1. About Suntrace

2. Suntrace Resources

3. Selected Credentials
A full range infrastructure service provider

We are a global one-stop shop for all engineering services relating to energy, water, mobility and infrastructure.

We are a global one-stop shop for all engineering services relating to energy, water, mobility and infrastructure.
Suntrace complements the renewable energy expertise of the group – both in engineering and finance.
Independent experts for solar energy solutions

- Established 2009 in Hamburg, Germany
- International team with experienced engineers & managers from Germany, Spain, Brazil, Colombia, Honduras, Kenya, Thailand and partners in Chile, Morocco, Mexico, Southern Africa
- Covering photovoltaic (PV), solar process heat, concentrating solar power (CSP), solar research, independent power producers (IPP) & utilities
- Expertise: >7000 MW solar, > 100 projects, > 40 countries
- Solutions for all steps of the project development chain from feasibility, project development, finance and investment to construction and operation

Suntrace Headquarters in Hamburg, Germany
From initial concept to full realisation

Holistic view through combining meteorological | technical | financial expertise all under one roof
Suntrace – independent experts for renewable energy

Technology & Engineering
- Basic Design
- Energy Yield Simulation
- Site Specific Engineering
- Techno-Economic Optimization
- Procurement
- Construction Supervision

Renewable Resource
- Solar & Wind Resource Assessments
- Site Qualification with Measurements:
  - Solar, Wind, geophysical conditions

Project Development & Finance
- Technical and Economic concepts
- Project development management
- Financial structuring and placement (equity and debt)
Technology and Engineering

- Technical Concept Engineering
- Techno-Economic Optimisation
- Procurement & Construction

**Suntrace provides**

- Independent consultancy & Owners Engineering
- Technical Advisory services from initial concept to full realisation covering the whole range of PV and CSP applications including hybrid and storage systems
- Professional simulation tools with in-house modelling solutions for performance simulation and techno-economic optimisation
Renewable Resource

• Meteorological Measurements
• Resource Assessments
• Site Characterisation

Suntrace provides

• On site measurement solutions with HelioScale stations jointly developed by Suntrace GmbH and Wilmers Messtechnik GmbH
• Cost-effective meteorological assessments from high-level project screening to bankable expert opinions for PV and CSP projects
• Reduction of uncertainties through our step-wise solar resource assessment approach providing a trustful base for the entire project development
Project Development & Finance

- Business Case Development
- Financial Modelling
- Structuring & Arranging Finance & Investment

**Suntrace provides**

- Advisory on solar markets & projects, business models
- Integrated approach with project development know-how for reaching bankability
- Track record for viable business models & financing solutions in dynamic market environments
  > 5 bn USD capital (debt & equity) raised for power plants in over 10 emerging markets
1. About Suntrace

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3. Selected Credentials
We can draw on a powerful network of experts

Pool of over 1000 professionals and experts within global Dornier Group.

Offices and cooperation partners in Germany, Abu Dhabi, Brazil, Chile, Dubai, India, Jordan, Kazakhstan, Mexico, Morocco, Namibia, Serbia, Saudi Arabia, Spain, Tunisia, Ukraine

Membership in organisations and associations such as BSW solar, ISES, Deutsche CSP, IEA PVPS, SolarPACES, Renewable Energy Hamburg & IEA

Cooperation with universities and research institutions such as Fraunhofer ISE, DLR, TU Hamburg

Head Office in Hamburg, Germany with regional hubs in India, Spain and South Africa
Focus on dynamically growing, emerging solar markets

**International Project Activities**

Australia, Bangladesh, Brazil, Cambodia, Cameroon, Cape Verde, Chile, China, Colombia, Cyprus, Czech Republic, Egypt, Ethiopia, France, Germany, Ghana, Greece, Guadeloupe, India, Indonesia, Italy, Jordan, Kenya, Kuwait, Libya, Maldives, Mali, Mexico, Mongolia, Morocco, Namibia, Nicaragua, Portugal, United Arab Emirates, Uzbekistan, Saudi Arabia, Slovakia, South Africa, Spain, Syria, Tanzania, Tunisia, Turkey and Vietnam

**Suntrace Offices**

Germany: Suntrace GmbH
Spain: Suntrace Prisma S.L.
India: Suntrace Energy India Ltd.
South Africa: Suntrace Africa Pty.

