

KEY FIGURES DSEC



350+
Employees



300 M€
Latest project value



500+
Projects completed
in 65+ countries



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BIO-BASED INDUSTRIES



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Serving the World Bio-based industry

Process integrator dedicated to Agro-processing industries

De Smet Engineers & Contractors (DSEC) is a private company located in Belgium, created in 1989:

- **Acting as an engineering & general contractor company** specializing in the agro-industrial and bio-based industry fields,
- **Fully integrated world-class provider** of project management, engineering, procurement and construction services.

DSEC carries out projects from their initial conceptual stage (audits and engineering studies) up to complete delivery, including commissioning and performances demonstration (turnkey management - EPCM or full turnkey construction - EPC).

Implementing External Technologies and beyond

- Capability to develop full projects **from feedstock handling to product conditioning**, including **offsites and construction works**
- Full **understanding of Technology Providers' downstream requirement** through DSEC's large experience in the agro industry (filtration, evaporation, separation, drying, chromatography, ion exchanges...)
- Experience in **assessing and validating all stages of process development** and products definition so as to reach a comprehensive concept before effective project start (Pilot ► Demo ► Industrial)
- Experience in **2G cellulosic sugars, lignin and lignocellulose, bio solvents**.

Industrial Biotechnology: a large range of processes that DSEC can develop

- **Catalytic reaction** (polyols)
- **Fermentation and bioconversion**
- **Membranes technologies**
- **Separation technologies** (solid / liquid)
- **Cross-sectional, interdisciplinary bio-refinery approach** through valorisation of food processing **side/waste streams** by the biochemical/biofuels industry for the **economical and environmental benefit** of both activities.

Biorefineries & Bio-based chemical plants



Reliability through experience

2G Fermentable sugars production plants

PARTICULAR FOCUS ON TECHNOLOGY PROVIDER'S DEVELOPMENT IN THE 2G FERMENTABLE SUGAR PRODUCTION

- Biomass pre-treatment (wood, straw, bagasse, agroindustry wastes, energy crops...)
- Enzymatic hydrolysis
- Lignin processing
- Catalytic reaction

Green field implementation or add-on to existing 1G facilities

Biomolecules & bio-plastics

EXPERIENCE IN THE DESIGN AND IMPLEMENTATION OF BIOMOLECULES PRODUCTION PLANTS

- **Bio-based organic acids:** Butyric acid, Glycolic acid, Lactic acid
- **Bio-solvents:** Ethyl acetate, Levoglucosenone (LGO), Propanediol (PDO)
- **Bio-plastics:** PLA, PET bio-recycling, Compound/Filler



DSEC is your partner for...

PROJECT DEFINITION

- PDP development based on technical process description from supplier & client
- Technical & technological assessments
- Selection of appropriate technology & unitary operation
- Integration of an add-on into & existing facility
- Utilities engineering & interfaces design
- CAPEX & OPEX development

PROJECT IMPLEMENTATION

- Overall Project Management including cost control & scheduling
- Detailed Design of all activities (Civil & Structure, Piping, E&I...)
- Procurement of equipment & materials
- Workshop quality control & FAT
- Expediting services
- Integration of all related project activities
- Plant automation standardization
- Site activities management including implementation of site HSSE
- Plant commissioning & start-up assistance

