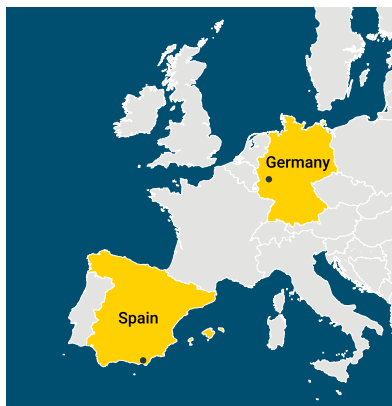


Qexpert

Expert Consulting Services
during all phases of
your CSP project



EXPERT CONSULTING SERVICES



European CSP Services offices

CSP Services was founded in 2007 with the start of the Spanish 2'000 MW CSP program by a group of highly qualified engineers and CSP experts. Since then, the company has grown constantly and further experts from industry and science have joined the team. As a leading international expert service provider, our consulting service **QExpert** offers professional advice in order to integrate state of the art technical solutions and know-how into your CSP project. Today, our senior staff relies on over 20 years of experience in the CSP market and more than 500 successfully realized projects worldwide.

Our competence stands out due to a unique mixture of long-time expertise in CSP project development and execution, a deep academic background and extensive hands-on experience with concentrator prototypes, assembly lines and solar field testing. **QExpert** consultants have a one-stop approach with the capacity to guide a broad variety of customers through all phases of their CSP project.

By considering technical, economic and operational aspects using a holistic approach, **QExpert** offers efficient customized solutions that contribute to the viability and long-term profitability of your CSP project.

Our **QExpert** services include:

	Development Phase	Construction Phase	Operation Phase
Developers & Owners Investors & Lenders Insurance Companies Legal Advisors Public Agencies	<ul style="list-style-type: none"> • Feasibility study • Conceptual design • Techno-economic optimization • CAPEX and OPEX modelling • Due diligence • Risk assessment 	<ul style="list-style-type: none"> • Owner's engineering • Contract negotiation support • EPC management • Quality assurance • Dispute resolution 	<ul style="list-style-type: none"> • Plant condition survey • Plant performance check and optimization • Dispute resolutions • O&M contractor performance check • HTF analysis (hydrogen)
EPC Contractors Subcontractors	<ul style="list-style-type: none"> • Conceptual design • Techno-economic optimization • Quality assurance concepts 	<ul style="list-style-type: none"> • Quality control • Check of sub-suppliers • Construction optimization • Contract negotiation support 	<ul style="list-style-type: none"> • Dispute resolution
O&M Contractors	<ul style="list-style-type: none"> • Proposal support 	<ul style="list-style-type: none"> • Contract negotiation support 	<ul style="list-style-type: none"> • Performance check • Process optimization • Plant condition survey • HTF analysis (hydrogen)



Key benefits of QExpert

QExpert is independent, technology-neutral and works to the highest standards of research and science.

An early involvement of **QExpert** in the project realization can prevent considerable follow-up costs, as many parameters affect the profitability of a project. Technical, economical and contractual structuring of a project comprises the following:

- Conceptual technical design
- Techno-economic optimization
- Contract design
- Sourcing strategy
- Quality assurance concept

The more advanced a project is, the more difficult corrective measures become. Therefore, we advise:

- Opt for a highly competent, experienced and independent advisor from the beginning
- Basic project design before contracting the EPC company
- 3rd party quality control throughout the execution of an EPC contract
- Plant performance testing before preliminary / final acceptance
- Performance improvement throughout the lifetime of the plant

QExpert accompanies you throughout the entire project. We are with you every step of the way starting with feasibility studies and solar resource assessment, through to technology selection, EPC- and O&M-tendering, supervision of construction and commissioning, up to and including the commercial operation of the plant.

Further entities like insurance companies or technical advisors can be guided with objective, technology-independent and supplier-neutral advice related to CSP technology.

If not directly involved as owner's engineer, **QExpert** also supports EPC contractors, key component suppliers, technology providers and O&M companies to reach their respective goals.