**Dornier Group Offices**

Ukraine, Kazakhstan, UAE, Saudi Arabia, Jordan, Serbia
1. About Suntrace

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Namibia – Project Development Support (2014 – ongoing)

Development, Implementation & Operation Support of a 5 MWAC PV plant for an industrial offtaker

Suntrace was mandated by SunEQ to develop a 5MW PV project, after SunEQ was successfully selected as the preferred bidder in a competitive tender process conducted by the client, an industrial offtaker in Namibia.

Services:

- Site selection
- Full solar resource assessment, including installation of ground mounted solar measurement station
- Conceptualisation
- Energy yield
- Techno-economic optimisation
- Feasibility study
- Support with permitting e.g. Generation License
- Financial modelling
- Project finance structuring: debt & equity
- Project finance structuring: debt & equity
- EPC selection
- Transaction support
- Debt financing strategy & transaction structuring
- Negotiation process support
- Financial closing
- Construction Supervision
- Asset Management
Deutsche Investitions- & Entwicklungsgesellschaft (DEG): Market Studies & Project Development for PV Projects in Tunisia

Suntrace GmbH analysed the solar energy market in Tunisia for several business models, both utility-scale grid connected as well as Commercial and Industrial Power Supply with solar energy. Suntrace developed a technical and financial concept for a 10 MW PV project that won the auction for a 20 years PPA with national utilities STEG. Suntrace now is developing the project on behalf of Tunisian partner Aurasol and SunEQ for bankability and construction. Further, Suntrace developed diverse approaches for commercial and industrial power supply for industries such as textiles, cement and food industry.

Services

• In-depth analysis of Tunisian electricity & solar market
• Development of various business models such as utility-grid connected and commercial & industrial power supply with autoproduction scheme
• Policy framework & Banking sector
• Evaluation of various business models for the project pipeline: 10 MW utility off-take PV project in bid submission stage, 6 MW Industrial solar power supply for Dairy Group and 10 MW Industrial solar power supply for cement factory

International Finance Corporation (IFC): Scaling Solar Program - PV

Suntrace as lead company in a consortium with Gauff Power International (GPI) is working as Technical Advisor for tendering of 2 x 100 MW utility scale PV projects in Ethiopia. In addition to the TA Mandate, Suntrace also leads the separate solar measurement campaign funded by IFC.

Both mandates support World Bank Group’s IFC Scaling Solar Program with EEP Ethiopia Electric Power.

Services:

• Site screening and site selection
• Specialist studies including solar resource assessment, geological, hydrological and topographical study
• Comprehensive E&S impact analysis
• Review of grid code and grid integration study
• Preparation of technical specifications for Scaling Solar tender documents
• Technical expert during prequalification and RFP stage
• Bid evaluation and support during tender process
• 1 year solar resource measurement campaign for 3 project location, including the provision of Helioscale Measurement Systems
Cambodia – Technical Advisory (2018 – ongoing)

**ADB: Technical and Commercial Advisory for a Utility Scale Solar PV Park in Cambodia**

Suntrace supports the Asian Development Bank (ADB) in working with Cambodia’s national utility, Electricité du Cambodge (EDC), to develop a solar park of up to 100 MW covering project feasibility and procurement support. As technical and commercial advisor for the project, the company is responsible for the following: development of a feasibility study report, procurement risk assessment, financial model, financial structuring of the project, traser and information memorandum for the project for marketing purposes, draft RfP documents with tender process inputs and support of tender process.

**Services:**

- Pre-Development Support
- Feasibility Study Report
- Environmental and Social Impact Assessment (EIA)
- Project Financial analysis and Economic Assessment
- Procurement Support
The Moroccan Agency for Solar Energy (MASEN) was established to develop and manage the 2000 MW of solar power facilities envisioned under the Moroccan National Plan Against Climate Change and the Moroccan Solar Plan (NOOR) including the Noor Midelt Project. Suntrace, in a consortium with Gopa-intec, has recently completed the feasibility study for the NOOR Midelt solar complex that is planned to have approximately 800-1600 MW CSP/PV solar capacity installed by 2020. Under this assignment, Suntrace has assessed different technology configurations to develop the most economic and reliable solution for the Moroccan Solar Plan. Currently, Masen is initiating the 3-stage tendering process for these projects with continued support from Suntrace.

