



***Phases of Development
of an Environmental Solution***

1. Goals Setting.

- Definition of spokespersons. From the Client: General Management, Production and Environment. From LEF: 1 partner + 1 Project Manager + 1 Junior Engineer.
- Flows characterization (if exists): average, maximum and minimum concentrations. Operation time per day.
- Target: Meeting the regulations, or other specific parameters (list them).
- Current treatment flow rates and future projections.
- Energy valorization (CIRCULAR ECONOMY)
- CO2 Footprint. CO2 print reduction.
- Reduction of the CO₂ print.
- Automation Required.
- Own and external means to guarantee correct operation and maintenance.
- Warranty provided by LEF.
- Safety, Health, and Enviromental.
- Assurance of Quality.
- Providers of CE mark, technical service in Europe..
- Supply Scope: E, EP, EPC.
- Finding the best OPEX for the client.

2. Process Selection.

- Definition of spokespersons. From the Client: General Management, Production, Engineering and Environment. From LEF: 1 partner + 1 Project Manager + 1 Junior Engineer.
- Are there any process studies available? Validation and discrepancies between current and future scenarios.
- Representative sampling for laboratory tests.
- Laboratory tests in order to determine analytics, treatment trials and analysis of treated samples.
- Is it possible to segregate the effluent into streams that require easier treatment processes?
- Mass balance.
- Energy balance.
- Waste generated: characterization of the waste, destinations.
- Power and other services required.
- Low, medium, or high voltage?



- Develop production studies to know when the discharges occur: continuous or discontinuous.
- CAPEX and OPEX results.
- Is financing required?

3. Footprint.

- Definition of spokespersons. From the Client: Production Management, Engineering and Environment. From LEF: 1 Project Manager + 1 Senior Engineer + 1 Junior Engineer.
- Space required / Urban regulations / Required permits / Other regulations: APQ...
- Tanks made in civil works or on a slab.
- Required refrigeration, steam, compressed air, recovery of products of interest, water, biogas, and its integration in the factory, etc.
- Use of advanced technologies to reduce the space required.
- Weather, geographic altitude (height above sea level), earthquake conditions, Etc.
- Drawings related, developed in 2D.

4. List of Equipment and Instruments.

- Definition of spokespersons. From the Client: Production Management, Engineering and Environment. From LEF: 1 Project Manager + 1 Senior Engineer + 1 Junior Engineer.
- Material specifications: Power, Civil, Mechanics, Automation, and Control.
- Preferred brands.
- Others: capacity of after-sales service, references in similar processes from certified vendors.
- Certifications: CE, UL, API...

5. Necessary Facilities.

- Definition of spokespersons. From the Client: Engineering and Maintenance Management and Environment. From LEF: 1 Project Manager + 1 Senior Engineer + 1 Junior Engineer.
- Required Equipment: List, Specifications, Power, Capabilities, Manuals, Etc.
- Required tanks: construction specifications, permissible materials, Etc.
- Overhead, surface, or underground pipes, in supports or accessible channels.
- Materials specifications.
- Hydraulic, diameters of the pipelines, power, automatization, control, compressed air and fluid piping, according to their composition.



- 3D drawings.
- Isometric and explosion drawings.
- Motor list, including power, type of starter or VFD, Etc.
- Signal list, specifying feed characteristics, and type of output: digital or analog.
- Required grounding connections list.
- Process calculations, hydraulic calculations, heat losses, structural calculations...

6. Power, and Control cabinets.

- Definition of spokespersons. From the Client: Engineering and Maintenance Management and Environment. From LEF: 1 Project Manager + 1 Senior Electrical Engineer + 1 Junior Engineer.
- Motor protection and automation architecture.
- Separated power, and control cabinets, or integrated into the same room.
- Power protection: control cabinets of fixed motors or with removable units.
- Number of Junction Boxes for integration of instrumentation: translation to digital.
- Signals transmission protocol between JB and central cabinet: cable, optic fiber, or wireless.
- PLC and HMI / distributed control: characteristics, and preferred brands.
- SCADA communication architecture with the rest of the cabinets in the factory.
- Design of periodic reports: registration of set-points, and changes, alarms, and instrument readings. Pumps working times and chemical consumption (total and per gpm).

7. Production Control, and Factory Acceptance Test, FAT.

- Definition of spokespersons for production control and FAT tests.
- Specification of the inspection points required, during FAT, to accept the machinery.
- Identification of the machinery whose manufacturing and installation will be controlled.
- Updated timetable and workshop intervention dates.
- Packing and shipping to the final destination.
- Quality assurance: inspection points plan, certifications, procedures, traceability...
- Occupational Risks Prevention: regulations and validation of compliance by the entire supply chain.



8. Installation Supervision and Mounting Works.

- Definition of spokespersons for installation supervision.
- Scope of works.
- Diagram for notifications and approvals in case of unexpected issues.
- Certifications of the mounting providers.
- Quality assurance.
- Health, Safety and Risks.

9. Commissioning and Hand-over.

- Definition of spokespersons for commissioning and hand-over.
- Design of the Performance Test.
- Minimum required services for commissioning.
- Procedures Manuals, which contain the start-up procedures for the different equipment and parameters to be controlled, to validate the correct operation, with clean water to verify the facilities, and for normal operations with process water.
- Stabilization Times, Necessary time to stabilize the processes. Time Programed between start-up with clean water and process water until passing the Performance Test. Microbiological processes may require special times to get positive performance results.
- Follow-up visits until expiration of LEF's warranty.
- Technical assistance during the warranty period with remote access to the control system.
- Minimum recommended spare parts list.

10. Operación / Mantenimiento Preventivo y Correctivo / Asistencia Técnica.

- Scope of works.
- Timeframes and types of required attention.
- Response time since an incident is reported.
- Communication process and client/supplier spokespersons.
- Responsibility for negligent actions.
- Periodic reports and frequency of on-site meetings with the assigned managers.