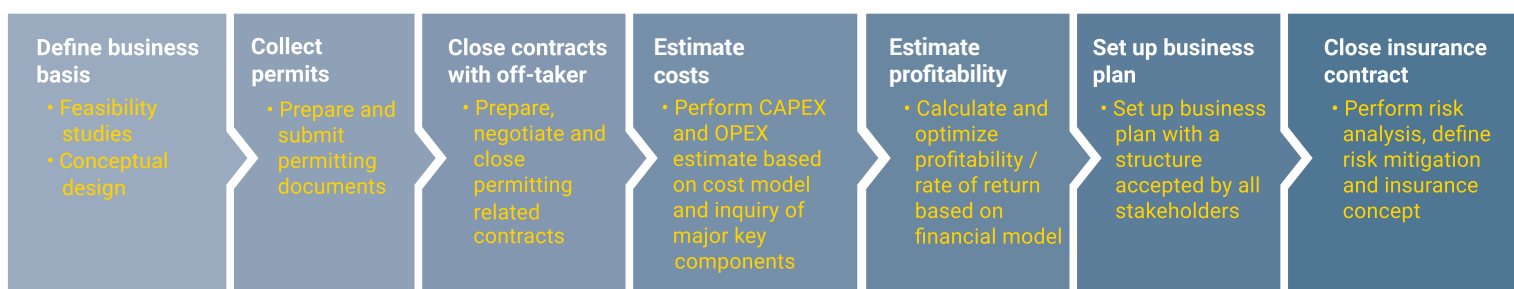
1 Consulting for Developers, Owners and Investors

During planning and implementation of a complex project, conflicts of interest may arise between the contracting parties. **QExpert** can assist in resolving disputes and eliminating traps at an early stage of the project, avoiding consequential damages, additional costs and delays.

Owner's and EPC contractor's economic views of a project are different by nature:

Owner's objectives	EPC contractor's objectives
Time focus is commercial plant lifetime (25 years or more)	Time focus until plant acceptance and end of warranty period (3-5 years)
High profit considering total project lifetime (by low levelized costs of electricity LCOE)	Most economical solution to fulfill contract (by finding ways to reduce costs)
No "hidden costs", smooth execution	Claim for additional payments in case of unforeseen issues
Start commercial operation as soon as possible	Claim for additional construction time
High quality, considering project lifetime	Sufficient quality to survive warranty period
Good communication with EPC through receiving immediate information regarding quality issues, time delays and cost variations	Keeping a good relationship with owner by solving arising issues independently and quickly
Wants his "dream" plant to be built by the EPC (lack of time and know-how usually don't allow him to clearly specify his wishes and to take care about all details)	Wants to build the owner's "dream" plant (in the most economical way by involvement of a complex net of subcontractors)

Activities along the value chain of a typical CSP project: Developer/ owner tasks are depicted in white, the corresponding QExpert portfolio is shown in yellow.





In their role as owner's engineer, our consultants act as independent advisors for the owner, ensuring the quality of work executed by contractors and suppliers. **QExpert** has the ability to quickly close skill gaps in the owner's staff to guarantee a time-saving efficiency, a smooth communication and a sustainable project execution.

QExpert...

...analyzes the owner's technical needs and communicates them to the EPC contractor

...ensures the quality of work carried out by contractors and suppliers

...supports the settlement of conflicts between the owner and EPC

...is an independent advocate for the owner's business objective

...works in a cooperative relationship with the owner

...fills skill gaps in the owner's staff

...acts based on trust and confidence

Select contract model for EPC

- Analyze pros and cons of EPC procurement concepts (turn-key, lot-wise, define owner scope)
- Produce tender documents for EPC

Select contract model for O&M

- Analyze pros and cons of O&M procurement concepts (own staff, subcontracting of services, JV)
- Produce tender documents for O&M

