS

OPEX COST KEY POINTS

- **COMPUTERIZED MANAGEMENT SYSTEM (CMMS)**
- **LOW COST PREVENTIVE MAINTENANCE**
- **STRING / CENTRAL INVERTERS**
- **MANUAL / ROBOTIC MODULE CLEANING**



OPTIMAL SOLUTION & CONCEPT DESIGN

- **AC CAPACITY**
- **DC CAPACITY**
- **GROUND COVER RATIO**
- **LAYOUT**
- **SLDs**
- **ENERGY PERFORMANCE P50/75/90/99**
- **O&M COST ESTIMATION**



THANKS FOR YOUR ATTENTION

Q&A