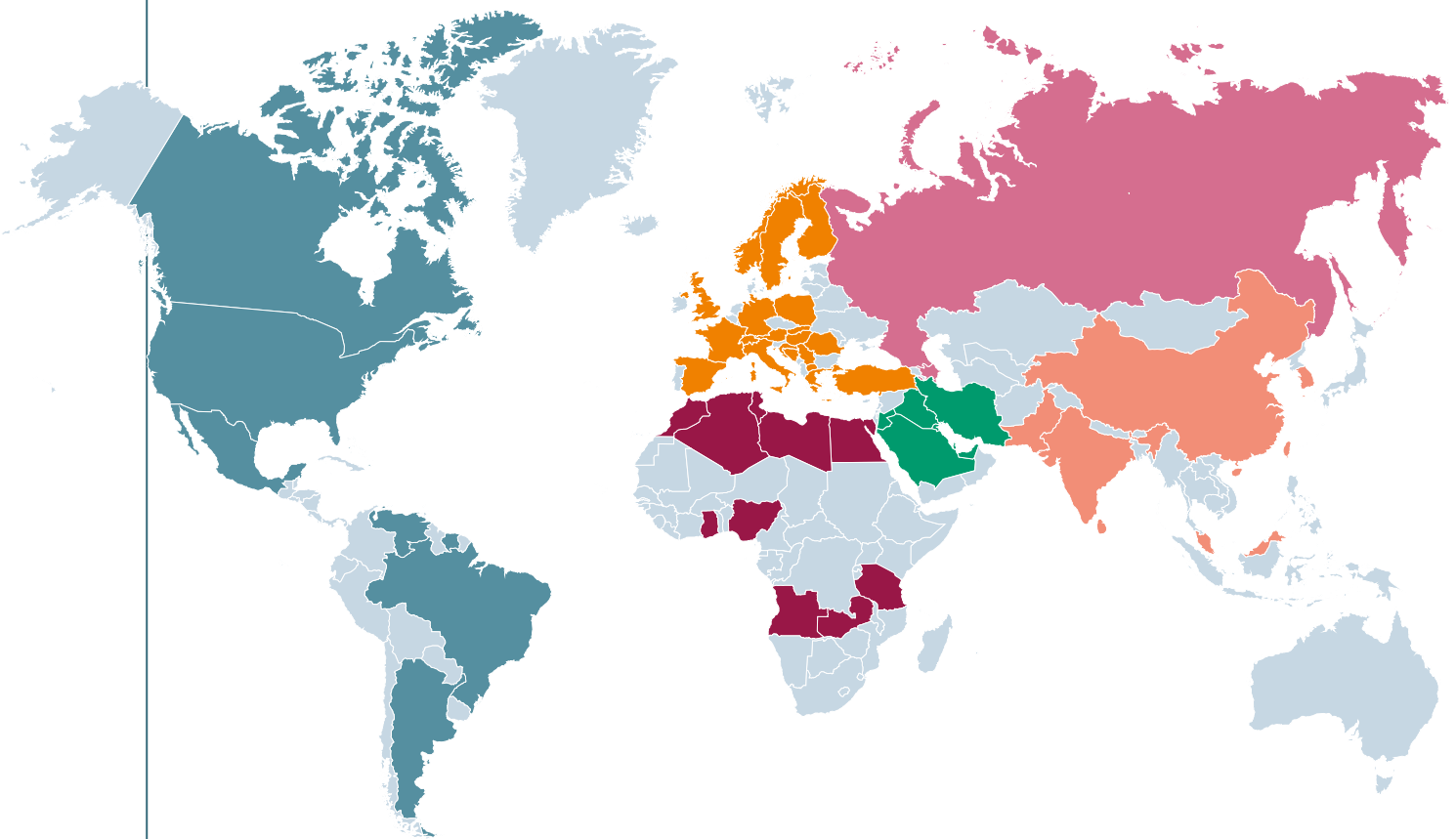




SAIPEM REFINING AND PETROCHEMICAL



60 YEARS OF EXPERIENCE IN THE DOWNSTREAM SECTOR



AMERICAS

REFINERY UNITS	46
PETROCHEMICAL UNITS	12

AFRICA

REFINERY UNITS	113
PETROCHEMICAL UNITS	5

MIDDLE EAST

REFINERY UNITS	248
PETROCHEMICAL UNITS	17

FAR EAST AND OCEANIA

REFINERY UNITS	54
PETROCHEMICAL UNITS	26

CIS

REFINERY UNITS	2
PETROCHEMICAL UNITS	2

EUROPE

REFINERY UNITS	470
PETROCHEMICAL UNITS	102

EPC PROJECTS

700+

INDIVIDUAL REFINING AND
PETROCHEMICAL UNITS BUILT

37

GRASS ROOTS
REFINERIES BUILT

50+

COUNTRIES

SAIPEM'S CAPABILITIES

**SAIPEM IS ACTIVE THROUGHOUT THE ENTIRE
DOWNSTREAM CHAIN**



*** UPSTREAM**



**** PRODUCT
EXPORT PIPELINES**



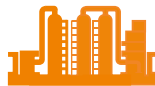
OIL TERMINALS



**** OIL PIPELINES
FOR IMPORT**



**CRUDE OIL DISTILLATION
AND UPGRADE**



**PETROCHEMICAL FROM
REFINING INTERMEDIATE**

* Upstream brochure available on request

** Pipelines brochure available on request



TECHNOLOGICAL SKILLS AND EXPERIENCE

**SAIPEM BOASTS LONG LASTING AGREEMENTS
AND ALLIANCES WITH THE WORLD'S LEADING
LICENSORS, OFFERING INNOVATIVE, RELIABLE
AND COMMERCIALY PROVEN TECHNOLOGIES**

The commitment to always deliver the most effective solutions also from the point of view of technology is one of the organisation's key missions.

The strategic focus of conducting detailed studies to evaluate, compare and select the licensed technologies by assessing the technical, operational and economic aspects that will ultimately benefit both the project implementation and plant operation allows Saipem to contribute significantly to its clients' projects starting from the conceptual phase. Saipem's extensive experience in optimising the integration of process technologies within large and complex EPC projects, including the development of synergies with efficient utilities and offsites, delivers exceptional value with tailored solutions on a specific project basis. Constantly ensuring its engineering and technology expertise is updated enables Saipem to continuously support clients during the life of the plant to improve performance - also by introducing actual innovations - and staying up to date with changing markets and regulation requirements.