Close financing

- Negotiate equity and loan financing contracts

Close EPC and O&M contracts

- Negotiate with and award EPC and O&M contractor

Build plant and reach PAC, operate and reach FAC

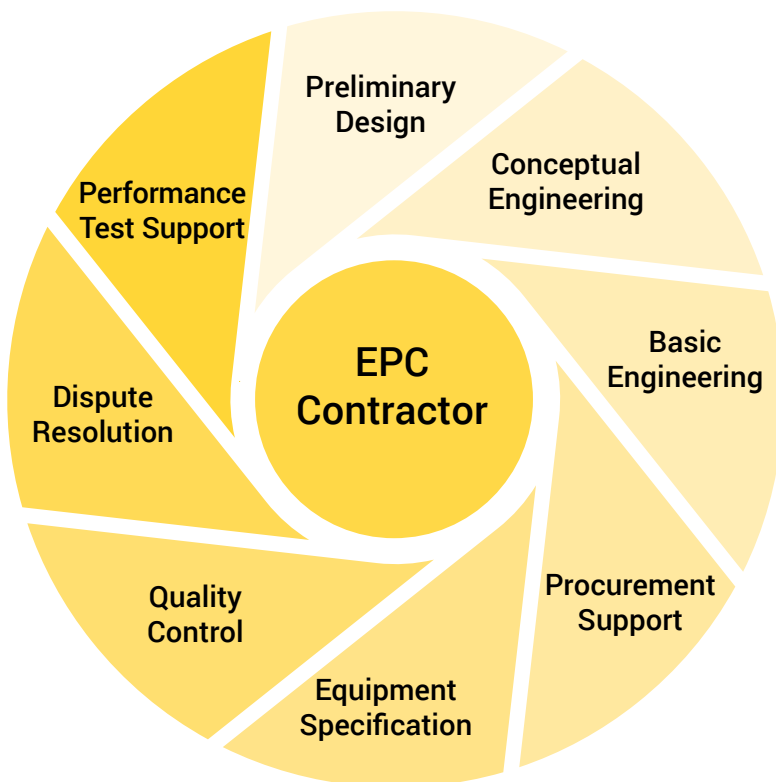
- Supervise implementation process until PAC
- Supervise warranty period until FAC

Commercially operate plant

- Accompany commercial operation by performance engineering and continuous improvement process

2 Consulting for EPC Contractors and Suppliers

QExpert provides engineering and design services for EPC contractors and key component suppliers in an early project phase. Our assistance is based on an integral view. It takes all aspects into account to find the optimum techno-economic approach. During project execution, besides **QExpert** consulting, CSP Services offers its unique measuring technology for quality control of solar fields, based on parabolic trough, heliostat, Fresnel or Dish-Stirling technology. We offer on-site construction supervision as well as geometric quality control of mirror panels, concentrator steel structures and completely assembled concentrators.



