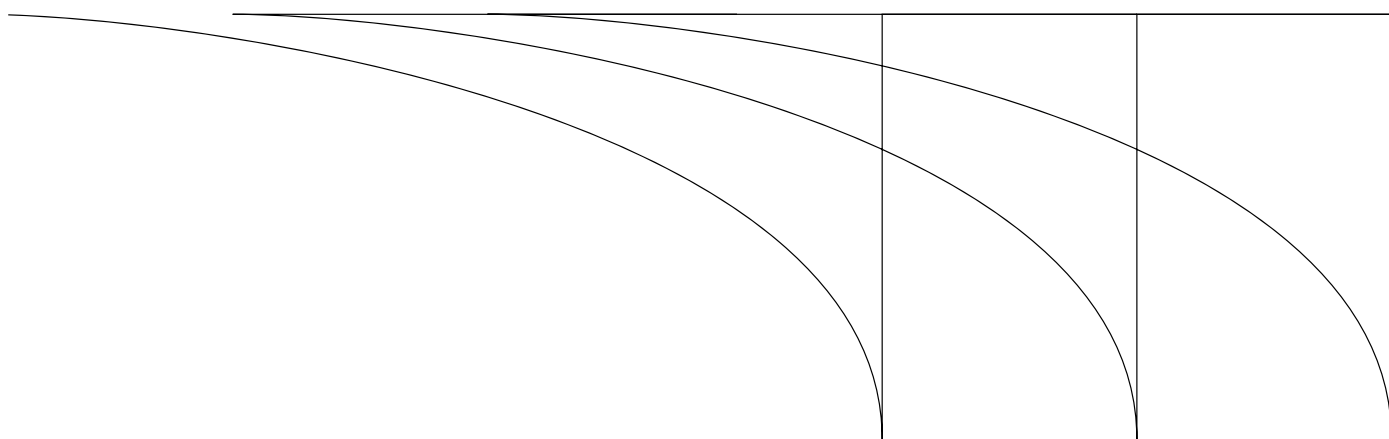
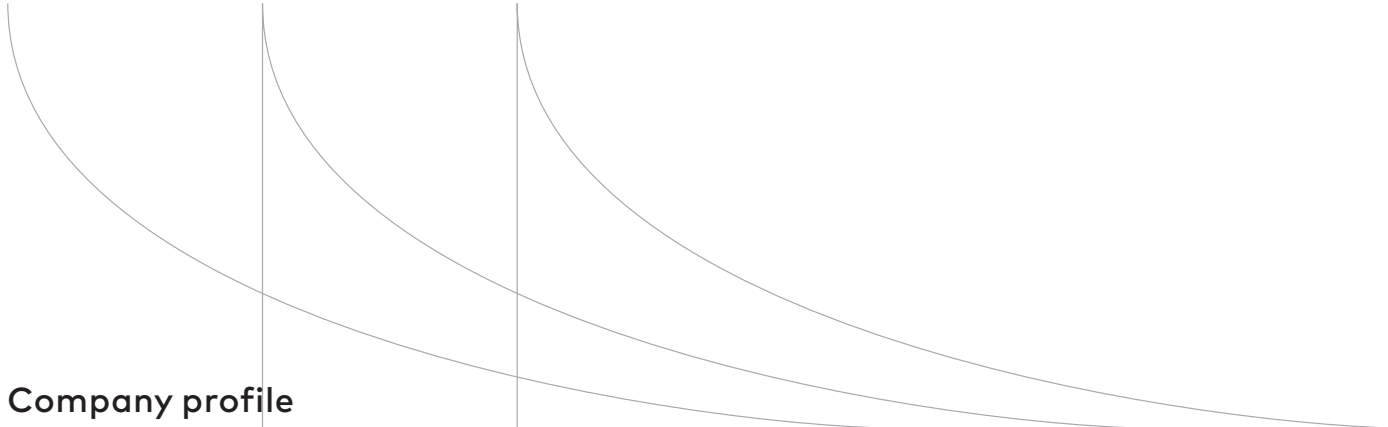


sbp sonne gmbh





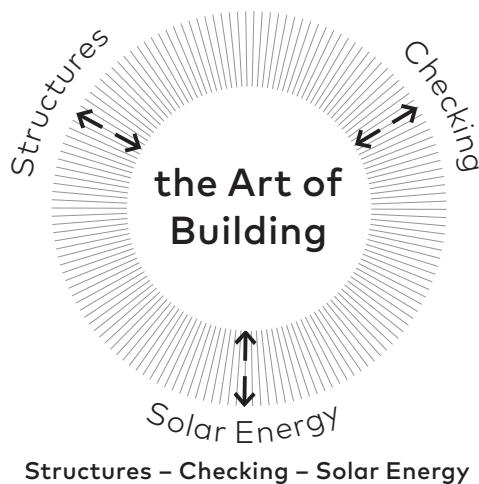
Company profile

schlaich bergemann partner are independent consulting engineers.

Since the founding of our office in 1980 by Jörg Schlaich and Rudolf Bergemann, our aim has been to design and develop innovative structures. Our projects range from long-span lightweight roofs, a wide range of bridge types, slender towers and innovative buildings, to pioneering solar power plants.

Since 2002, the office was managed by Knut Göppert, Andreas Keil, Sven Plieninger and Mike Schlaich. In 2011, Michael Stein was appointed partner in our New York office. Knut Stockhusen became partner in 2015. Today the six of them cooperatively lead schlaich bergemann partner.

schlaich bergemann partner is divided into three areas of core competencies:



For more than three decades, schlaich bergemann partner has been consulting and developing technologies in the renewable energy sector. Due to outstanding success, sbp sonne gmbh was spun off in 2009 to house all the office's renewable energy activities.

Consulting Engineers for Renewable Energy sbp sonne gmbh – Stuttgart

Managing Directors: Markus Balz, Andreas Keil
 Director: Gerhard Weinrebe



Markus Balz



Gerhard Weinrebe

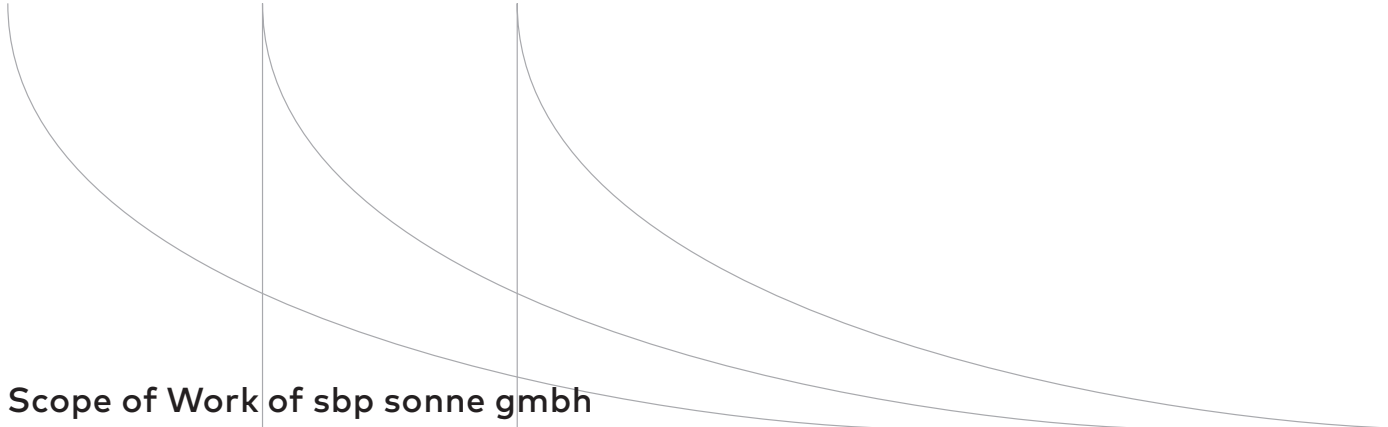
Today, sbp sonne is arguably the most experienced solar engineering office globally, leading specialized and cutting-edge technology development projects in six continents.

What sets sbp sonne apart is its unique ability to effectively apply systems engineering knowhow to the solar energy sector, whose multidisciplinary nature cannot be covered by one of the traditional engineering disciplines alone.

Our highly productive team consist of structural engineers, mechanical engineers, aerospace engineers, physicists and specialists for thermodynamics, optical and energy systems.

Integrated system solutions are enabled by combining decades of interdisciplinary knowledge, which extend beyond structural engineering into the fields of thermodynamics, kinematic and process control, drive technologies, optics, software development, meteorology, series manufacturing and cost reduction.

Combining these skills and fields of expertise under one roof enables complex tasks to be performed on a comprehensive basis and inevitably leads to overall system innovation and true technologically cost-effective trend-setting systems.



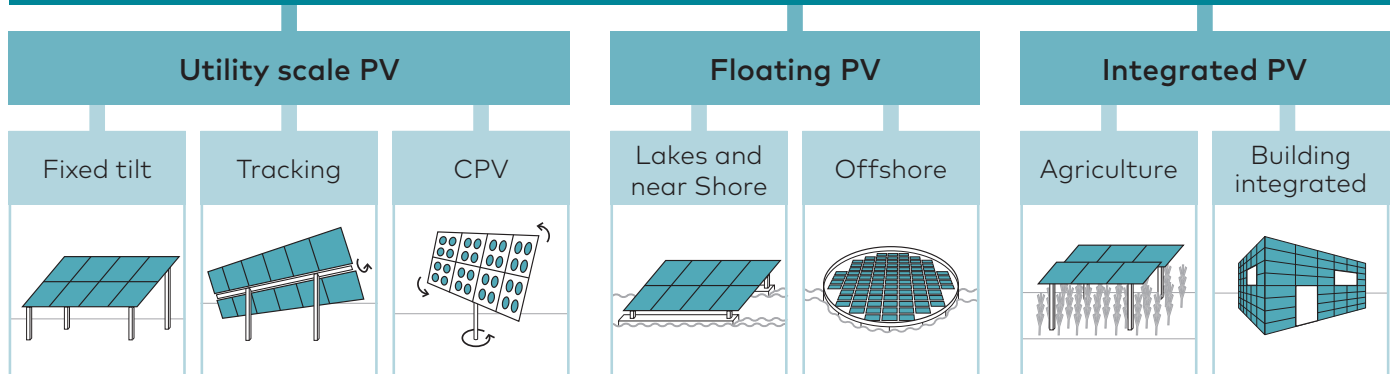
Scope of Work of sbp sonne gmbh

It is foreseeable that the use of the sun's radiation in its different variations will play the most important role in the context of future energy supply. For this reason, sbp sonne is dedicated to developing new technologies for the use of solar radiation – ranging from large utility scale power plants to decentralized power production.

