

Outstanding full range  
of **services** through the  
whole project cycle



# Exceptional and comprehensive support delivered across all stages of the project development process

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Biopolymer projects require intense interaction between different parties during the project execution activities, from very conceptual phase until production. Due to the extensive experience developing biopolymer plants globally, Sulzer offers a complete set of services to help potential investors and current producers. This variety of services covers the whole plant cycle: from the preliminary feasibility stages and sample production thanks to Sulzer's Technology and Innovation centers, until the plant is fully operational, passing through the design phases (basic and detail engineering), advisory activities during pre-commissioning, commissioning and start-up.

As a trusted leader in delivering cutting-edge, tailor-made plant solutions, Sulzer places the utmost priority on supporting our clients. Below is an overview of the key services offered by our skilled team of experts:



## Pre-Feasibility Study (PFS)

During the initial stages of the project, the PFS serves as a critical tool to guide potential investors in shaping the key parameters of the business case. This includes determining the order of magnitude for overall Capital Expenditures (CAPEX), Operating Expenditures (OPEX), estimating plot requirements, defining overall plant footprint, and project delivery timelines, among other essential factors. Additionally, the study provides basic market insights and highlights Sulzer's key public industrial references, offering a comprehensive perspective on how biopolymer plants have evolved over time and adapted to industry trends. Upon request, the PFS can also include preliminary financial analyses, such as estimates for the Return on Investment (ROI) and Internal Rate of Return (IRR), based on the data available at that stage of the project exchanged with investors. This enables investors to better assess the economic viability and make investment decisions moving forward.

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## Feasibility Study (FS)

Building upon the insights gained from the PFS, the FS delves deeper into project-specific details, offering more tailored technical and engineering information. At this stage, investors are required to provide additional comprehensive and specific data about the business case, such as target production capacities, site location, and utility availability. Leveraging these inputs, Sulzer's technical team develops a package of preliminary documents which are customized to address the unique characteristics and requirements of the project.

These documents typically include a conceptual plant footprint adapted to the site constraints, a preliminary effluent summary, Process Flow Diagrams (PFDs) for key process steps, and consumption summaries for utilities/energy and raw materials. The FS is a highly collaborative process where the generated data and documents are reviewed and discussed among all stakeholders, including the client, investors, and the different engineering teams. This iterative approach allows for revisions and refinements, ensuring that the deliverables accurately reflect the project's technical, operational, and economic peculiarities. By combining engineering capabilities with a tailored approach, Sulzer ensures that the FS provides a solid foundation for informed decision-making and successful project execution.

## Testing and sample production

The core of a technology provider's success also lies in its laboratory and pilot plant facilities; hence Sulzer continuously invests resources to ensure its biopolymer Technology and Innovation facilities remain state-of-the-art. These facilities are key to improve the technologies and meeting any specific project requirements. Whenever a unique test is necessary to advance a project, Sulzer is equipped with the setup and expertise to conduct trials at both laboratory and pilot plant scales. For instance, if a project involves an unconventional raw material or requires unique product specifications, Sulzer's facilities can deliver tailored solutions.

The laboratory setup is ideal for quick evaluations, requiring relatively small amounts of raw materials to provide rapid insights. In contrast, the pilot plants are built at bigger scales for comprehensive testing and data collection, accommodating much larger material quantities to support seamless scale-up to industrial production.

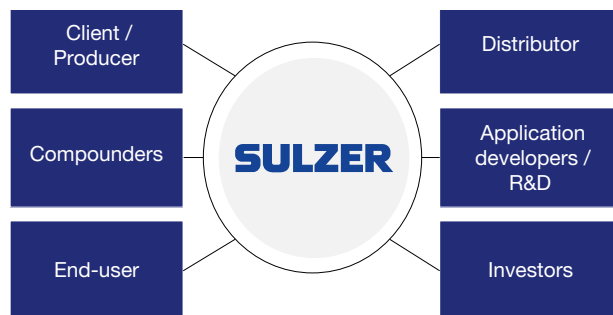
With the pilot plant's capabilities, Sulzer ensures that its clients receive the support needed to validate their projects and achieve their business objectives.