Services for EPC contractors and key component suppliers

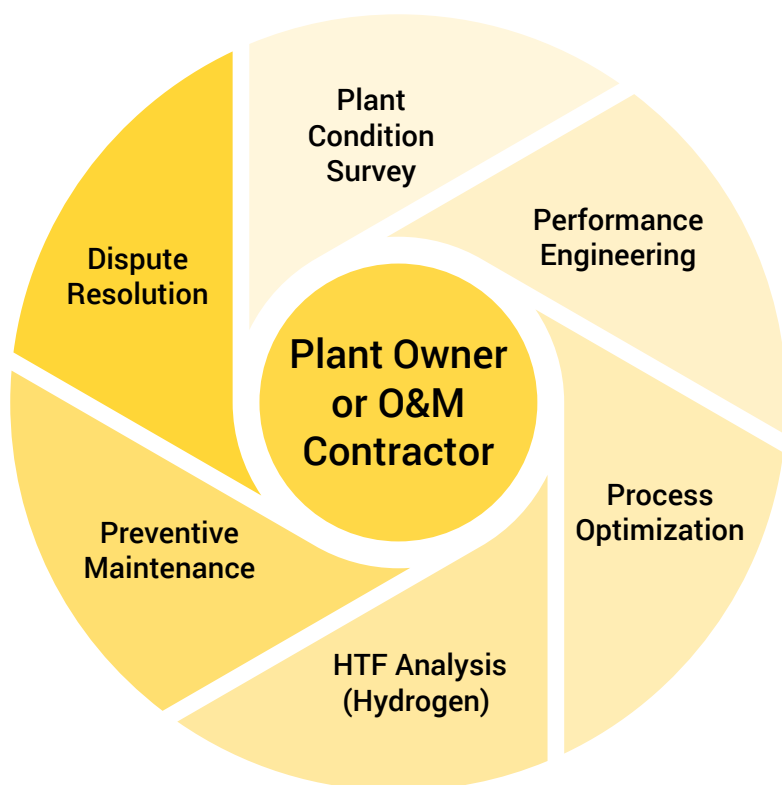




3 Consulting Services related to O&M

CSP Services has executed numerous service contracts in operational CSP plants all over the world. Based on this experience, **QExpert** supports O&M companies in setting up O&M concepts and preparing proposals. We are experienced in implementing preventive O&M, providing general advice and analyzing weaknesses in the O&M concept. This minimizes costs and risks and maximizes plant performance and lifetime.

In the commercial operation phase, owners or O&M contractors can benefit from CSP Services' unique testing technology for analyzing and optimizing the optical and thermal performance of a plant.



Services for plant owners, asset managers and O&M contractors



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Our team of renowned experts has a proven track record of more than 500 successfully finished projects worldwide since 2007. Therefore CSP Services has the competence, the experience and the necessary tools to secure the highest quality standards of a CSP project from the first day of planning, through implementation and commissioning, up to operation and maintenance:

- Consulting competence for all phases of a project
- Quality assessment of components and special equipment for quality control and data analysis
 - In preparation of a project (Solar Resource Assessment and Weather Data Analysis)
 - During execution of a project (quality control by QFoto, QDec and Expert Measurement Services)
 - After finalization of a project (Performance Testing and QFly optical solar field test)

Reference list and selected examples of QExpert services

Country	Task
Chile	Heliostat quality assessment in 100 MW solar tower plant
China	Technical evaluation of receiver technology Performance tests of parabolic trough (PT) test loops for 3 clients Cost estimate, performance calculation, profitability calculation of 50 MW PT plant
Denmark	Technical design and assembly consulting of PT development
Egypt	Basic and detailed engineering of 60 MW PT solar field
El Salvador	Site assessment and plant concepts for 50-100 MW PT plant development
France	Shape check of world's largest concentrator in 1 MW solar furnace
Germany	Quality assurance concept for PT field installation Shape check and canting procedure for solar furnace
Greece	Conceptual and permitting engineering for 70 MW PT plant project
India	Technical due diligence for 125 MW Fresnel plant Technical due diligence for 23 MW Fresnel plant project development Solar resource and energy yield analysis for PT plant project development
Israel	Concentrator shape check and canting procedure for large dish assembly Extensive solar field quality assessment of 110 MW PT plant
Italy	Conceptual power plant design for 50 MW PT plant with molten salt as HTF
Kuwait	Technology description and pre-feasibility study of 50 MW PT plant project Parabolic trough quality check for 50 MW plant during assembly
Morocco	Evaluation of different plant configurations for 280 MW PT plant project Parabolic trough quality check of 160 MW PT plant
Namibia	Pre-feasibility study for CSP plant
Oman	Conceptual design and profitability check for 100 MW enhanced oil recovery plant
Saudi Arabia	Proposal engineering of ISCC plant Parabolic trough quality check for ISCC project during assembly Design review of new type of Fresnel collector
South Africa	Expert reflector assessment of 100 MW PT plant
Spain	Receiver aging evaluation of two 50 MW PT plants in operation Performance analysis and optimization strategy of 50 MW PT plant in operation Owner's engineer support for 50 MW PT plant with thermal storage Solar field analysis for 25 MW PT plant in operation Due diligence and energy yield calculation for eight 50 MW PT plants in operation Basic and detailed engineering for three 50 MW PT plants Enhanced HTF analysis (hydrogen) for several PT plants in operation Procedure for tracking optimization for 50 MW PT plant in operation Concentrator shape optimization procedure for 50 MW PT plant in assembly
Sweden	Technical evaluation and due diligence of Dish-Stirling product development
UAE	Owner's engineer support for 100 MW PT plant Technical due diligence and performance check of Dish-Stirling solar park in operation
USA	Project development and basic design of two 250 MW PT plant projects Enhanced HTF analysis (hydrogen) for several PT plants in operation



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