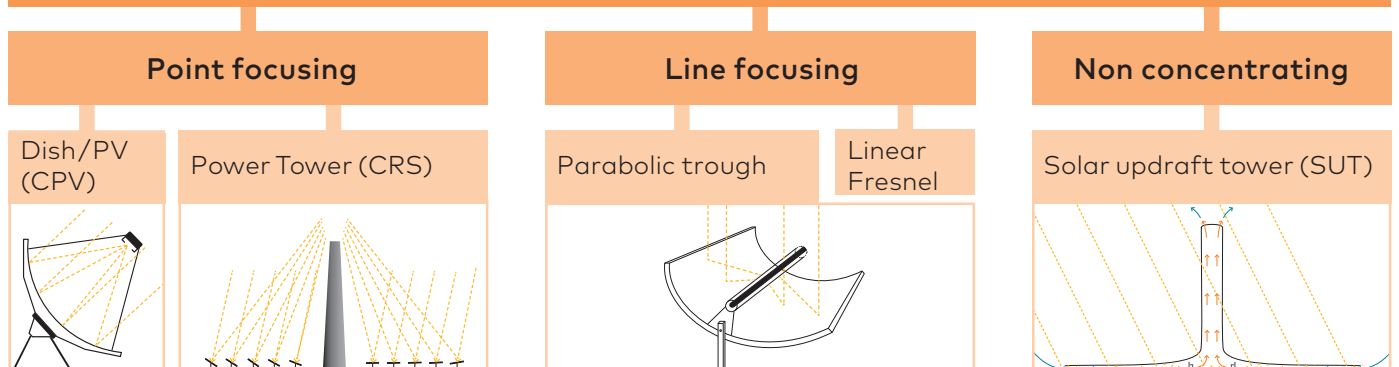
Our key technologies include:

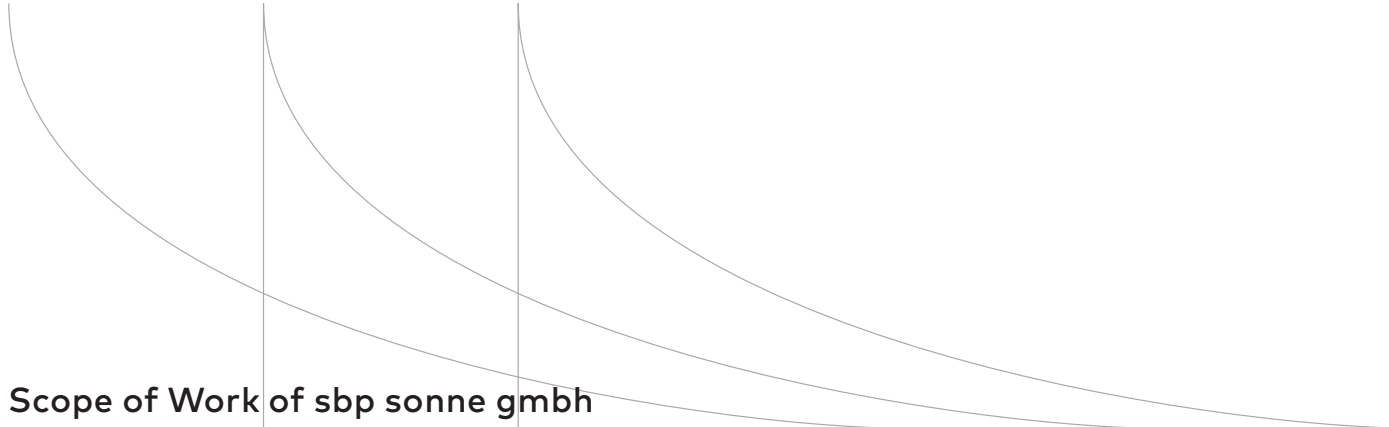
- Single axis photovoltaic trackers
- Fixed tilt photovoltaic structures
- Parabolic trough collectors
- Heliostats and technologies related to solar power towers
- Concentrating photovoltaic (CPV) systems
- Building integrated photovoltaic systems (BIPV)
- Climate covers
- Dish Stirling systems
- Solar updraft towers

Photovoltaics



Solar thermal power plants



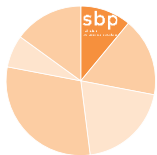
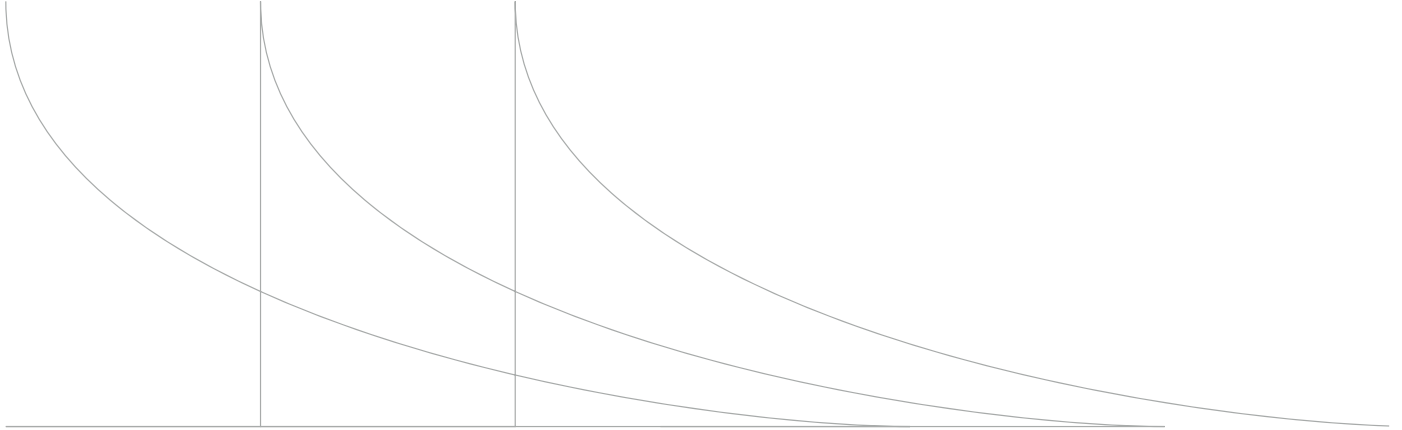


Scope of Work of sbp sonne gmbh

While our services are customized to the specific needs of our clients, typical activities include:

- Development, licencing and implementation of solar technologies
- Multidisciplinary consulting for client and owner
- Cost analysis and techno-economic optimisation of all solar energy systems
- Structural and technology optimization
- Project management
- Conception of solar energy technologies
- Efficiency calculation and yield analysis
- Structural reviews, conceptualization, calculation and optimization services.
- Optical evaluations and optimizations (intercept factors, flux density distribution, and flux control)
- Interpretation and statistical analysis of meteorological data
- Conceptualization and logic of structural stow behavior
- Controls engineering and drive units
- Planning of prototype and series production
- Assembly supervision and quality management during construction
- Feasibility studies
- Technology provider/ licenser of EuroTrough, UltimateTrough and Stellio heliostat





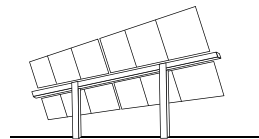
Worldwide CSP Market



Chinese CSP Market

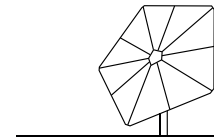
CSP Market

As of 2020, the technology developed and licensed by sbp sonne is implemented in 13% of the global CSP market and 45% of the CSP market in China.



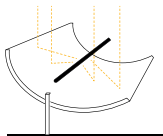
PV Projects

sbp sonne has conducted key consultation tasks in more than 10GWe worth of commercial PV projects.



Heliostat and Tower

sbp sonne is an expert in heliostat and tower design for central receiver systems and has developed the award winning Stellio heliostat. sbp sonne received the prestigious 'SolarPACES technology innovation award' three times.



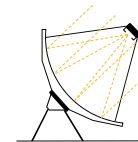
EuroTrough Collector

sbp sonne designed the well-known EuroTrough collector, which among other recognitions was chosen for all three of the 50MW Andasol power plants in Spain. The design is also utilized in countless other power plants. The design is also utilised in many other power plants in Spain, Egypt, India, Kuwait and China.



sbpRAY

Our software development capability was recognised by winning an innovation award for the inhouse sbpRAY raytracing software.

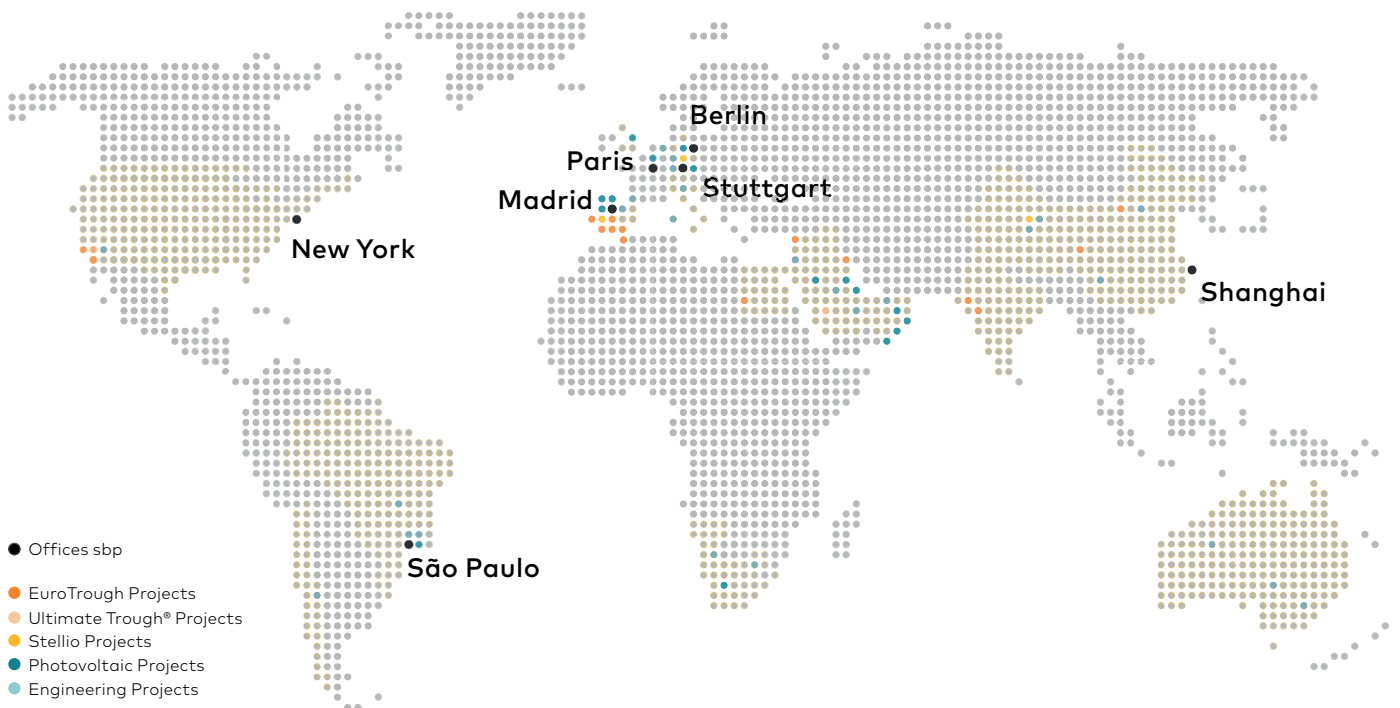


Dish Stirling

In 1986, sbp designed and put the first Dish Stirling systems into operation.