Services:
- Detailed Feasibility Study
- Site Assessment
- Technology Review (PV and CSP)
- Engineering
- Layout of Project
- Techno-Economic Optimization
- Financial Model, Sensitivity Analysis
- Risk Assessment
- Environmental and Social Impact Assessment (preliminary)
- Grid Impact Assessment
- Tendering Process for Selection of IPP
- Request for Qualification
- Request for Proposal Stage 1 & 2

B2Gold: Detailed Feasibility Study of a PV-Diesel Hybrid project with 15 MW for supply of mining operations.

Heavy Fuel Oil and Diesel engines are installed from the mining operations, and the PV array shall integrate with the engines with the objective to work as a fuel saver on a commercial basis

Services:

• Site assessment
• Definition of Technical concept with technology comparison
• Assessment of mining operation profile and engine management scenarios
• Solar resource assessment
• Conceptual engineering and energy yield modelling
• Technical specifications for EPC and O&M tender
• EPC Tendering
• Financial Advisory with financial modelling
• PPA Term Sheet drafting
Mali – Solar Measurement Campaign (2018 – ongoing)

B2Gold: Solar Measurement Campaign for a Mine in Mali

Planning, commissioning and implementation of a high quality solar measurement campaign, including regular delivery of bankable solar data over a one-year period.

Services:

• Identifying and proposing suitable sites for hosting the solar measurement equipment
• Procuring and importing high quality measuring equipment
• Arranging for site permitting and access
• Commissioning of the sites
• Providing one year of high quality, ‘bankable’ meteorological data
• Ensuring strong local involvement and capacity building
Portugal – Owner’s Engineer for 4 Solar Plants (2018 – ongoing)

Aquila Capital: Owner’s Engineer for Construction Supervision (aggregate capacity 173 MWac) in Portugal

Suntrace was selected in co-operation with Efisun SARL for the construction supervision services of four solar power plants located in Portugal with cumulative capacity of 173 MW.

Services:

• Construction and implementation supervision
• Review of technical specifications
  o Plant layout
  o Electrical design
  o Equipment and civil/mechanical works
• Support building and safety regulatory compliance
• Review planned commissioning procedures regarding electrical/civil/mechanical works

World Bank: Strategic Plan for Renewable Energy Development in Libya

Suntrace GmbH together with GOPA Intec developed a strategic plan for renewable energy development in Libya, including: Energy mix assessment and renewable resource assessment as well as framework for a pilot private sector participation transaction

Services:

- Assessment of energy mix and renewable resources
- Elaborating economic rationale for Renewable Energies (Solar and Wind) in Oil & Gas-rich Libya
- Develop strategic plan for Deployment and upscaling of Renewable Energy capacities based on Least Cost Energy Plan
- Educated on Public-Private-Sector Partnership and Private Sector Investment and (Project-) Finance Mechanisms and Requirements
- Suggest institutional mechanisms, regulatory framework and roadmap for RE deployment
- Feasibility study for pilot PPP project including technical and financial concept (100 MW PV)
Spain – Joint Project Development (2017 – ongoing)

First Tier European Utility: Joint Project Development - PV

Suntrace is engaged with the partner to jointly develop greenfield PV projects in Spain.

Services:

- Site Selection and characterisation
- Initial checks to confirm pre-feasibility
  - Infrastructure close to the project site
  - Irradiation levels
  - Initial technical concepts
  - Permitting requirements
- Negotiation of land options with land owners
- Management of the detailed permitting process from greenfield to ready-to-build-status
Bangladesh – Feasibility Study (2016 – 2017)

Power Cell: Feasibility Study for 100 MW Solar PV and Wind Project financed by the World Bank

Suntrace was engaged with partners EQMS and WindForce to determine the feasibility of grid-connected utility-scale solar PV power plant(s), of approximately 200 MW of aggregate installed capacity.

