



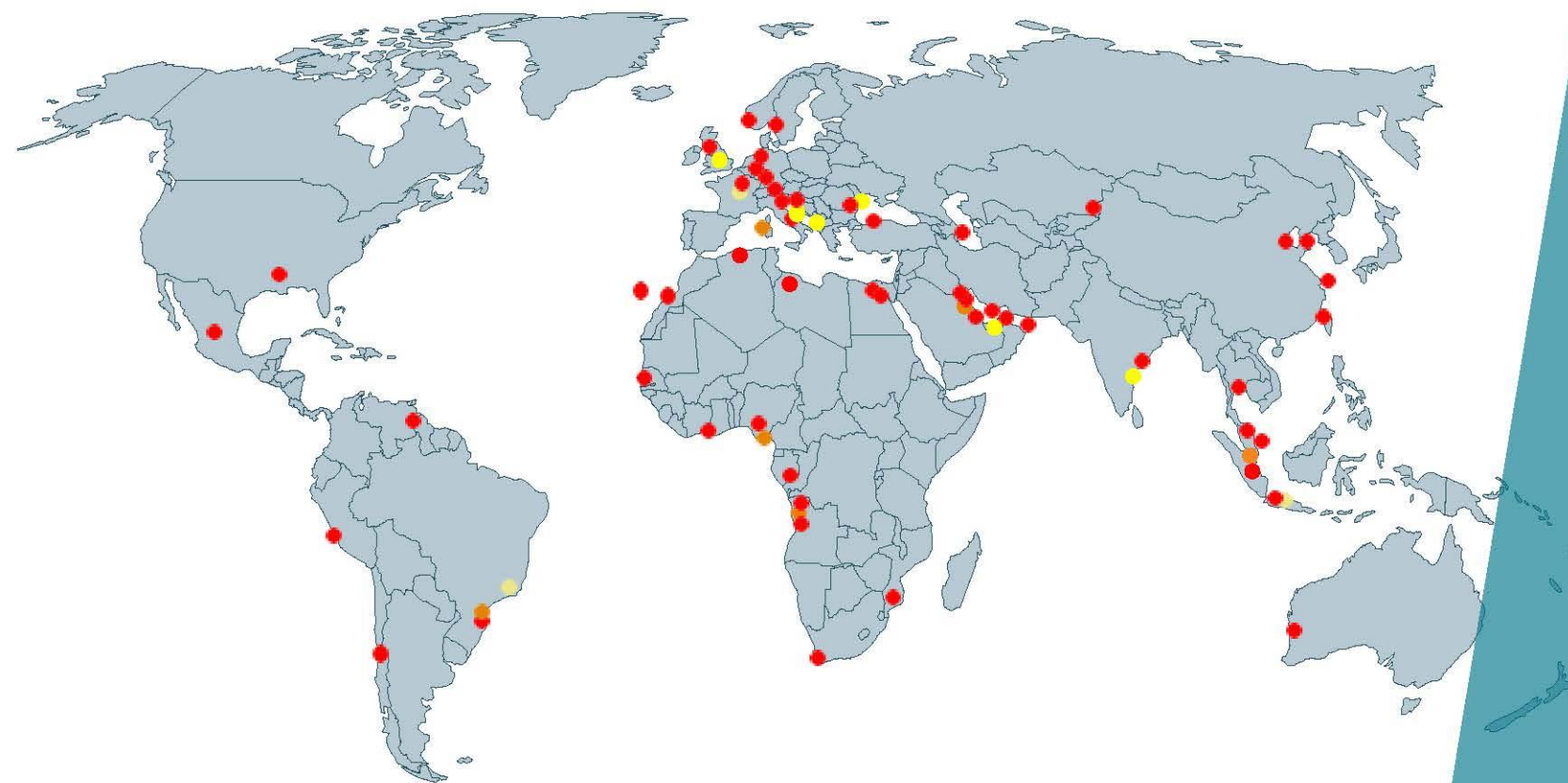
# SAIPEM EXPERIENCE IN BIOREFINERIES

Case study - Story of a successful integration with Enilive biorefineries



# OUR GLOBAL REACH

Spanning continents, connecting markets



**Engineering centres**  
Dedicated to research & development, business process management and information technology

**Prefabrication yards**  
Focused on prefabrication, assembling and erection operations of large and complex manufactures such as offshore platforms, plant modules, subsea manifolds and components

**Other relevant sites**  
headquarters, branches and subsidiaries

## Key figures

A snapshot of our global impact

WE OPERATE IN **> 50** COUNTRIES

**> 30,000**  
EMPLOYEES WORLDWIDE

**> 120**  
DIFFERENT NATIONALITIES

**6** PREFABRICATION YARDS

Arbatax (Italy), Guarujá (Brazil), Ambriz (Angola), Dammam (Saudi Arabia), Karimun (Indonesia), Rumuolumeni (Nigeria)

**14,549 M €**  
REVENUES

**1,329 M €**  
ADJUSTED EBITDA

**337 M €**  
CAPITAL EXPENDITURE

**2,639**  
ACTIVE PATENTS

N.B. data as of 2024

# ONE SAIPEM, six distinct business lines





# SAIPEM EXPERIENCE IN BIOREFINERIES

## Why decide to convert an existing refinery VS. build new plant

### NEW PLANT

- It is necessary to develop new infrastructure and logistics systems.
- New units for auxiliary's services must be constructed according to the consumption of the plant.
- When shutting down a plant, it is important to factor in costs related to environmental remediation, ongoing maintenance, environmental compensation and taxes.
- The establishment of a new plant affects more on adverse manners (impact on landscape, environmental repercussions, NIMBY) respect to the benefit (new jobs, increase of product availability).