Together we develop innovative solutions.

Offices and projects worldwide



New York

schlaich bergemann
and partner lp

São Paulo

sbp latin america

Madrid

sbp ingenieros
españa, s.l.

Paris

sbp france sarl

Stuttgart

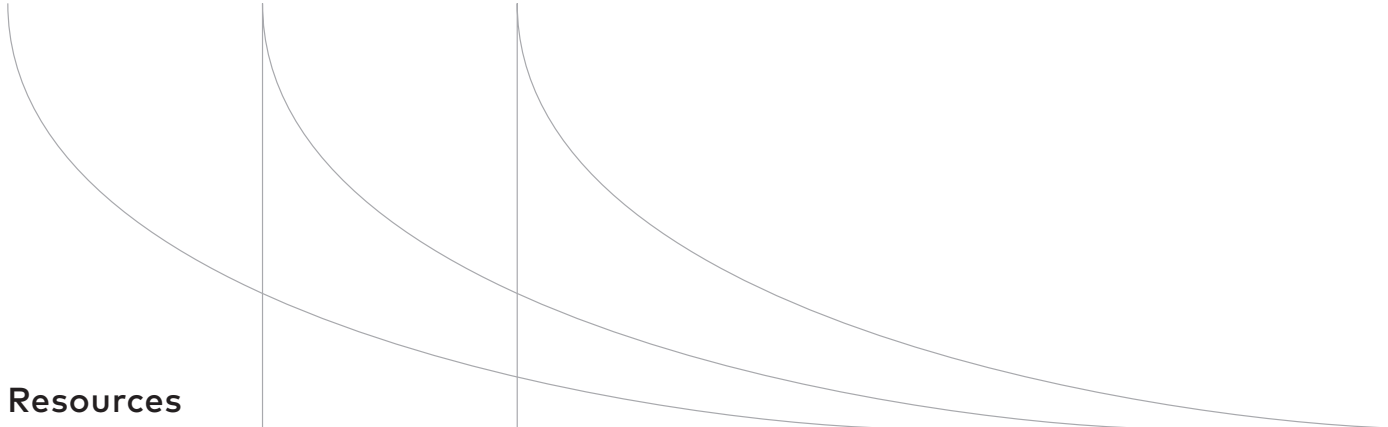
sbp gmbh
sbp prüfingenieure gmbh
sbp sonne gmbh

Berlin

sbp gmbh
sbp prüfingenieure gmbh

Shanghai

sbp engineering design
consulting co., ltd.



Resources

Technical Equipment

All workstations are linked in a network via a cross-location, mirrored server structure. Our internal IT management staff guarantees a complete data backup and permanent archiving.

Extensive software packages are available to all employees. We work with all current CAD and CAE programs, tendering and layout programs. Our internal specialists are able to develop special applications for specific projects and tasks.

In addition to individual tools, the latest plotter systems, folding devices, 3-D printers, high-performance photo printers, cameras, mobile phones and tablets are available, guaranteeing the complete digital processing of projects across countries and time zones.

CAD: Nemetschek Allplan 2019, Autodesk AutoCAD 2020, Rhinoceros 6, Autodesk Inventor 2020

CAE: SOFISTIK Finite Elements: ASE4, SOFISTIK 3D-Frameworks: STAR3, SOFiplus graphic pre & post-processor Cubus CEDRUS, FAGUS, SJMepla glassdesign, Kretz composite design

BIM: Revit 2020, Navisworks 2020, Allplan 3D 2019, Sofistik BIMtools for Revit Structure and Revit Extension 2020, Dynamo

FEA: Ansys, Nastran

AVA: iTwo 2020

Office: Microsoft Office 365 ProPlus, Microsoft Project 2016, Lotus Notes/Domino 9.1, Microsoft Teams

DTP: Adobe Creative Cloud (Version 2020)

Transfer Services: e-mail (SMTP), www (HTTP)

Workstations: (~100) Dell Precision Operating System: Windows 10

Notebooks: (~30) Dell Precision Operating System: Windows 10

Server: HP, Dell SAN: DL2700 Operating Systems: Windows 2019, Linux, VMware, SBP CLOUD

Printers: LaserJets (A4): HP/GL-2; PCL-6; PS; Canon C5535i (A3): PCL5c, PS ; LED-Plotter (A0): HP/GL-2; TIF DesignJet (A0): HP/GL-2; PCL-5; MakerBot Replicator 2X (3D)

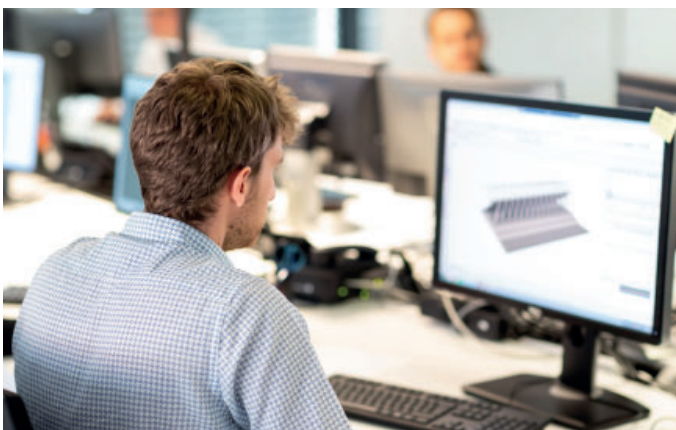
Media: CD: CD-ROM, CD-R, CD-RW; DVD: DVD+R/RW; LT06: Polycom-Video Conference System group 500

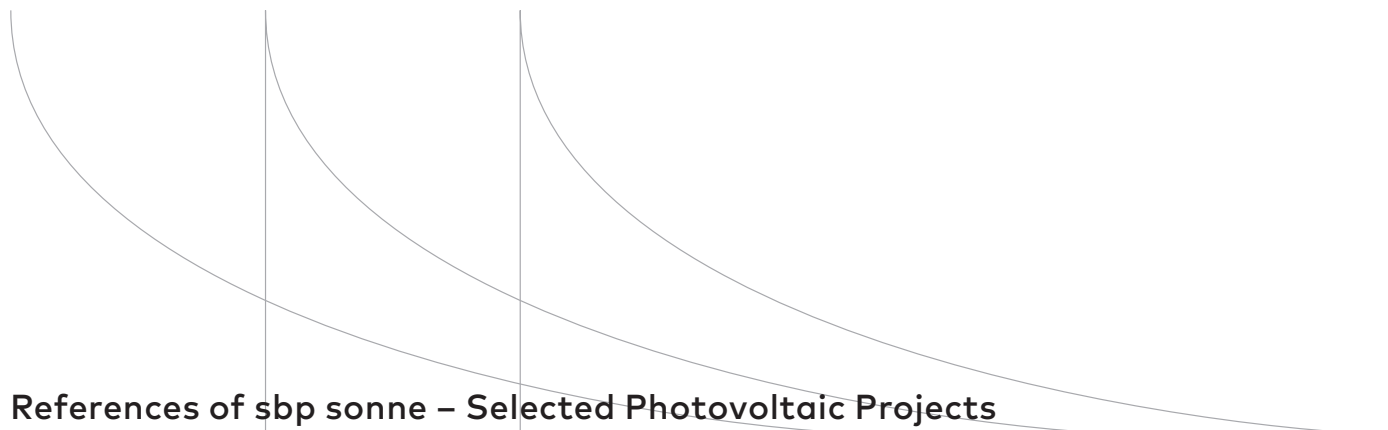
Solar software: sbpRAY2 (ray tracer and optical optimisation software), sbpAPS (aim point strategy and control software), sbpBCS (heliostat beam characterisation system), SolTrace (ray tracer), DELSOL, RABL (parabolic trough intercept simulator), HELIOS, CIRCE, System Advisory Model (SAM), PySAM, meteonorm (meteorological database), bifacial_radiance

Extended services: QFly (via CSPS), Photogrammetry (dynamic wind behaviour, via CSPS), Modal analysis (via DLR),

Software development: PyCharm, gitlab, C#, C++,

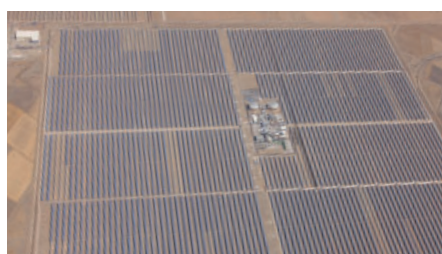
Equipment: MavicPro Drone, IR camera, 3-D printer