Services:

- 5 Feasibility Studies:
- Layout plan of the sites, conceptual design
- Cost-benefit analysis
- Prove non-traditional development options (i.e. floating PV)
- Energy yield modelling
- Cost calculation
- Project Structuring
Suntrace Africa Ltd.: Technical Support to Project Development of a 15 MW PV Project

Services:

- Project support with technical advisory and expert assessments
- Site assessment study with site visit and GIS based analysis
- Project feasibility study
- Definition of technical concept with technology comparison (thin film vs. crystalline technology, fixed vs. tracking system, concentrating PV)
- Solar resource and meteorological site assessment
- Energy yield modelling
- Support at authorisation and permitting process
- Financial modelling and economic optimisation
Suntrace GmbH has been mandated to conduct a high-level check review of several PV projects in Vietnam and to identify its economic potential by optimising the plant’s conceptual layout through a techno-economic optimisation.

The consultant’s main objective under this assignment is to support the client’s due diligence of the project and to provide tender process support for EPC and O&M procurement. The project review, initial solar resource assessment, and optimisation of the conceptual plant design aims to show the project’s economic potential and provide basis for further decisions to be taken.

This includes the following tasks:

- Review of developer’s solar resource assessment, technical layout, energy yield assessment, development status and findings of the feasibility study.
- Preparation of technical specifications for tender documents and bidder selection.

Based on this analysis, the consultant has identified potential for improvement leading to the subsequent tasks.

- Analyse available data sources during an initial solar resource assessment and calculation of best estimate for GHI.
- Conduct a techno-economic optimisation of the PV plant conceptual design analysing different technical alternatives (e.g. type of mounting system as fixed and 1-axis tracking, module tilt and pitch, and electrical concept, etc.)
Suntrace is appointed as Owner’s Engineer for 2 x 50 MW PV plant in Vietnam to provide technical advisory for a private Client.

Services:

- Review of Pre-Feasibility studies and Feasibility studies
- Site visit
- Techno-economic optimization
- Preparation of functional technical specification for tender documents
- EPC and O&M Tender Support
- Finalize negotiations with preferred EPC ad O&M bidder
- Construction supervision and commissioning
Mexico – Market Analysis (2016)

First tier European Renewable IPP and Utility: Detailed Analysis of the Mexican Solar Market

The analysis is based on Suntrace’s expert opinion, their partners in Mexico as well as on desk research. The objective was to give the client a detailed overview of the Mexican solar market with detailed information on the auctions for potential investment in PV projects as well as on how to find an optimum market entry strategy.

Detailed analysis of on the Mexican solar market with the following outline:
- Country profile
- Policy framework
- Energy sales models (auctions, direct PPA's)
- Electricity and solar market
- Solar resources
- Banking sector
- Competitors
- Stakeholders
- Auction results
Kenya – Feasibility Study (2016)

Chevron Africa: Detailed Feasibility Study for a 40 MW PV Project in Kenya

Detailed Feasibility Study (DFS) for a 40 MW PV project in Kenya under the National Renewable Energy Feed-in Tariff policy. The DFS is complete and has been handed to the FiT Committee for review. Support and guidance to the project developer for project development steps and structuring of project.

Services:

- Site Assessment
- Solar Resource Assessment
- Technology Review
- Conceptual Engineering of the PV plant
- Conceptual plant design
- Economic and Financial Assessment
- Implementation Plan
- Report with conclusions and recommendations
Multiple Countries – Strategic Market Analysis (2016)

Strategic Market Analysis of Multiple Countries

As part of an internationalising strategy Suntrace developed key criteria for investments in wind and solar power plants for undisclosed clients.

On the basis of these criteria Suntrace generated a country rating tool to identify possible countries.

Afterwards Suntrace did detailed market analyses for these countries, which include the country profile as well as detailed information about the energy market. Moreover the situation of resources and the market of banks were examined.

Finally Suntrace supported the client with the implementation in the fundraising phase, the market entry phase and in the transaction phase.
Mexico – Feasibility Study (2015 – 2016)

DEG: Feasibility Study for two PV Projects in Mexico

Feasibility Study in Mexico including detailed market analysis, business model and project pipeline in Mexico as well as technical and financial analysis of two PV projects.