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## Sulzer network

Thanks to the long experience within the biopolymer market, Sulzer has been able to establish a widespread network of contacts in different geographical locations and sectors. Upon request, and once the project is more advanced, Sulzer makes available a list of contacts in order to facilitate the investment decision, for instance, sharing potential distributors of biopolymers who could buy large amount of product, research centers who can develop a specific application, or even contact with different financing entities with special credit lines for such sustainable projects.



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## License

A cornerstone of Sulzer's value proposition is the technology licensing package, which grants investors the right to utilize Sulzer's cutting-edge biopolymer technology under clearly defined conditions. This license not only enables clients to operate efficiently and competitively but also ensures peace of mind by offering comprehensive protection against potential patent infringements. Sulzer's robust intellectual property framework, coupled with its reputation as a global leader in advanced technology solutions, provides clients with unparalleled security and confidence.

In addition to the licensing rights, Sulzer's technology package includes a comprehensive suite of deliverables in the form of Basic Engineering Package, designed to support clients throughout the project lifecycle. This includes, but is not limited to, process design documentation, proprietary know-how, and access to Sulzer's technical expertise, ensuring a smooth transition from technology transfer to full-scale production.

Furthermore, Sulzer is committed to fostering long-term partnerships with its licensees. By continuously innovating and enhancing its technology, Sulzer ensures that its clients remain at the forefront of the market by working collaboratively with its licensees to the maximizes value and drive long term success.





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## Basic Engineering Package (BEP)

In order to obtain a more precise CAPEX estimate and be able to design the equipment according to the specificities of the project, a BEP is developed by the Sulzer experts. This package includes comprehensive technical information to facilitate Engineering Procurement and Construction (EPC) contractors' cost estimating activities such as diagrams, process datasheets, drawings of Sulzer proprietary equipment and alarm and interlock list among others. The BEP could be either contracted separately from the Sulzer proprietary equipment, which are designed with the outcome information from the BEP, or all together within a single contract framework. These documents not only streamline the cost estimation and procurement process for contractors but also serve as a foundation for finalizing the plant's detailed engineering and construction phases executed by the EPC contractor/s.

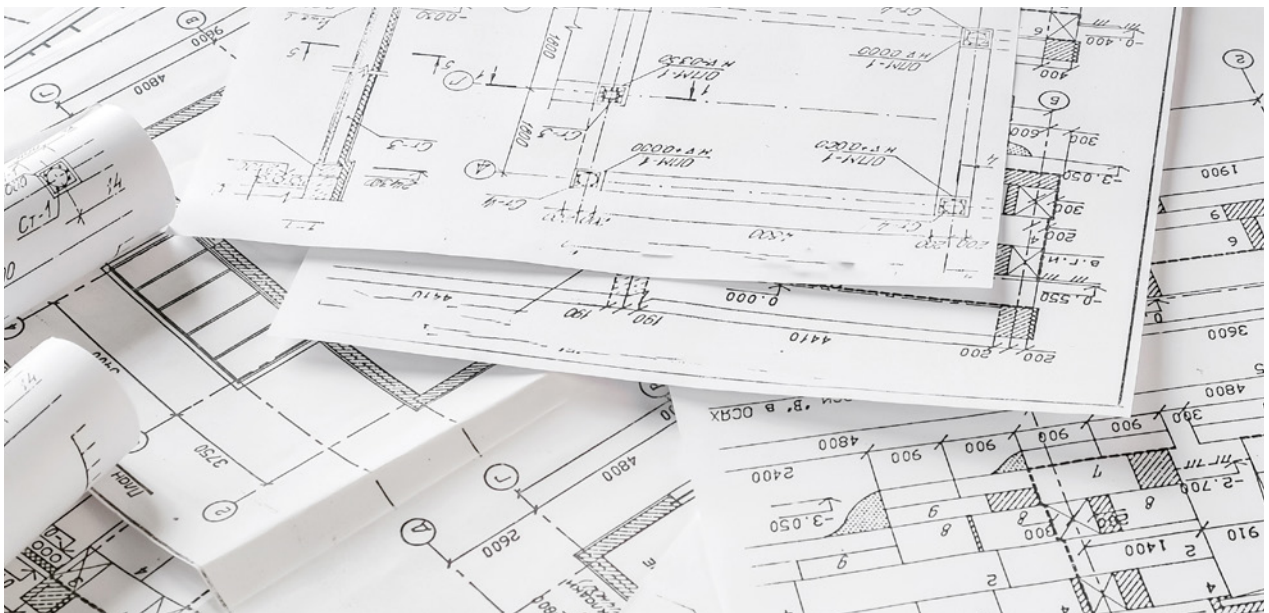
Sulzer offers flexibility in how the BEP is integrated into the overall project framework. As mentioned before, the package can be contracted as a standalone deliverable, but always coupled to the license, with the purpose of sharing the BEP information to carry out the technology