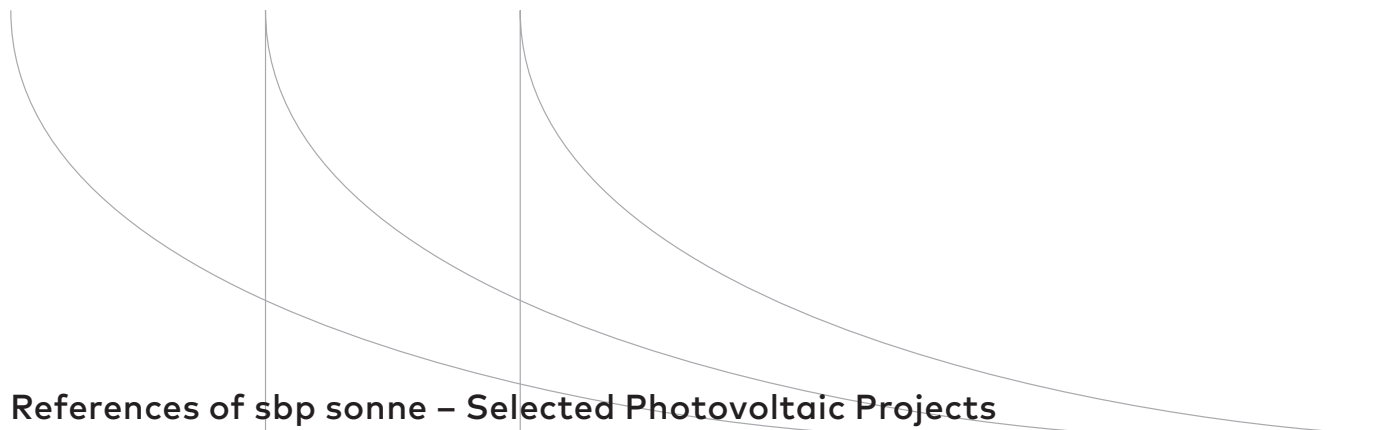




References of sbp sonne – Selected Photovoltaic Projects

Project Location Completion	Scope of our Work	Client
TubeSolar, Germany, 2020	Design of a light weight structural system for Agri PV application.	TubeSolar
PVHardware Tracker für CHINT (48.5MW), Serpa, Portugal, 2020	Review of the structural system of PV hardware 1P PV tracker	PV Hardware
Ideematec PV-Tracker (2200MW), Sudair, Saudi Arabia, 2020	Review of the structural system of Ideematec 2P PV tracker	Ideematec
Ibri NEXTTracker (600MW), Ibri, Oman, 2019	Review of the structural system of NEXTracker 1P PV tracker	NEXTracker
Sudair PV Hardware (2200MW), Sudair, Saudi Arabia, 2019	Review of the structural system of PV Hardware 1P PV tracker	PV Hardware
Talayuela Soltec Tracker (300MW), Talayuela, Spain, 2019	Review of the structural system of Soltec 2P PV tracker	Soltec
Ibri Soltec Tracker (600MW), Ibri, Oman, 2019	Review of the structural system of Soltec 2P PV tracker	Soltec
Floating PV, Belgium, 2019	Design of a floating PV system	K2 Systems, Renningen, Germany
Sudair GameChange Tracker (2200MW), Sudair, Saudi Arabia, 2019	Review of the structural system of GameChange 1P PV tracker	GameChange
Talayuela Ideematec Tracker (300MW), Talayuela, Spain, 2019	Review of the structural system of Ideematec 2P PV tracker	Ideematec
Cabrera Ideematec Tracker (200MW), Cabrera, Spain, 2019	Review of the structural system of Ideematec 2P PV tracker	Ideematec
Ibri ArcTech Tracker (600MW), Ibri, Oman, 2019	Review of the structural system of ArcTech 1P PV tracker	ArcTech

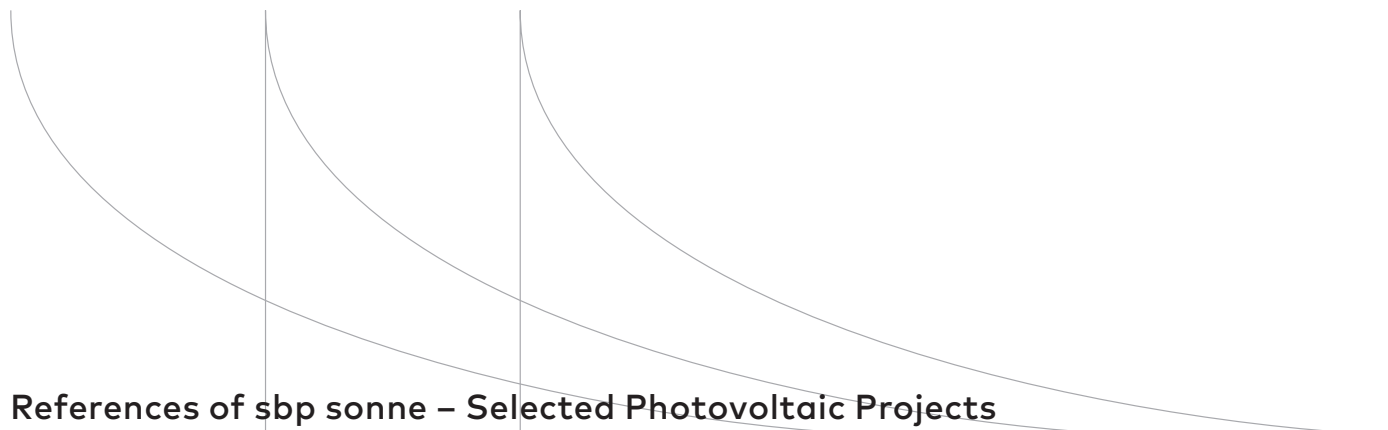




References of sbp sonne – Selected Photovoltaic Projects

Project Location Completion	Scope of our Work	Client
Ideematec Tracker Galloping, Germany, 2019	Review of the aeroelastic wind tunnel test results provided by Wacker engineers	Ideematec
Cabrera Soltec Tracker (200MW), Cabrera, Spain, 2019	Review of the structural system of Soltec 2P PV tracker	Solar Century
Sakaka NEXTracker (300MW), Sakaka, Saudi Arabia, 2019	Review of the structural system of NEXTracker 1P PV tracker	Mahindra
Floating PV, Boskoop, Netherlands, 2018	Conceptual and detail design support and development of floating PV for lakes and ponds	K2 Systems, Renningen, Germany
Mahindra Tracker, India, 2018	Review of the structural system of Mahindra 1P PV tracker	Mahindra Susten
Benban Ideematec Tracker (160MW), Benban, Egypt, 2018	Review of the structural system of Ideematec 2P PV tracker	Acwa Power
Benban PVH Tracker (160MW), Benban, Egypt, 2018	Review of the structural system of PV Hardware 3L PV tracker	Acwa Power
Mafraq Nclave Tracker (50MW), Mafraq, Jordan, 2018	Consulting ACWA Power to rebuild the Mafraq PV tracker solar field	Acwa Power
Mafraq RCA, Mafraq, Jordan, 2018	Root cause analysis for a failed PV tracker solar field	Acwa Power
Development of a CPV Dish, 2015	Analysis of collector piping problems and development of solution	Solar Systems Pty.Ltd

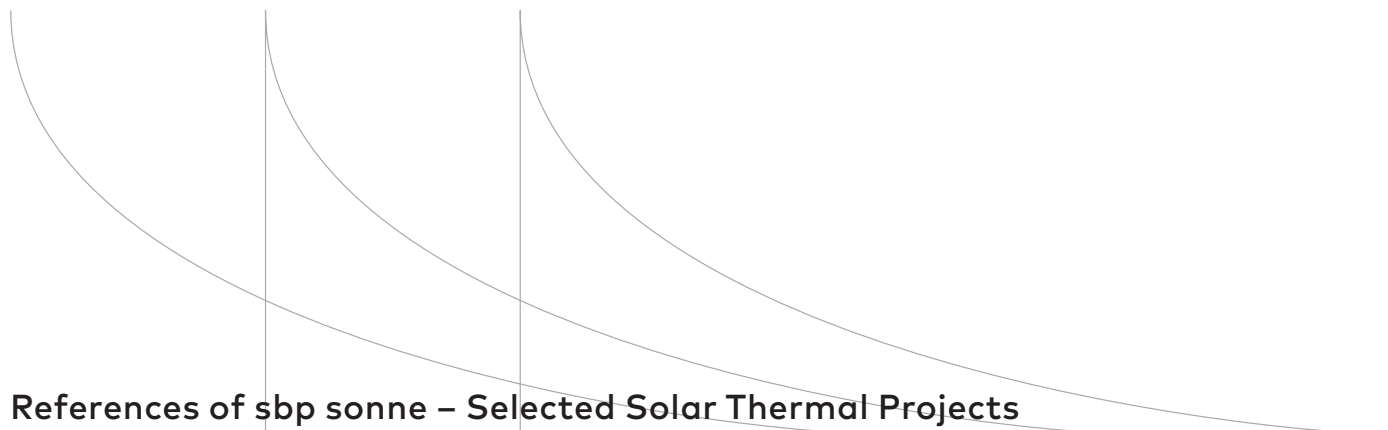




References of sbp sonne – Selected Photovoltaic Projects

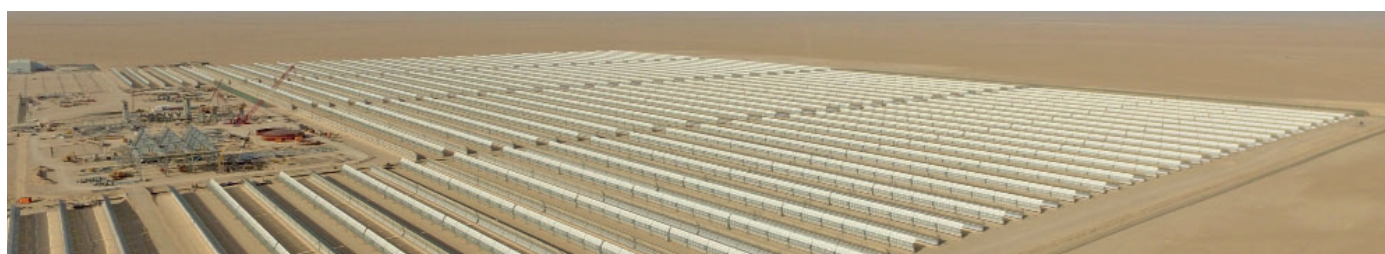
Project Location Completion	Scope of our Work	Client
K2 Rack optimisation, Europe, 2014	Optimization of a PV Rack system designed by K2	K2 Systems, Renningen, Germany
CPV System 1, Pune, India, 2012	Design of a tracker system for concentrated PV	Azur Space
CPV development project with Indian partner, India, 2012	Structural and optical detailed design of collector	Confidential
Photovoltaic System on the Brasilia National Stadium, Brazil, 2012	Development of design possibilities for photovoltaic modules and a collection system for rainwater	KfW - Kreditanstalt für Wiederaufbau
Photovoltaic Systems on the Roof of the Corinthians Stadium in Sao Paulo, Brazil, 2012	Basic design of the glazing roof part of the Corinthians stadium with integrated PV cells	Odebrecht
Photovoltaic Systems on the Maracana Stadium, Brazil, 2012	Development of design possibilities for photovoltaic modules on the stadium roof	KfW - Kreditanstalt für Wiederaufbau
PV Tracker, England, 2009	Conceptual design development	AdvancesSis Ltd. UK