Country Analysis of the regulatory environments of the Mexican solar market, including:

- General country profile
- Feed-in tariff and government support, including certificate systems
- Institutional framework
- Policy and legal framework: project development aspects such as permitting, access to the grid, transmission, electricity market regulation, land access
- Financial market analysis: available lending opportunities (banks and investors)
Chile – Technical Due Diligence (2015)

Colbún: Technical Due Diligence for three PV Projects (in total 300MW) in Chile

Suntrace in cooperation with 8.2 Ingenierpartnerschaft Obst&Ziehmann and LAER S.A. has performed a technical Due Diligence and contract review for three projects to evaluate possible purchase options for the Chilean electricity producer Colbún.

Services:

• Technical Due Diligence of system design
• Review and verification of solar resource assessment
• Assessment of EPC contracts
• Assessment of O&M contracts
• Technical verification reports
Chile – Owners Engineering (2015)

Austrian Solar: Owners Engineer for 100 MW PV Project in Huatacondo

Suntrace GmbH in cooperation with 8.2 Ingenierpartnerschaft Obst & Ziehmann and LAER S.A. was in the role of the Technical Tender Manager and the Owners Engineer.

Services:

• Provide technical specifications for O&M
  o scope of work, including regular inspections
  o definition of guarantees and criteria for performance
  o standards required to implement a state-of-the-art monitoring system
  o requirements, proposal forms and evaluation matrix

• Indicative bid tender process for EPC and O&M

• Firm bid tender process for EPC and O&M

SunPower Kenya: Detailed Feasibility Study for a 40MW PV Project in Kenya

Detailed Feasibility Study (DFS) for a 40 MW PV project in Kenya under the National Renewable Energy Feed-in Tariff policy. The DFS has successfully been approved by the Ministry of Energy in Kenya. Support and guidance to the project developer for project development steps and structuring of project.

Services:

- Site Assessment
- Solar Resource Assessment
- Technology Review
- Conceptual Engineering of the PV plant
- Conceptual plant design
- Economic and Financial Assessment
- Implementation Plan
- Report with conclusions and recommendations
EERChile: Owners Engineer for 3 x 100 MW fixed mounted solar PV park in Chile

Suntrace together with 8.2 Ingenieurbereitschaft Obst & Ziehmann and LAER S.A., acted as the Owners Engineer for a 300 MW fixed mounted solar PV park in Chile.

Services:

- Project management
- Support project development
- Feasibility study
- Conceptual engineering
- Preparation of vendor pre-qualification process
  - Definition of qualification criteria
  - Creation of pre-qualification documents
  - Vendor selection
- Supply and operation of 4 solar measurement stations
- Technical specifications for EPC and O&M
- EPC and O&M negotiation and selection
HydroChile: Conceptual Design and Energy Yield Assessment for a 150 MW PV plant in Chile

Services:

• Project support with technical advisory and expert assessments
• Solar Resource and meteorological site assessment
• Definition of technical concept with technology comparison (thin film vs. crystalline technology, fixed vs. tracking system, concentrating PV)
• Energy yield modeling
Chile – Owner’s Engineer (2013 – 2014)

Sol del Loa S.A.: Owner’s Engineer for a 100 MW PV plant in Chile

Suntrace GmbH in cooperation with 8.2 Ingenierpartnerschaft Obst & Ziehmann and LAER S.A. was in the role of the Technical Tender Manager and the Owner’s Engineer.

Services:

• Project management and technical due diligence
• Support bidder pre-qualification and selection
• Technical specifications for EPC and O&M agreements
• EPC and O&M contract negotiations and selection
La Huayca: 30 MW PV Ground & Central inverters & 66kV connection

Services:

- Supervision of construction work
- Confirm equipment adequacy and check installations
- Perform commissioning activities
Dii GmbH: Financial Concept and Business Case for the installation of 300 MW PV generation capacity

Services:

• analysis of energy market patterns and power requirements
• development of project financing concept
• financing research – domestic and international debt and equity funding
• financial and investment framework
• banking market and project financing analysis
• financial modelling to assess competitive electricity cost
• calculations of business case and tariff requirements
• legal and financial requirements for financing of solar PV generation capacity in Tunisia

The ESMAP initiative aims to support country-driven efforts to improve renewable energy resource awareness, put in place appropriate policy frameworks for renewable energy development, and provide ‘open access’ to resource and geospatial mapping data. It also supports the Global Atlas being developed by the International Renewable Energy Agency (IRENA) by improving the data availability and quality that can be accessed through the online portal on a modular basis.