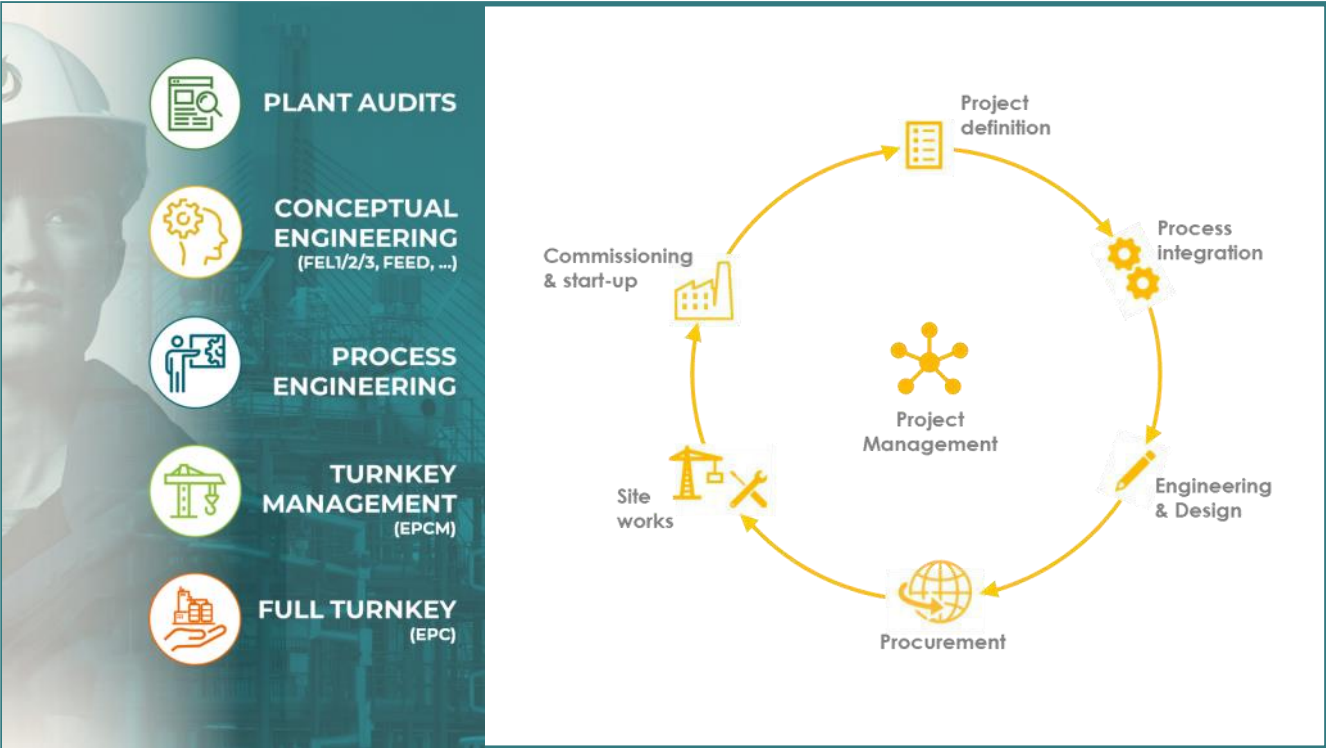
Reliability through experience

DSEC's Assets for the Bio-based Industry



- Efficient Integration of new developments and flexibility in dealing with changing environments
- Strong track record accumulated for more than 30 years, working in 65 countries and completing more than 50 Large Scale Projects (which major bio-based projects referenced are listed opposite)
- Integrated, robust, validated process and final product definition, before transfer of technology (Pilot ▶Demo ▶Industrial)
- Repeated experience with key industry players, Client IP protection
- In-house specialists in Bio-based organic acids, Bio-solvents, Bio-plastics ...
- Focus on efficiency and energy saving
- Full independence from equipment suppliers allowing optimization of projects' Global Sourcing Strategy
- Execution of all downstream process units applicable for the Bio-Industry such as: filtration, evaporation, separation, drying, chromatography, ion exchange, ...
- Familiar with all types of raw material: seeds, grain, molasses, beet, chicory, bagasse, wood, straw, ...

MEETING OUR CUSTOMER'S NEEDS



Industrial References in Bio-based Industries

PRODUCT	CUSTOMER	COUNTRY	CONTRACT	YEAR
BIO-ETHYL ACETATE from bioethanol	Crop Energies	Germany	EPCM	2024 > 2025
BIORECYCLING of PET in PTA & MEG	Carbios	France	EPCM	2024 > 2025
BIO-SOLVENT (Cyrene) & LGO from sawdust	Circa	France	EPCM	2023 > 2025
TANNIN From chesnut wood biomass	Silvateam	Italy	Engineering services, FEED studies, Detailed engineering, Cost estimates	2023 > 2024
CELLULOSE, HEMICELLULOSE and LIGNIN From woody biomass	Bloom Biorenewables	Switzerland	FEL2	2023
LACTIC ACID from wood waste	TripleW	Belgium	FEL2 + FEL3	2023
2G SUGARS, LIGNIN from woody biomass	Fibenol	Estonia	FEED followed by EPCM Greenfield project	2018 > 2023
PROPANEDIOL, BUTYRIC ACID from (raw) glycerol	Metabolic Explorer (METEX)	France	FEED followed by EPCM Greenfield project	2017 > 2020
2G SUGARS, BIO-CHEMICALS from woody biomass, wheat straw, sugarcane bagasse	Several undisclosed customers	E.U. Brazil	Several Pre-FEED and FEED studies	2016 > 2023
AMINO ACID from sugars	Ajinomoto-Eurolysine	France	Several EPCM Brownfield units	2015 > 2018
2G BIOFUELS from woody biomass, wheat straw, sugarcane bagasse, cane straw	Several undisclosed customers	E.U. Brazil Australia	Audit, Pre-FEED, FEED studies, Cost estimates, Engineering services	2015 > 2023
2G BIOFUEL from miscanthus/wheat straw	INA	Croatia	Basic Engineering OSBL	2019 > 2020
LACTIC ACID from sugar	Galactic	Belgium	Engineering services	2013 > 2018