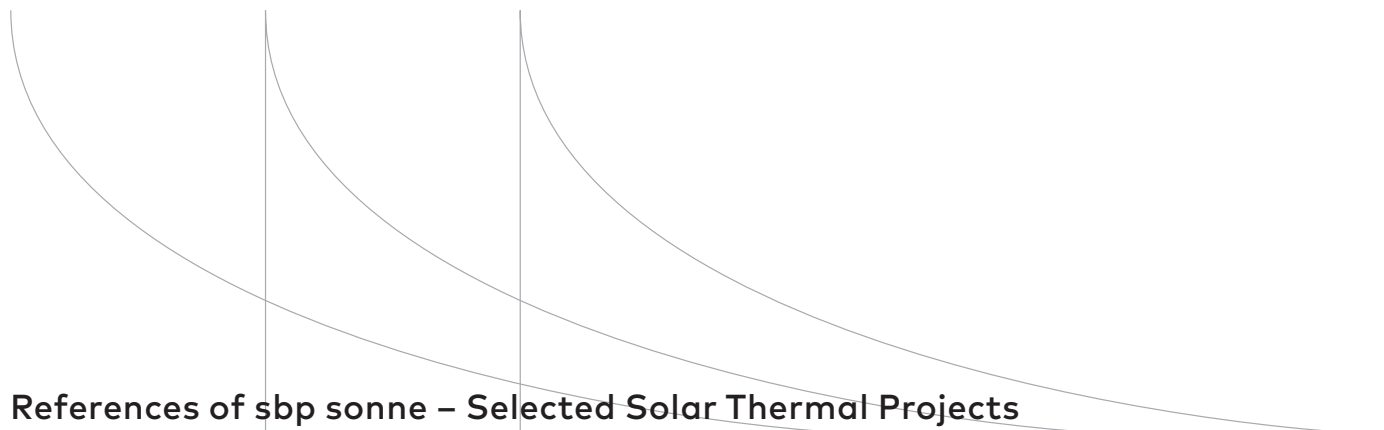




References of sbp sonne – Selected Solar Thermal Projects

Project Location Completion	Scope of our Work	Client
Vast Solar, Australia, 2018-2020	Techno-economic optimisation study for system configuration, heliostat technology development, concept, preliminary design, design, detailed engineering, solar field optimisation	Vast Solar
Beam Down Tower Design, China, 2019-2020	Conceptual design of tower and secondary reflector for beam down tower concept. Additional Optic Studies.	BCP
SinoTrough, Germany, 2019	Innovative development of a new parabolic trough for the Chinese market. Feasibility studies, preliminary design, prototyping, and detailed design	Bundesministerium für Bildung und Forschung
Royal Tech sbp Trough Collector Development, China, 2019	Technology development of a large span parabolic trough for Chinese market. Feasibility studies, preliminary design, prototyping, and detailed design.	Royal Tech CSP
Aim Point Strategy for 50MWe Hami Power Tower, China, 2017-2020	Development of a robust aim point strategy software for dynamic solar tower plant operation	Dongfang
Midelt, Morocco, 2019	Solar field engineering and optimisation of Heliotrough technology for Hybrid plant applications. Feasibility studies, preliminary design, prototyping, and detailed design.	TSK Electronica y Electricdad, S.A. and Flagsol TSK Engineering GmbH
1.5MW Rotem 1 parabolic trough power plant Dimona, Israel, 2018	EuroTrough License, solar field engineering package, manufacturing and assembly, training and QA	Brenmiller Energy, Israel
100MW Parabolic Trough Power Plant Urat, Middle Banner, China, 2017-2018	EuroTrough License, solar field engineering technology package, support for manufacturing and assembly, training and QA	Royaltech

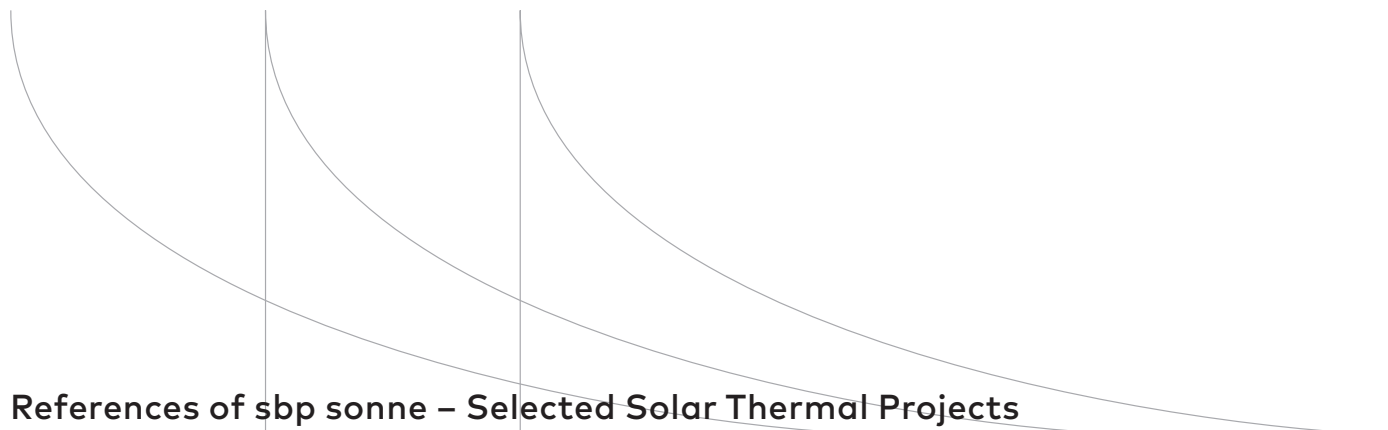




References of sbp sonne – Selected Solar Thermal Projects

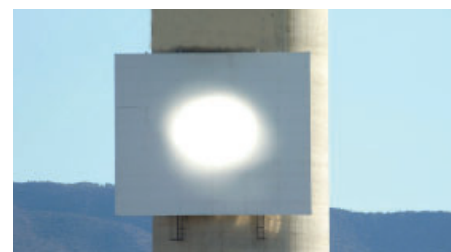
Project Location Completion	Scope of our Work	Client
HELIOKONTURPlus Jülich, Germany, 2016-2019	Design optimization, finalization and construction of 5 Stello heliostats, checking of commissioning procedure, elaborate structural and optical test program, long term testing of components, preparation for autonomous heliostat solution	BMWi
100MW molten salt tower power plant Jinta, China, 2017	Basic engineering of solar field layout and power calculation, Stello heliostat engineering and license agreement	PowerChina Northwest Engineering Corporation Limited
50MW molten salt tower power plant Gonghe, China, 2017	Heliostat technology evaluation and solar field optimisation, Stello heliostat license agreement	PowerChina Northwest Engineering Corporation Limited
50MW molten salt tower power plant Hami, China, 2017-2020	Basic engineering of solar field layout and power calculation, Stello heliostat engineering and license agreement	Dongfang Boiler Corporation
50MW Ultimate trough power plant Gongga, China, 2017	Ultimate Trough License, solar field engineering package	Tibet development investment group
Gridsol - Smart renewable hubs for flexible generation solar grid stability 2016-2019	Heliostat field layout and optimization for single and multi-tower systems; modelling of molten salt trough fields	European Commission
MS Loop Project – Molten salt Parabolic Trough Power Plant Manchasol, Spain, 2016-2019	Adaptation of existing Ultimate Trough design to high concentration application needs	European Commission
Next-CSP – High temperature concentrated solar thermal power plant with particle receiver and direct thermal storage Cerdanya, France, 2016-2020	Adaption of Stello heliostat to very high concentration application	European Commission
Redstone 100MW MS Tower Northern Cape, Postmasburg, South Africa, 2019	Complete turnkey solar field with 23.397 Stello heliostats in Stello Consortium, solar field layouts, all solar field engineering, beam/tracking quality assurance, optical warranties, full supply of all parts, incl. hard- and software as well as assembly and erection	Acciona, ACWA/Solarreserve

