



**FULLY INTEGRATED
CELLULOSIC ETHANOL
PRODUCTION**

**CLARIANT'S SUNLIQUID®
STORY**

CLARIANT 

Public

Ralf Hortsch
Business Line Biofuels & Derivatives
02.03.2020

what is precious to you?

Clariant at a Glance – A Globally Leading Company in Specialty Chemicals

4 399

Sales 2019 (CHF m)
from continuing operations

692

EBITDA¹ 2019 (CHF m)
after exceptional items from
continuing operations

3

Core Business Areas

17 223

Employees 2019
of total Group including
discontinued operations

38

Net result 2019 (CHF m)
of total Group including
discontinued operations

15.7%

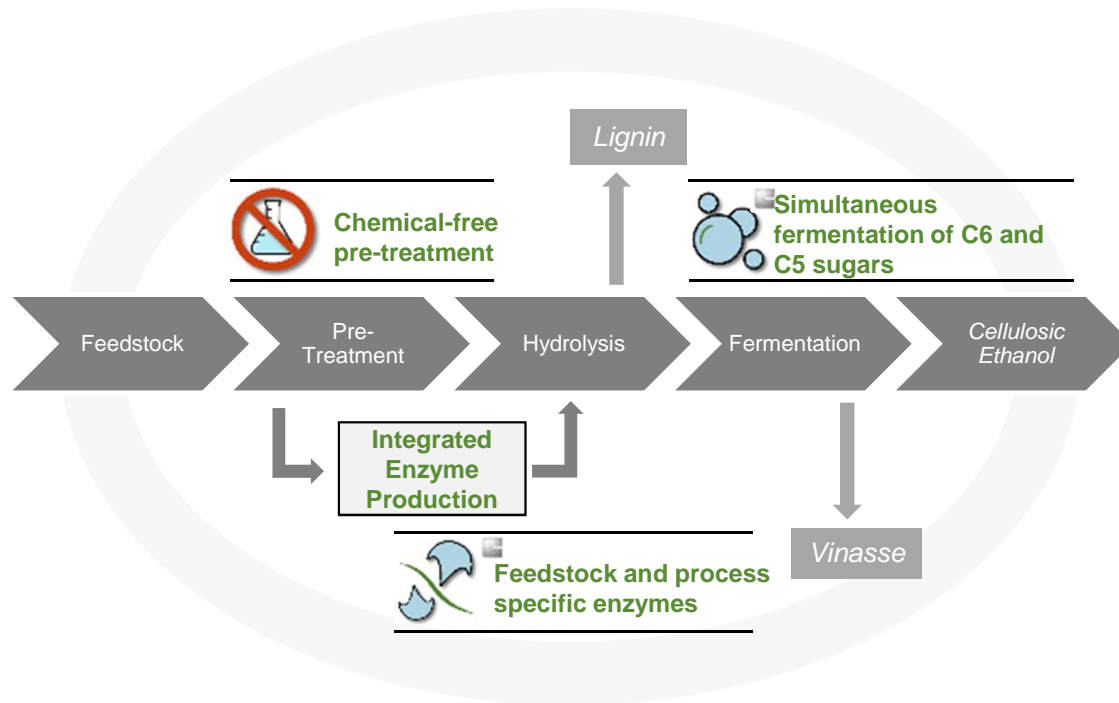
EBITDA margin¹ 2019
after exceptional items from
continuing operations

118

Production sites worldwide
of total Group including
discontinued operations

¹ excluding a CHF 231 million provision for an ongoing competition law investigation by the European Commission

sunliquid® process: fully integrated cellulosic ethanol production



The **chemical-free** mechanical and thermal **pre-treatment** enables an optimal hydrolysis. Purification steps are unnecessary and makes for a safer and more environmentally friendly process.