### INFRASTRUCTURE COST

### UTILITY & AUXILIARY SYSTEMS COST

### ENVIRONMENTAL COST

### CLIENT REPUTATION

### CONVERSION OF EXISTING REFINERY

- Continue utilizing the existing refinery facility for the similar products.
- Leverage on available Auxiliary units, assessing the reliability and lifespan of the existing and retrofitting only when and where essential.
- Converting the refinery helps decreasing compensation costs for environmental remediation and opens up the opportunity to earn carbon credits or other environmental benefits.
- Transforming an older asset to manufacture environmentally sustainable products can improve its reputation within the community.

# SAIPEM EXPERIENCE IN BIOREFINERIES

SAIPEM EXPERIENCES with ECOFINING™ technology: 3 EPC (1 ongoing), 7 FEED (3 ongoing)

## STAND-ALONE GREENFIELD UNITS

- Maximum unit flexibility
- Produce 100% renewable fuel
- Targeted product slate
- Highest capital expense, but the best economy of scale



Enilive Venice Biorefinery

Eni Livorno Refinery



## REVAMP OF EXISTING UNITS

- Repurpose assets
- Faster time to production
- Fixed capacity and limited feed flexibility
- Moderate capital expense and economy of scale



# CASE STUDY

## SUCCESSFUL IMPLEMENTATION STORY @ ENILIVE VENICE REFINERY

- The **world's first conversion** of traditional refinery's entire processing cycle a to a biorefinery (Eni Porto Marghera Refinery, 2014)
- **Ecofining™** technology, developed and patented in 2007 by Eni in collaboration with Honeywell UOP

- 400,000 TPA of Waste & residues and Vegetable oil treated & converted

2009

FEASIBILITY STUDY

BASIC Engineering



2012

FEED

2014

EPsCm

Decision for  
Re-Use vs. Re-Place

2023

FEASIBILITY STUDY

2024

FEED

- Adding SAF production (2026) and increasing capacity (2027)



# CASE STUDY

## FEASIBILITY STUDY

INPUT from ENI Refinery team:

- Evaluation of the accessible feedstock
- Examination of the technologies available for biofuels production
- Definition of the capacity for biofuels production within the refinery scheme to optimize the use of current units and minimize the need for renovations or new units.

In collaboration with the Refinery team:

- Implementation of the refinery plan to incorporate the chosen technology and the execution strategy

## BASIC DESIGN

- Evaluation of modifications needed for the current hydrodesulfurization unit.
- Establishment of minimum requirements for new metallurgy.
- Specification of new operating/design parameters and catalyst.
- Determination of the size for auxiliary units such as SWS, ARU, and WTP.
- Revision of process conditions in downstream refinery units (including changes in flow rate, compositions, and conditions) - coordination with other LICENSORS.

## FEED

- Evaluate each item for potential reuse, upgrade, or replacement.
- Check the systems for possible upgrades or changes (including piping, cables, control room, and electrical substation).
- Assess the services like steam, cooling water, air, nitrogen, flare, drains, and storage.
- Definition of the tie-in points.
- Prepare the documentation required for dismantling.

## FEASIBILITY STUDY

In addition to what reported above and in collaboration with the Refinery team:

- Definition of the Tie-in points
- Establishment of minimum requirements for new metallurgy

## BASIC DESIGN + FEED

- Implementation of the PDP developed by Honeywell-UOP into FEED design of the revamped unit
- validation of the size for auxiliary units such as SWS, ARU, and WTP.
- Revision of process conditions in downstream refinery units (including changes in flow rate, compositions, and conditions) - coordination with other LICENSORS.
- Evaluate each item for potential reuse, upgrade, or replacement.
- Check the systems for possible upgrades or changes (including piping, cables, control room, and electrical substation).
- Assess the services like steam, cooling water, air, nitrogen, flare, drains, and storage.
- Prepare the documentation required for dismantling.

- 8 months

What we do in the past

Today improvement

# CASE STUDY



## LESSONS LEARNED

- 1 Ensure the design of the biorefinery to comply with the feedstocks potential variation as selected by the Client
- 2 Improve the collaboration with all the Technology Provider involved.
- 3 Collaborate with the Licensor and Client to develop the ISBL design, aiming to create a tailored Process Design Package (PDP) for the retrofit.
- 4 Conducting series of site visits, since the feasibility study phase, and gathering documentation for the existing facilities (including manufacturer documentation and maintenance records)
- 5 Carry out an extensive analysis and evaluation of the existing equipment's metallurgy due to the acidic components introduced with the new feedstock
- 6 Carefully check the possibility to implement new engineering standard for the revamp of existing unit



# Thank you!