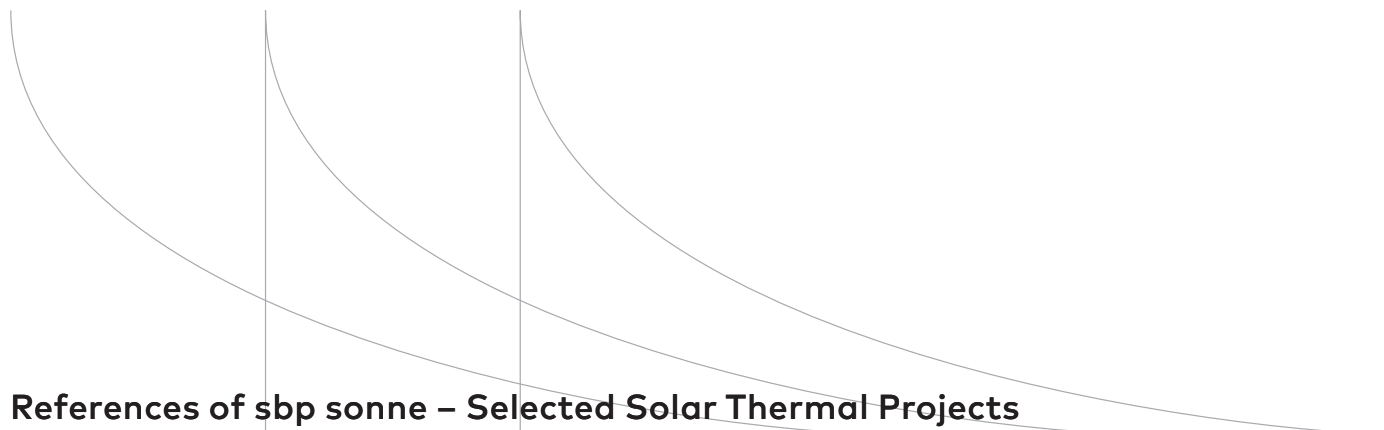




References of sbp sonne – Selected Solar Thermal Projects

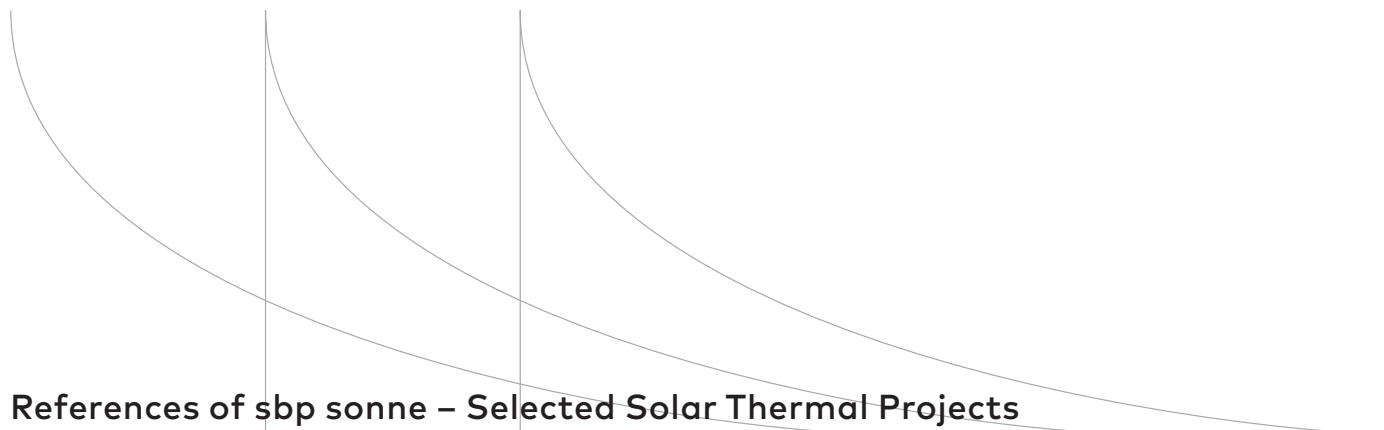
Project Location Completion	Scope of our Work	Client
HPS2 Parabolic Trough Molten Salt Test loop Evora, Portugal, 2017	Helio Trough license package and site assembly service	TSK / Flagsol, Cologne, Germany
43MW Duba Green ISCC Ultimate Trough Duba, Saudi Arabia, 2017	Ultimate Trough license package	INITEC, Spain
Shagaya 50MW Parabolic Trough plant Kuwait, 2016 - 2017	EuroTrough license package, solar field engineering, manufacturing and assembly training and qa	TSK
50MW parabolic trough power plant Delingha, China, 2016 - 2017	EuroTrough license, solar field engineering technology package, support for manufacturing and assembly, training and qa	Suncan, Beijing Shouhang IHW Resources Saving Technology Co.,Ltd
3rd party expert study Parabolic trough collector piping analysis 2016	Analysis of collector piping problems and development of solution	Confidential
3rd party expert study Parabolic Trough Collector Failure 2015	Root cause analysis of structural parabolic trough collector failure	Confidential
Stellio, South Africa, 2015	Development of a rotationally symmetric heliostat	SASOL, South Africa
Development of a parabolic trough power plant with salt storage San Quiricio, Italy, 2015	Conceptual design, detailed design, building and testing of prototype, planning of mass production	CLP, Italy
K2 Rack optimisation Europe, 2014	Optimization of a PV Rack system designed by K2	K2 Systems, Renningen, Germany
Detailed report about the use of Parabolic Troughs in Brazil 2014	Feasibility study	GiZ, Gemeinschaft für internationale Zusammenarbeit, Brazil
HelioFocus 500m ² Big Dish - four demonstration plants Mongolia, 2014	Conceptual design, detailed design	HelioFocus, Israel
50MW parabolic trough power plant Delingha, China, 2014	Solar field design and optimization	SEDC, China





References of sbp sonne – Selected Solar Thermal Projects

Project Location Completion	Scope of our Work	Client
125MW power tower and 200 MW Parabolic trough power plant 2014	Parabolic trough and heliostat field layout and optimization	Confidential
Linear Fresnel power plant Australia, Middle East, 2014	Feasibility study for the technical and economic evaluation of a linear solar-Fresnel collector made of organic building materials	Novatec
ET Parabolic Trough, Godawari GGEL Solar Plant: 50MW, Godawari, India, 2013	Euro Trough license package, detailed design of solar field, manufacturing and site assembly service	Lauren Engineers & Constructors India Pvt.
ET Parabolic Trough, Gujarat Solar One: 25MW + storage Gujarat, India, 2013	Euro Trough license package, detailed design of solar field, manufacturing and site assembly service	Cargo Power & Infrastructure, India
ET-Parabolic Trough Morón: 50MW Parabolic Trough power plant Morón, Spain, 2012	Euro Trough license package, detailed design of solar field	
Blythe Solar Power Plant, Parabolic Trough 4x250MWel Power generation Riverside County, CA, Design Phase, 2012	Design, detailed engineering, tender documents	
Ultimate Trough, Parabolic Trough Test Loop California, USA, 2012	Concept, preliminary design, design, detailed engineering, tender documents, fabrication and site supervision	
Feasibility study for Fresnel concentrator 2011	Structural and optical detailed design of collector	
Ultimate Trough, Parabolic Trough (Test Loop) Köln, Germany Prototype	Concept, preliminary design, design, detailed engineering, tender documents, fabrication and site supervision	
Helio Focus, 500m ² Dish (Prototype Power Co-generation) Ramat Hovav, Israel	Concept, preliminary design, design, detailed engineering, tender documents, fabrication and site supervision	
NT HelioTrough Loop KJC Kramer Junction, USA, 2010	Design, detailed design, tender documents, manufacturing and site supervision of Test-Loop	
HelioTrough, Parabolic Trough Test Loop SEGS V Plant, Kramer Junction, CA, USA, 2009	Design, detailed engineering, tender documents, fabrication and site supervision	
DLR-Testing carrier PSA, Parabolic Trough project Almería, Spain, 2009	Conceptual and detailed design, tender documents	DLR Cologne
ET-Parabolic Trough, Extremasol: 50MW Parabolic Trough power plant Badajoz, Spain, Part 1: Aug 09 Part 2: 2012	Euro Trough license package, detailed design of solar field	Flagsol/Cologne



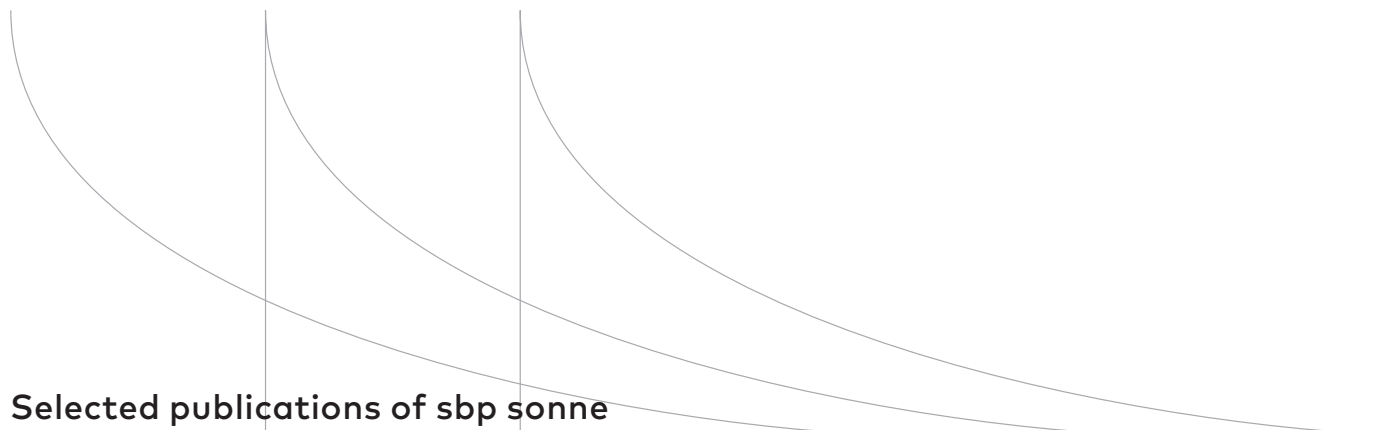
References of sbp sonne – Selected Solar Thermal Projects

Project Location Completion	Scope of our Work	Client
ET-Parabolic Trough, Solar Combined Power Plant Kuraymat Kuraymat, Egypt, 2010	Euro Trough license package, detailed design of solar field	Flagsol, Cologne
ET-Parabolic Trough, Astexol 2: 50MW Parabolic Trough power plant Badajoz, Spain, 2011	Euro Trough license package, detailed design of solar field	CSP-Consult, Cologne / Elecnor, Spain
ET-Parabolic Trough, Andasol III: 50MW Parabolic Trough power plant Aldeire, Spain, 2011	Design, detailed engineering, tender documents, fabrication and site supervision of solar field	Flagsol/Cologne
ET-Parabolic Trough, Andasol II: 50MW Parabolic Trough power plant Aldeire, Spain, 2009	Design, detailed engineering, tender documents, fabrication and site supervision of solar field	Flagsol/Cologne
ET-Parabolic Trough, Andasol I: 50MW Parabolic Trough power plant Aldeire, Spain, 2008	Design, detailed engineering, tender documents, fabrication and site supervision of solar field	Flagsol/Cologne
3kW Dish/Stirling 4.7m, Infinia Dish Spain, USA and other sites, 2007	Conceptual design, detail engineering, checking	Infinia Corp. USA
10kW Dish/Stirling 8.5m EuroDish Odeillo, France, 2004	Conceptual design, detailed design, mechanical and electrical engineering, site supervision	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Berlin
Skal ET parabolic trough collector loop, Kramer Junction, USA, 2003	Design, detailed engineering, tender documents, fabrication and site supervision	Solar Millennium AG + BMU
4x Cherenkov Telescope, 14 m Namibia, 2003	Conceptual design, analysis, detailed design including structural and mechanical engineering, site supervision	MPIK, Max Planck Institute for Nuclear Physics, Heidelberg
Eurotrough II - Prototype Almería, Spain, 2002	Conceptual design, detailed design, site supervision	European Commission
10 kW Dish/Stirling 8.5m EuroDish Milan, Italy, 2002	Design, analysis, detailed design, mechanical and electrical engineering, site supervision, commissioning	ENEA
DISTAL 2: Concentrator 8.5m 3 x kW Dish / Stirling Almería, Spain, 1997	Conceptual design, analysis, detailed design, mechanical and electrical engineering, site supervision, testing since 1997	Baden Württemberg Energy Foundation
DISTAL 1: 9kW Dish/Stirling 7.5m Almería, Spain, 1992	Conceptual design, analysis, detailed design, site supervision including structural, mechanical and electrical engineering, testing since 1991 SOLO Kleinmotoren GmbH	BMFT (German Federal Ministry for Research and Technology)
50kW Solar Updraft Tower, pilot plant Manzanares, Spain, 1989	Basic research: design, construction, operation and evaluation	BMFT (German Federal Ministry of Research and Technology)