Services:

• Identifying and proposing suitable sites for hosting the solar measurement equipment
• Procuring and importing high quality measuring equipment
• Arranging for site permitting and access;
• Commissioning of the sites
• Operation and maintenance of 5 solar measurement stations for 24 months including data quality control
• Providing two years of high quality, ‘bankable’ meteorological data
• Ensuring strong local involvement and capacity building
Bangladesh – Solar Resources (2017 – ongoing)


This project is a project of the World Bank Energy Sector Management Assistance Program (ESMAP). The ESMAP initiative aims to support country-driven efforts to improve renewable energy resource awareness, put in place appropriate policy frameworks for renewable energy development, and provide ‘open access’ to resource and geospatial mapping data. It also supports the Global Atlas being developed by the International Renewable Energy Agency (IRENA) by improving the data availability and quality that can be accessed through the online portal on a modular basis.

Services:

- Planning, commissioning and implementation of a high quality solar and wind (LiDAR) measurement campaign at a single site selected by the GoB
- Site selection, procurement and logistics
- Regular delivery of bankable solar and wind data over a two year period
- Ensuring maintenance, security, local cleaning/caretaking, mitigation against extreme weather events and corrosion, and a full re-calibration at the end of the measurement period
- Ensuring strong local involvement and capacity building at all stages of the measurement campaign
Market Sounding for 550 MW Wind Project

Services:

• Bank market sounding: conduct sounding of financing options – sounding and suggesting possible sourcing alternatives, local funding from commercial banks, ECA coverage on EPC-related loans, bi- and multilateral banks (in particular, IDB, CAF, local Colombian Banks, but also KFW, World Bank - IFC and others, as they appear useful).

• Financial modelling: set up a financial model (single currency) to reflect all necessary technical, economic and financing assumptions to navigate towards an optimised bidder price for upcoming PPA auctions in Colombia

• Financial structure outline: develop alternative financial structuring scenarios and run these with the financial model in order to elaborate an optimum solution;

• Optimize scenarios according to financing options help evaluating their effect on key financial and economic performance indicators of the Project. These would include electricity costs and bidding/sale prices, while considering side constraints such as IRR requirements and maximum gearing ratios.
South Africa – Solar Resource (2015 - ongoing)

Engie: O&M of Solar Measurement Station for Kathu Project

Services:

• O&M services for solar measurement station
• Data validation
• monthly measurement reports
• Maintenance site visits
• Bankable solar resource expert opinion
• Quality control of on site measurements
• Adjustment of satellite data to on site measurements
• calculation of uncertainties
• TMY creation
Maldives – Solar Resources (2014 – ongoing)

World Bank ESMAP: Renewable Energy Resource Mapping

• The ESMAP initiative aims to support country-driven efforts to improve renewable energy resource awareness, put in place appropriate policy frameworks for renewable energy development, and provide 'open access' to resource and geospatial mapping data. It also supports the Global Atlas being developed by the International Renewable Energy Agency (IRENA) by improving the data availability and quality that can be accessed through the online portal on a modular basis.

• The measurement device is equipped with real-time data transmission and reporting. The delivery of high quality solar resource measured data is needed for validation of solar resource models. Key to this effort is the focus on reducing uncertainty of the models, thereby reducing financial and technical risk during implementation of Photovoltaic solar power plants.
Maldives – Solar Resources (2014 – ongoing)

World Bank ESMAP: Renewable Energy Resource Mapping

Services:

- Advisory related to solar resource verification
- Site identification and site selection, providing advise for solar map making
- Procurement and installation of 4 solar measurement stations
- Operation and maintenance of 4 solar measurement stations for 24 month including data quality control
- Verification and calibration of instruments
- Capacity building and training
RWE/Innogy: Independent validation of performance simulation and testing procedure for ISCC plant

Services:

- High level quality check of the solar resource assessment report including satellite data and on site measurements
- Performance simulation and assessment of EPC provided thermal energy yield of a 115 MWth parabolic through solar field for an ISCC power plant
- Detailed modeling of warm-up and cool down procedures including solar field transients
- Assessment of the solar field performance testing requirements outlined in the terms of references and elaboration of suitable modifications for the EPC agreement

The work was in support of RWE/Innogy bid preparation for the Al Abdalyiah ISCC tender issued from Kuwait Authority for Partnerships Projects (KAPP) and the Kuwait Ministry of Electricity and Water (MEW).
**Tanzania – Solar Assessment and Feasibility Study (2015 – ongoing)**

**ZECO: Solar Assessment and Feasibility Study for Wind parks, Solar Farms and Solar Home Systems in Zanzibar**

**Services:**

- Solar measurement campaign including support on installation of measurement stations and quarterly data report
- Feasibility studies for potential wind farms, solar parks and solar home systems, including technical, economic and financial analysis
- Risk and sensitivity analysis of technical, economic and financial performance
- Analysis of regulatory schemes for development of wind and solar systems, recommendations and best practices from international experience
- Close collaboration with governmental entities and other stakeholders
- Training and capacity building on solar assessment, financial analysis and regulatory schemes
K.A.CARE: Techno-Economic Optimisation for 50MW CSP Project

Services:

- Specialist study under subcontract from ILF for K.A.CARE
- Adapt CSP Solar field size and row distance to define plant layout within given site boundaries
- Cost assessment for CAPEX and OPEX and creation of cost curves
- Definition of economic and financing conditions together with the client
- Supervise setting-up and operating of CSP specific financial model and sensitivity calculations
- Perform techno-economic optimisation to identify lowest LCOE configuration (variation of Plant capacity and storage capacity)
- Development of plant layout drawing
- Report

Europe Aid: Capacity Building in Wind and Solar, Key Expert CSP (WECSP)

Services:

- Planning and coordination of all technical tasks related to site selection and qualification of the CSP pilot plant including topographical surveys, soil and geotechnical studies.
- Develop technical concept and cost estimates for the CSP demo plant.
- Solar resource assessment and estimation of potential yields of the CSP plant.
- Define specifications of the CSP pilot plant.
- Contributing to the definition of the CSP test laboratory.
- Contributing solar energy aspects to the work packages on the national renewable energy strategy.
- Development of curricula for CSP at Jordan universities and training courses for CSP industry in the country.
- Definition of criteria for commissioning of the CSP pilot plant
Kuwait Oil Company (KOC): Process Simulation Study of Integrated CSP Plant for Solar Thermal EOR

Subject of the study was a process simulation of the proposed integrated concentrating solar power plant (CSP) for production of steam, power & fresh water from sea water for Enhanced Oil Recovery (EOR). For that purpose different CSP technologies have been analysed regarding their suitability for the considered integrated CSP plant. The produced thermal energy, by solar field and diesel fired backup boiler, is used in different applications in the plant. Main energy consumers are steam production for EOR oil well steam injection, heating steam for desalination unit producing make-up water for steam cycle and mirror wash water, and live steam for steam turbine. The power plant concept has been optimized to efficiently generate the required energy supply, with the aim to achieve a high solar share in steam generation with the lowest levelized cost of steam.

Services

- Site visit of oil field
- Solar resource assessment as basis for energy yield simulation
- Comparison of three CSP technologies regarding suitability for EOR process
- Design of desalination unit
- Simulation of the integrated CSP plant with EBSILON
- Techno-economic optimization of whole plant towards lowest levelized cost of steam (as main output)
KfW: Technical Expert to Ministry of Energy in CSP Tower Tender Evaluation

KfW has financed the technical expert (Consultant) to support the Ministry of Energy during the technical evaluation of CSP Tower Projects submitted under its call for tender.