evaluations and detailed analysis of the cost estimate. Alternatively, BEP can be bundled with Sulzer's proprietary equipment under a single contract, ensuring seamless alignment between the engineering package and the equipment's manufacturing while optimizing delivery time.

The design outlined in the BEP adheres to globally recognized industry standards, such as the major international codes, ensuring compliance with regulatory and quality benchmarks. Sulzer's engineering team is also adept at adapting designs to specific customer requirements, whether related to regional standards, operational preferences, or unique project conditions.

By leveraging Sulzer's expertise and state-of-the-art engineering capabilities, future end-users ensures the biopolymer plant is designed for optimal performance, reliability, and cost-efficiency.

Through the development of fine-tuned BEP, Sulzer demonstrates its commitment to delivering high-quality engineering solutions that enable clients to turn innovative concepts into reality.



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## Field Advisory Services (FAS):

### Ensuring seamless project execution and optimal plant performance

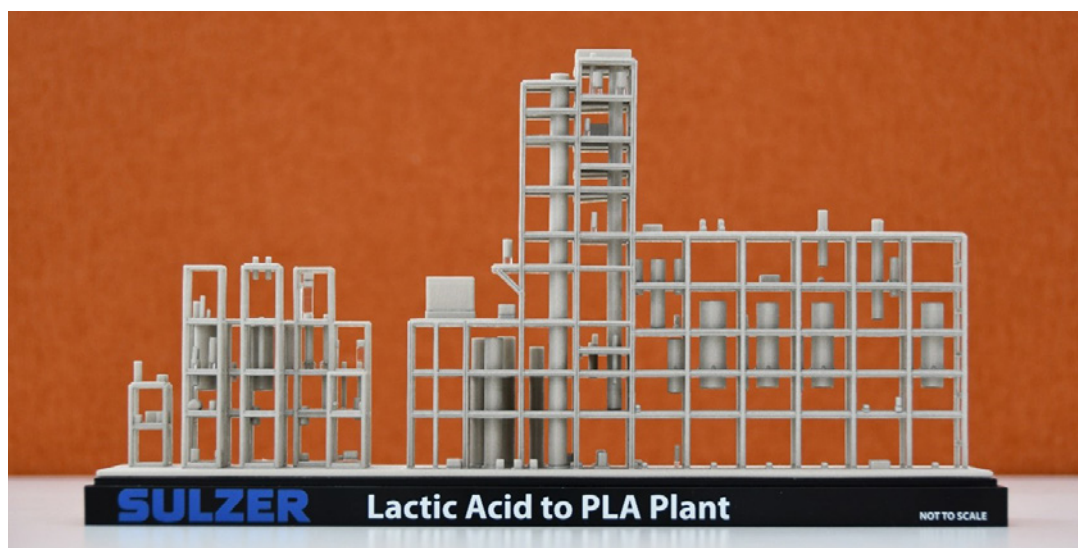
Once the proprietary equipment has arrived on site, Sulzer's FAS provide comprehensive support to ensure smooth and efficient plant construction. Our team of highly skilled specialists works closely with the selected contractors and end-users, offering expert guidance through each critical stage of the site activities. The different types of FAS are summarized below:

- **Mechanical completion:** review advisory services: Sulzer experts advise clients' site personnel to check specific critical equipment mechanical installation, ensuring compliance with the BEP.
- **Pre-commissioning advisory services:** before full-scale operations begin, Sulzer experts advise end-user's personnel in verifying that critical systems and equipment are installed correctly, functioning as intended, and ready for commissioning. This advisory phase includes system checks, flushing, among many others, ensuring a seamless and well prepared transition to the plant's commissioning and start-up.
- **Commissioning and start-up advisory services:** during commissioning and start-up, Sulzer's specialists advise client's site personnel

in the transition from pre-commissioning to operational readiness. These phases are critical for achieving a smooth and efficient ramp-up to full production capacity, and comprises different activities such as to fine-tune the different process sections, address any unforeseen challenges, and ensure the plant meets the required operational parameters.

- **Performance test:** once the plant is started-up and running at full capacity, Sulzer advisors remain on-site for the process performance test. This involves a joint assessment with all stakeholders (end-user, contractor/s, Sulzer, etc), to verify that the plant operates as per specifications and meets the agreed-upon performance guarantees especially by thoroughly evaluating the guaranteed parameters such as production throughput and product quality.

The duration of FAS varies based on project complexity, contractor experience, site conditions, and workforce availability among other factors. Regardless of the timeline, Sulzer's team remains dedicated to provide tailored support to meet the specific needs of each client.



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## Aftersales

Sulzer's biopolymer technology has a sufficient industrial track record to prove its process robustness. If regular plant inspections and maintenance are carried out together with operating the plant within its design basis, the unscheduled downtime is reduced to a minimum. In case that a repair is required, spare parts can be delivered worldwide in a relatively short time, and maintaining, or even improving the quality of the new supplied equipment.

Sulzer acknowledges the importance of keeping shutdowns to the lowest level possible, hence at the beginning of the plant lifecycle a comprehensive and tailor-made maintenance and spare part assessment should be developed between Sulzer and the end-user according to the plant specificities. Proper maintenance reduces the number of unforeseen and undesired shutdowns while a suitable spare parts stockage, including wear and tear spares, two years operation spares and/or capital spares; ensuring quicker repair and back to operations, minimizing the potential economical losses. Moreover, during normal operation, Sulzer can assist with any technical request and offers a series of support services such as on-site assessments, revamps and upgrades. The biopolymer technology as well as the bioplastic market are constantly evolving, hence it is frequent that during the plant life cycle an adjustment to the new circumstances is carried out. Specialists from Sulzer gladly upgrade the installed facilities to state-of-the-art plants in terms of technological performance and product portfolio. If fact, during the first years after the technology transfer and successful start-up, technology improvements will be communicated to end-users for their assessment and subsequent integration if approved.

Moreover, especially during the first years' operation, process data gathering and reporting is an interesting tool for end-users since it allows Sulzer experts to analyze and then propose any potential process optimization in order to maximize client's revenue and flawless production.



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## Conclusion

No matter in what phase the project is, Sulzer is ready to help providing the unmatched expertise developing biopolymer plants and boost the project to its next phase. From A to Z, Sulzer's accumulated know-how facilitates future end-users to bring biopolymer projects into a reality.

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**The Chemtech division is the global market leader in innovative mass transfer, static mixing and polymer solutions for petrochemicals, refining and LNG.**

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Chemtech is also leading the way in ecological solutions such as biopolymers as well as textile and plastic recycling, contributing to a circular economy. Our product offering ranges from technology licensing to process components all the way to complete separation process plants. Customer support ranges from engineering and field services to tray and packing installation, tower maintenance, welding and plant turnaround projects – ensuring minimal downtime.

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