Awards of sbp sonne

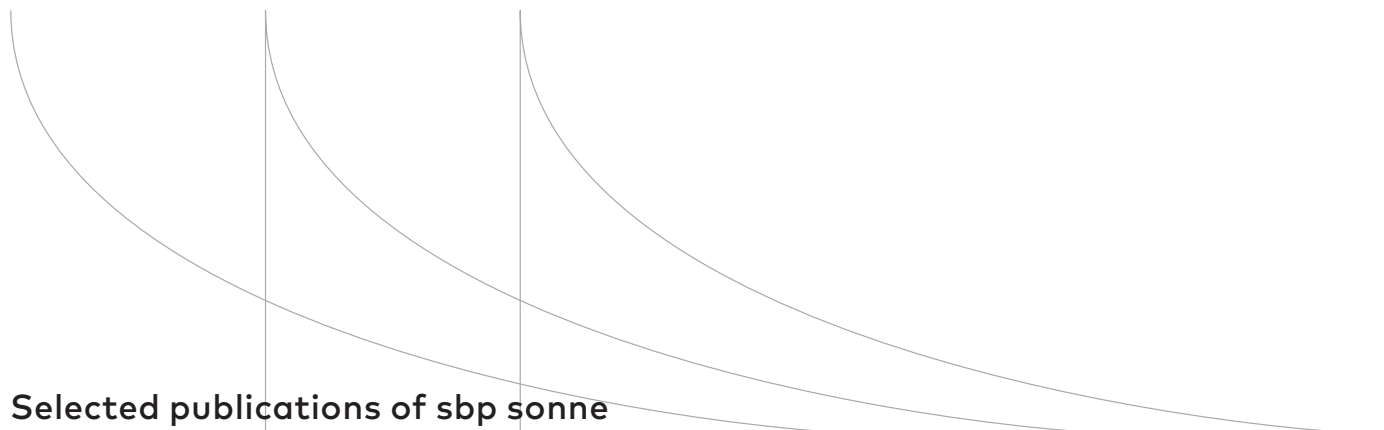
Award	Year
CSPPLAZA Globalisation Contribution Award	2018
CSPPLAZA technology innovation Award for the development of the Stellio heliostat	2017
CSP today engineering performance Award for the development of sbpRAY	2016
CSP today personality of the year Award	2016
SolarPACES Technology Innovation Award: Stellio Consortium for the development of the Stellio heliostat	2015
Finsterwalder Award for UltimateTrough test loop in California	2015
SolarPACES Technology Innovation Award: sbp and Flabeg for the Ultimate Trough	2013
CSP today engineering performance Award	2013
SolarPACES Award for the EuroTrough collector	2010
CSP today innovation Award for Heliotrough	2010
Stahl-Innovationspreis, 89: 1st prize: Parabolic concentrator	1989
Preis des Deutschen Stahlbau-Verbandes: Solar Updraft Tower	1982





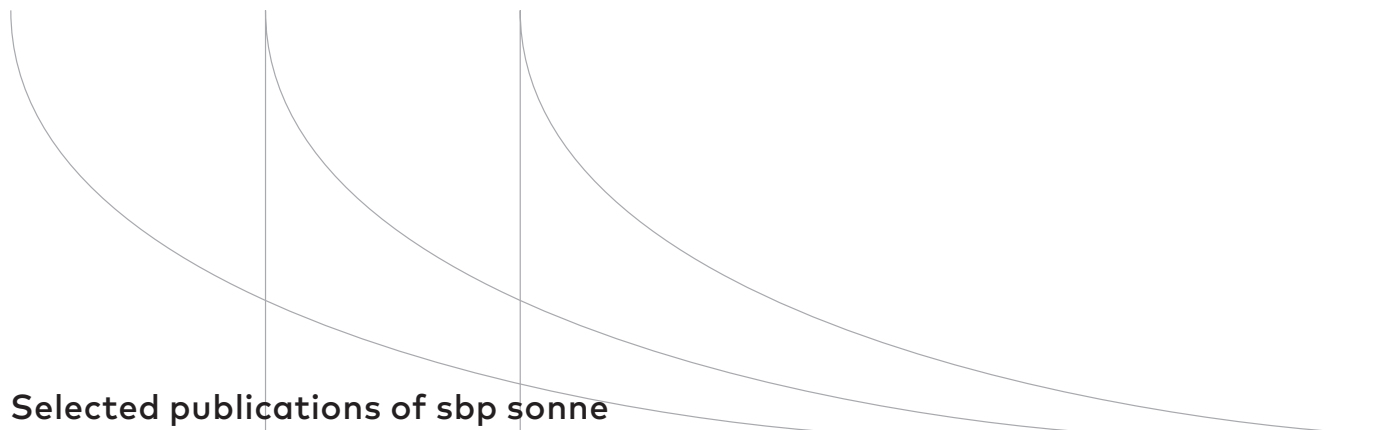
Selected publications of sbp sonne

Author/Date	Title/Date	Publisher
sbp sonne (2019)	sunsonne	sbp sonne gmbh
Weinrebe, G., Balz, M. (2019)	Effizienter Stahlbau für solarthermische Kraftwerke	Stahlbau
Gross, F., Balz, M. (2019)	Potentially Confusing Coordinate Systems for Solar Tower Plants	Proceedings of the 2019 SolarPACES Conference, Deagu, Korea.
Landman, W. A., Gross, F., Weinrebe, G., (2019)	Methodology for identifying heliostat field layout improvements	Proceedings of the 2019 SolarPACES Conference, Deagu, Korea.
Gross, F., Landman, W. A., Balz, M., Sun, D. (2019)	Robust Aim Point Strategy for Dynamic Solar Tower Plant Operation.	Proceedings of the 2019 SolarPACES Conference, Deagu, Korea.
Rumsey-Hill, N., Zwingmann, B., Balz, M., Weinrebe, G. (2019)	Feasibility of a Stamped Concentrator Structure for the Stello Heliostat	Proceedings of the 2019 SolarPACES Conference, Deagu, Korea.
Riffelmann, K.-J., Weinrebe, G., Balz, M., Schmitz, M., Baudson, O. (2019)	Planning and building the first ultimate trough collector field in the Kingdom of Saudi Arabia	Presented at the SolarPACES Conference 2018
Riffelmann, K.-J., Schweitzer, A., Weinrebe, G., Balz, M. (2019)	System Analysis of Hybrid CSP-PV Plants with Integrated Thermal Storage	Proceedings of the 2019 SolarPACES Conference, Deagu, Korea.
Gebreiter, D., Weinrebe, G., Wöhrbach, M., Arbes, F., Gross, F., Landman, W. A. (2018)	sbpRAY – A fast and versatile tool for the simulation of large scale CSP plants	Presented at the SolarPACES Conference 2018
Arbes, F., Landman, W. A., Weinrebe, G., Wöhrbach, M., Gebreiter, D., Estebarez, J. M., Pereira, D. & Jurado, A. (2018)	Multi tower systems and simulation tools	Presented at the SolarPACES Conference 2018
Keck, T., Balz, M., Göcke, V., von Reeken, F., Gross, F., Landman, W. A, Collado, J., Salas, J., Gracia, J., Iriondo, J., Eizaguirre, I., Sun, D. (2018)	Hami – The first Stello solar field	Presented at the SolarPACES Conference 2018
Nieffer, D., Effertz, T., Röger, M., Weinrebe, G., Ulmer, S. (2018)	Heliostat testing according to SolarPACES task III guideline	AIP Conference Proceedings 2126(1)
Hankin, D., Cammelli, S., Kaneko, Y., Weinrebe, G. (2018)	The wind engineering behind the development of the Stello Heliostat	13th UK Conference on Wind Engineering, Leeds, 2018