Services:
Review evaluation criteria proposed and recommend an operational applicable evaluation process for the detailed tender evaluation

- Review of CSP technology proposed
- Review and evaluation of electrical capacity (MW), storage capacity (h) and technology, conventional fuel used for freeze protection and co-firing
- Review of land availability and suitability for proposed power plant configurations
- Review of environmental impact assessments supplied by applicants
- Feasibility of grid connection including grid connection point
- Review of PPA for the projects
- Review of water availability for operation and maintenance of proposed plant configurations
- Review CSP experience of applicants in respect to project development, engineering and construction experience for similar Projects
- Preparation of evaluation report
South Africa – Financial Advisor (2011-2012)

Ilangoalethu: Project Finance & Structuring Advisory Services for the Development of a 125 MW CSP plant

Suntrace acted on behalf of Sponsors as Project Finance Advisor to the project. Suntrace helped set up a sophisticated financial models, advised on financing options in the international and local banking markets. In addition, Suntrace provided financial and structuring advise in relation to the basic set up of the project’s contractual framework. Suntrace wrote the Information Memorandum and assisted to obtain financing commitments from banks with an overall debt volume of over 5 bn South African Rand (EUR 500 MM).

Services:

- Financial Structuring and Modelling
- Project Finance Structure and Fundraising Strategy
- Assistance in Arranging Finance
- Strategic support to the Client
- Preparation of Information Memorandum
- Development of banks term sheet
- Bank sounding and negotiations
Chile – Financial Advisory (2011)

GIZ: Economic Assessment for a CSP Plant Power Purchase Agreement in Chile

Services:

• Analysis of site specific solar irradiation and relevant meteorological data

• Development of an economic assessment of a PPA price range for a CSP power plant concept, considering different power and thermal storage capacities

• Determination of the levelized cost of electricity for different plant sizes

• Analysis and description of mayor cost components used in the economic assessment

• Independent review of economic assessment of CSP plants performed by the Renewable Energy Division of the Ministry and the Center for Renewable Energy Chile
India – Solar Resources (2011 – 2014)

Solar Mapping and Monitoring (SolMap-Project) for India (Part of MNRE’s SRRA project)

- The Indian ministry of new and renewable energy (MNRE) initiated the solar radiation resource assessment (SRRA) project to provide investment grade bankable solar radiation data to the solar industry, project developers, decision and policy makers in financing institutions and also the scientific community.

- SRRA has set up 120 automatic meteorological stations with solar radiation instruments fulfilling the highest commercially available standards across India. The solmap project contributes to the SRRA project by establishing quality checks of the data, following international best practices, and further data processing as well as gap fitting.

- Suntrace supported the project by the implementation of quality checks, data processing, solar radiation data product generation and analysis.

- Suntrace developed, adapted and improved advanced algorithms for quality checks, soiling correction and gap filling. Furthermore, an improved solar radiation atlas of India adapting ground measurements to satellite-derived solar radiation data was supplied within the project.
Brazil – Solar Resources (2013 – 2014)

**GIZ: Best practices for solar and climatological measurements and data analysis for CSP**

**Services:**

Due Diligence: Visit and verify quality of 15 CSP-specific meteorological stations in Brazil (site selection, quality of installation, data quality)

Four seminars over 3 to 8 days covering the following topics:

- Overview of CSP technologies
- Performance simulation of CSP
- Site selection for CSP plants
- Requirements & recommendation for CSP-specific meteorological stations:
  - Site selection criteria and installation of stations
  - Operation and maintenance of stations
  - Calibration of instruments and uncertainties of measurement
  - Data archiving & processing
  - Correlation of ground with satellite data
  - Estimation of longterm DNI data
  - Generating Typical Meteorological Years (TMY)
KfW: DKTI Concentrated Solar Thermal Power (CSP) Brazil, CSP Measurement Criteria

Providing Suntrace’ expert knowledge and advise in the field of CSP solar radiation analysis and country (Brazil) specific experience to KfW to create:

• Guideline report giving recommendations on CSP-specific solar resource measurements and analysis.
  o Meteorological Data required for Evaluation of the Bankability of large CSP Projects
  o CSP Climate Data Collection Requirements
  o Data Collection and Evaluation
• Oral presentation at the workshop at KfW office in Frankfurt.
• Tool for project-specific recommendations of measurement equipment
• Tool for selection of appropriate sites for CSP-meteo stations
• Tool for regular maintenance of meteorological stations
• Tool for check of CSP-specific meteorological stations and re-calibration
We have won the trust of a growing international base of public and private clients
What can we do for you?

Let's keep in touch

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… FOR BETTER RESULTS.