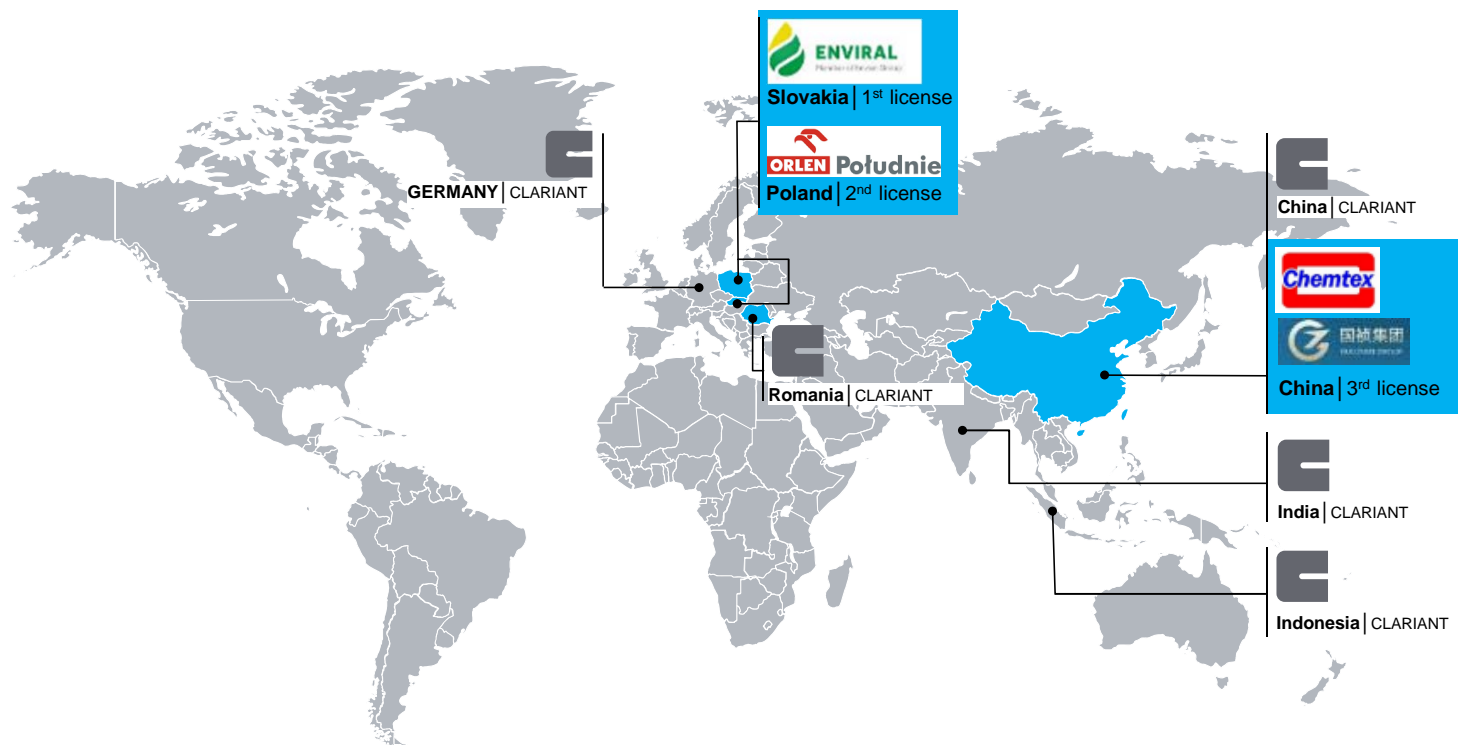


Through the **process integrated enzyme production** costs can be reduced to a minimum. Enzymes are produced exactly when and where needed, there are no costs for logistics or formulation and no dependence on external suppliers. **Feedstock and process specific enzymes** achieves a more efficient hydrolysis with maximum yields and makes the process flexible for different boundary conditions.



Excellent **by-product quality**. Low sulphur high dry-matter lignin. Vinasse as biogas substrate or organic fertilizer

sunliquid®: licenses, projects and offices on a global scale



sunliquid® TEAM MEMBERS

Germany Munich Straubing Frankfurt	China Shanghai India Mumbai Romania Podari Indonesia Jakarta
--	---

LICENSE AGREEMENTS & PROJECTS:

- Enviral, **Slovakia**
- Orlen Poludnie, **Poland**
- Chemtex/Anhui Guozhen, **China**
- Clariant own investment, **Romania**

sunliquid®: eagerly looking forward to its footprints in India

Reasons to choose Clariant's sunliquid® technology to enable profitable production in India

Clariant's sunliquid® starter cultures and process technology enables operators to:

Use sunliquid® package adapted for the Indian market with significantly lower OPEX compared to other providers
including localized **energy generation** package and **ZLD concept**

Eliminate acid and alkali consumption in pre-treatment
Pre-treatment chemical costs of approx. **30 Cr INR/year** can be eliminated*

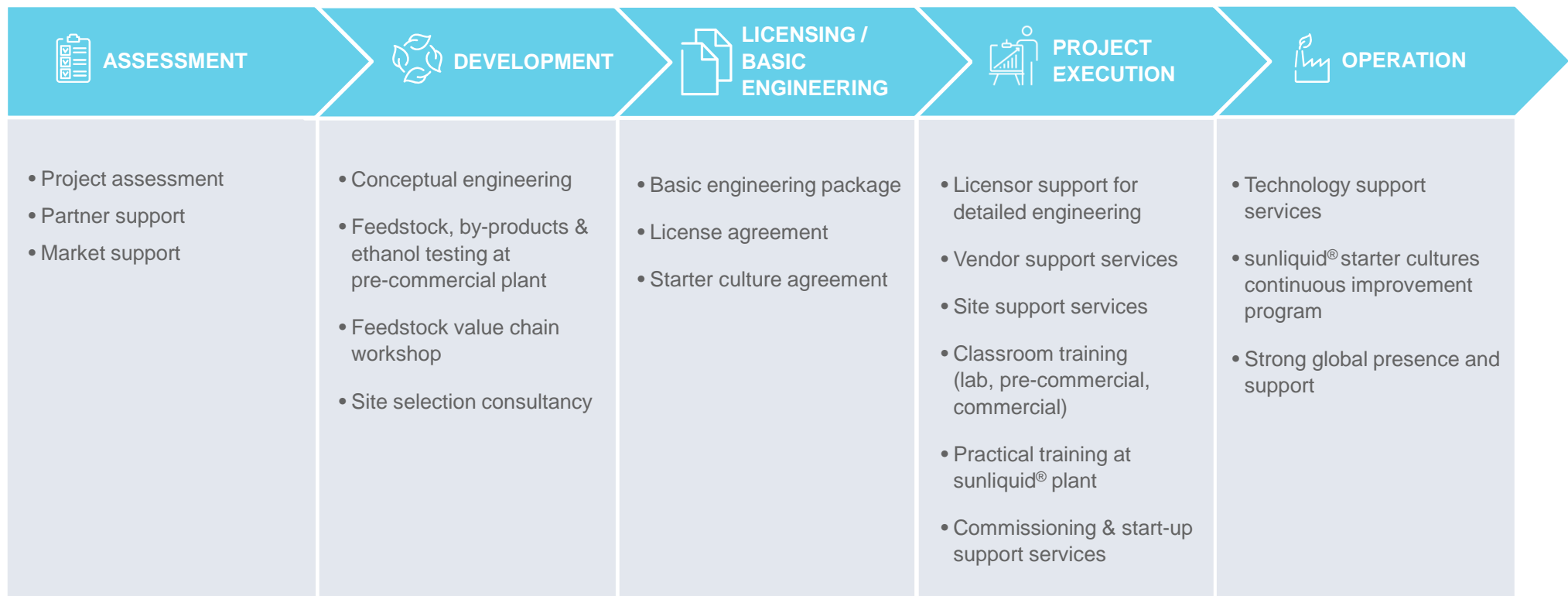
Obtain cost competitiveness and supply security through integrated enzyme & yeast production
Integrated on-site enzyme production **leads to lower transportation, purification & storage costs** compared to finished enzyme packages and enables operator influence on enzyme costs (e.g. lower feedstock costs leads to lower enzyme production costs)

Benefit from higher lignin quality
Lower moisture (35-40%) leads to higher lignin calorific value and **enables reduction/ elimination of secondary fuel**

Benefit from higher vinasse quality
Direct co-combustion with lignin enables onsite power generation **enables reduction in electricity imports**, and future option for use as higher value organic fertilizer

*Calculation for 100 KLPD plant

Our offering: tailored customer services throughout the entire value chain from feedstock to operation



Thank you for your attention!

Questions?

Ralf Hortsch

Head of Licensing & Services

Mobile: +49 151 461 24 943

ralf.hortsch@clariant.com