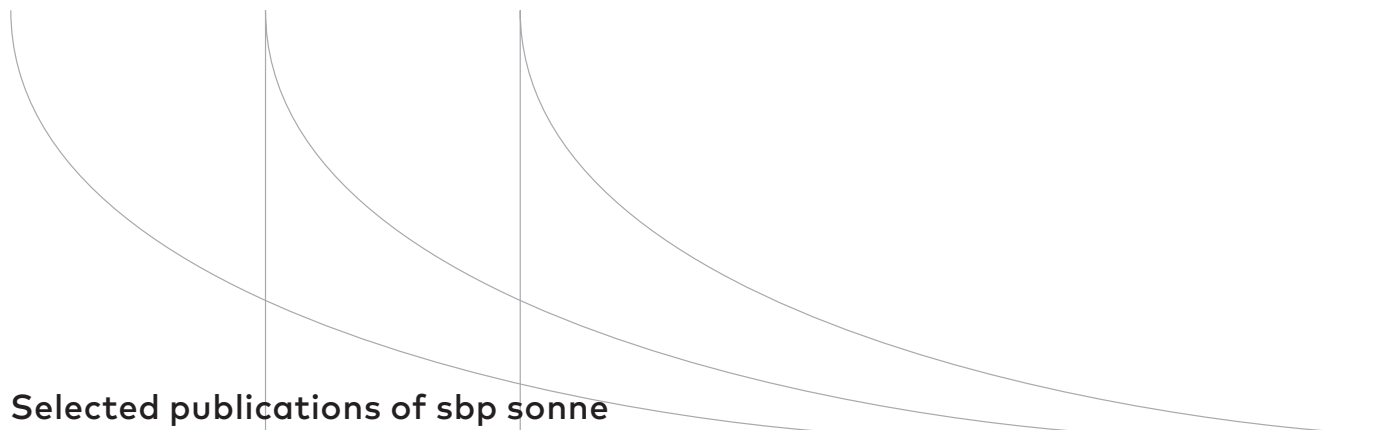
Selected publications of sbp sonne

Author/Date	Title	Publisher
Röger, M., Prahl, C., Jessen, W., Weinrebe, G., Happich, C., Ulmer, S., Seemann, W., Ax, M. (2018)	Luftgestützte Optimierung von Heliostatfeldern - Projekt Heliopoint	CSP Network Treffen
Schedler, S., Ulmer, S., Koch, H., Röger, M., Benitez, D., Prahl, C., Weinrebe, G. (2018)	From Research to Industry: Development of a High-Resolution Measurement System for Mirrored Heliostats in Series Production	AIP Conference Proceedings 2126(1)
Paret, T. W., Wöhrbach, M., Buck, R., Weinrebe, G. (2017)	Incidence Angles on Cylindrical Receivers of Solar Power Towers	Solar Energy
Burghartz, A. K., von Reeken, F., Balz, M. (2017)	Economic Evaluation of Towers for Central Receiver Systems	Presented at the SolarPACES Conference 2017, Santiago de Chile, Chile
Telsnig, T., Weinrebe, G., Finkbeiner, J., Eltrop, L. (2017)	Life cycle assessment of a future central receiver solar power plant and	Solar Energy 157 (2017) 187-200
Arbes, F., Wöhrbach, M., Gebreiter, D., Weinrebe, G. (2017)	autonomous operated heliostat concepts	Presented at the SolarPACES Conference 2016, Abu Dhabi
von Reeken, F., Schweitzer, A., Balz, M. (2016)	Challenges for Parabolic Trough Collectors at High Wind Locations – The Ultimate Trough™ at DUBA, Saudi Arabia	Presented at the SolarPACES Conference 2016, Abu Dhabi
Dreyer, O., von Reeken, F., Balz, M. (2016)	Challenges and opportunities of thin-walled sections to reduce the cost of CSP concentrator structures	Presented at the SolarPACES Conference 2016, Abu Dhabi
Weinrebe G., Balz, M. (2016)	The heliostat field – receiver interface: Some considerations targeting at clarity and standardization	Presented at the SolarPACES Conference 2016, Abu Dhabi
Weinrebe, G., Keck, T., von Reeken, F., Glöcke, V., Röger, M., Effertz, T. (2016)	Stellio - Ein neuartiger Heliostat und Messverfahren für seine Qualifizierung	Kölner Sonnenkolloquium
Balz, M., Göcke, V., Keck, T., von Reeken, F., Weinrebe, G., Wöhrbach, M. (2015)	Stellio – Development, Construction and Testing of a Smart Heliostat 2015	Presented at the SolarPACES Conference 2015, Cape Town, South Africa
Arbes, F., Weinrebe, G., Wöhrbach, M. (2015)	Heliostat Field Cost Reduction By 'Slope Drive' Optimization 2015	Presented at the SolarPACES Conference 2015, Cape Town, South Africa
von Reeken, F. (2015)	Heliostat Cost Optimization Study 2015	Presented at the SolarPACES Conference 2015, Cape Town, South Africa
von Reeken, F., Weinrebe, G., Balz, M. (2015)	Extended RABL Method to Asses the Optical Quality of Parabolic Trough Collectors	Presented at the SolarPACES Conference 2015, Cape Town, South Africa



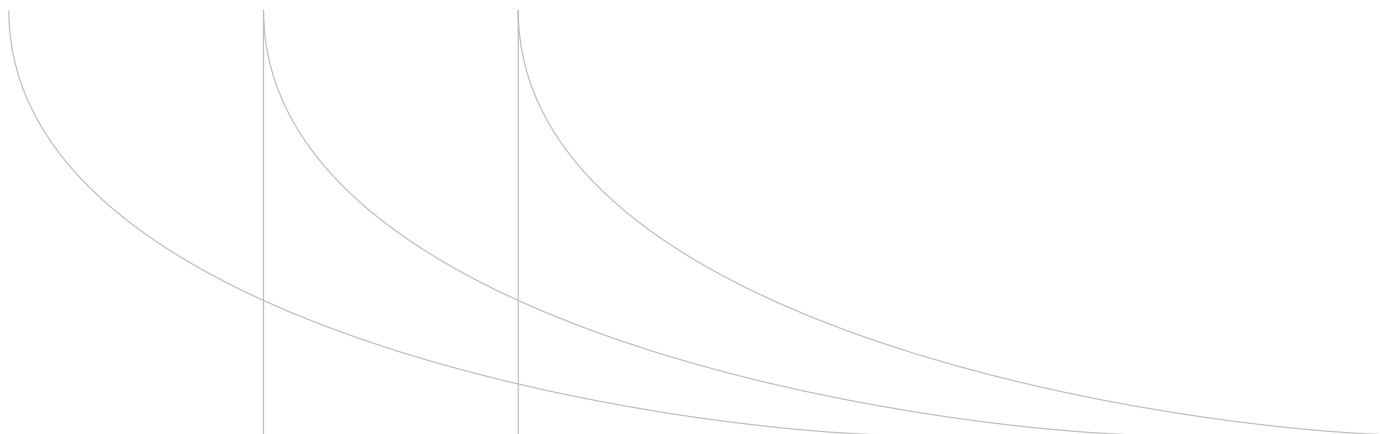
Selected publications of sbp sonne

Author/Date	Title	Publisher
Ruegamer, T., Kamp, H., Kuckelkorn, T., Weinreibe, G., Keck, T. [...] (2014)	Molten Salt for Parabolic Trough Applications: System Simulation and Scale Effects	Energy Procedia, presented at SolarPACES 2013, Elsevier Ltd
Keck, T., M. Balz, M., Y. Blumenthal, Y. (2014)	Large is beautiful – progress of HelioFocus 500 m ² dish	Presented at the SolarPACES Conference 2014, Beijing, China
Schweitzer, A., Schiel, W., Birkle, M., Nava, P., Riffelmann, K.-J. (2014)	ULTIMATE TROUGH (R) - Fabrication, erection and commissioning of the world's largest parabolic trough collector	Energy Procedia, presented at SolarPACES 2013, Elsevier Ltd
Balz, M. (2014)	Environmental Loading Conditions for CSP Solar Fields	Presented at the SolarPACES Conference 2014, Beijing, China
Weinreibe, G., von Reeken, F., Wöhrbach, M., Plaz, T., Göcke, V., Balz, M. (2013)	Towards Holistic Power Tower System Optimization	Elsevier Ltd.
Keck, T., Balz, M., Haberstroh, H., Husenbeth, C., Weinreibe, G., Zwingmann, B. (2012)	Techno-economical evaluation of power tower system layout with specific view on heliostat design optimization and tower costs	Presented at the SolarPACES 2012, Marrakesh
Husenbeth, C., Zwingmann, B., Schiel, W. (2011)	Optical and Structural Optimization by linking FEM and Ray Tracing Analysis	Presented at the SolarPACES 2011, Granada, Spain
Schweitzer, A., Schiel, W., Abul-Ella, Z., Nava, P., Riffelmann, K.-J., Wohlfahrt, A., Kuhlmann, G. (2011)	Ultimate Trough® – The Next Generation Collector for Parabolic Trough Power Plants	Presented at the SolarPACES 2011, CIEMAT, Granada, Spain
Weinreibe, G., Abul-Ella, Z., Schiel, W. (2011)	On the Influence of Parabolic Trough Collector Stiffness and Length on Performance Techno-Economic Optimization Model for Parabolic Trough Collector Design	Presented at the SolarPACES 2011, CIEMAT, Granada, Spain
Weinreibe, G., Haufe, A., Schiel, W. (2010)	Techno-Economic Optimization Model for Parabolic Trough Collector Design 2010	Presented at the SolarPACES 2010 Conference, PROMES-CNRS Perpignan, France
Riffelmann, K.-J., Kötter, J., Nava, P., Meuser, F., Weinreibe, G., Schiel, W., Kuhlmann, G., Wohlfahrt, A., Nady, A., Dracker, R. (2009)	Heliotrough – a new collector generation for parabolic trough power plants	Presented at the SolarPACES 2009, Deutsches Forschungszentrum für Luft- und Raumfahrt (DLR), Berlin
Schiel, W. (2007)	Development and construction of the world-wide biggest solar power plant in Spain	Verein Beratender Ingenieure (VBI), Germany
Schiel, W., Schweitzer, A., Kracht, O., Hunt, B. (2006)	Collector Development for Parabolic Trough Power Plants at Schlaich Bergemann und Partner	Presented at the SolarPACES Symposium 2006, CIEMAT, Seville, Spain



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Author/Date	Title	Publisher
Schlaich, J., Bergemann, R., Schiel, W., Weinrebe, G. (2004)	The Solar Updraft Tower - An Affordable and Inexhaustible Global Source of Energy	Bauwerk Verlag, Berlin
Dos Santos Bernardes, M. A., Voss, A., Weinrebe, G. (2003)	Thermal and Technical Analyses of Solar Chimneys 511-524	Solar Energy 75 (2003), Elsevier Ltd.
Weinrebe, G., Schiel, W. (2001)	Up-Draught Solar Tower and Down-Draught Energy Tower - A Comparison	Presented at the ISES Solar World Congress, ISES, Adelaide
Weinrebe, G. (1999)	Technische, ökologische und ökonomische Analyse von solarthermischen Turmkraftwerken	Doctoral Thesis
Weinrebe, G., Martínez Moya, J.A., Rauscher, J. (1997)	Enhancing PSA's Flux and High Temperature Measurement Capabilities with two new systems, in: Solar Engineering	Presented at the Asme International Solar Energy Conference, American Society of Mechanical Engineers Solar Energy Division, Washington, D.C, USA
Valverde, A., Weinrebe, G. (1996)	Implementation of an Automatic Aiming-Point Strategy for a Volumetric Receiver in the PSA's CESA-1 Heliostat Field	Presented at the 8th International Symposium, C.F.Müller, Heidelberg, Cologne, Germany, pp. 1047-1065
Valverde, A., Weinrebe, G. (1996)	Implementation of an Automatic Aiming-Point Strategy for a Volumetric Receiver in the PSA's CESA-1 Heliostat Field	C. F. Müller Verlag, Häthig GmbH, Heidelberg
Weinrebe, G., Schmitz, M., Schiel, W. (1996)	The ASM-150 Stressed Membrane Heliostat: Test Results and Operational Experiences	C. F. Müller Verlag, Häthig GmbH, Heidelberg
Tyner, C., Kolb, G.J., Prairie, M., Weinrebe, G., Valverde, A. (1995)	Solar Power Tower Development: Recent Experiences. Presented at the 8th International Symposium	C.F.Müller, Heidelberg, Cologne, Germany, pp. 193-217
Weinrebe, G., Schmitz-Goeb, M., Schiel, W. (1994)	The ASM-150 Stressed membrane Heliostat: Test Results and Operational Experiences, in: SolarPACES	Presented at the 8th SolarPACES Conference, C.F. Müller Verlag, Heidelberg, Germany, Col, pp. 503-511
Schlaich, J., Schiel, W., Friedrich, K., Schwarz, G., Wehowsky, P., Kiera, M., Meinecke, W. (1990)	Aufwindkraftwerk-Übertragbarkeit der Ergebnisse von Manzanares auf größere Anlagen	BMFT (German Federal Ministry of Research and Technology)
Benz, R., Greiner, S., Keck, T., Schiel, W. (1989)	Study on the development of metal-membrane heliostats	BMFT (German Federal Ministry of Research and Technology)



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