**FROM TECHNOLOGY SELECTION TO SUCCESSFUL DELIVERY
OF COMPLETE PROJECTS**



REFINERY PLANTS

CONTINUING AND BUILDING ON THE SNAMPROGETTI™ LEGACY

SAMIR MOHAMMEDIA REFINERY: RESIDUE UPGRADING AND PRODUCT IMPROVEMENTS



→ Vacuum unit
54,300 bpsd

→ Hydrogen unit
102,000 Nm³/h

→ Hydrocracker unit
36,000 bpsd

→ Sulphur Plant units
2x253 t/d

→ Gasoil HDS unit
55,000 bpsd

Field location: **Marocco**

Project description

The refinery was built by Snamprogetti in 1963 and, during the following decades, it went through three subsequent phases of expansion in 1972, 1978 and 1983.

The plant was fed with crude oil imported through the adjacent port of Mohammédia and produced finished products for the domestic Morocco market, with a crude oil refining capacity of 6.25 Million Tons per year (around 130,000 BPSD).

The upgrade, which was completed between 2009 and 2010, resulted in an increase for the refinery in medium distillate product yields along with product specification improvement.

Back in the 60s this Project set an important cornerstone of Saipem's way of doing business by making local content and added value the centre of attention of the host countries by utilizing high percentages of local manpower.



PETROCHEMICAL

A STRONG INTEREST IN PETROCHEMICALS WITH THE PRIORITY BEING OLEFINS, POLYOLEFINS, ELASTOMERS AND THE MAIN INTERMEDIATE PRODUCTS

QATOFIN RAS LAFFAN POLYETHYLENE PROJECT



→ Hours of engineering
400,000

→ Concrete
10,500 m³

→ Smh erection work
1,150,000

→ Steel work and Piping
7,300 tons

Field location: **Qatar**

The plant has a capacity of 450,000 tpa of polyethylene using Univation technology and is one of the largest in the world on a single reaction line with the possibility of increasing to 600,000 tpa.

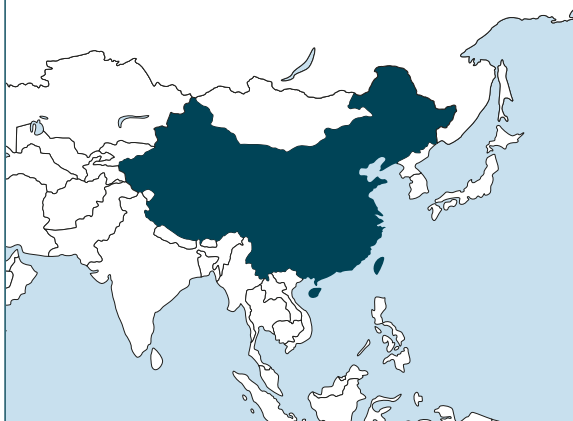
Main features

- Lifting and positioning of large items carried out with the plant already in an advanced state of assembly.
- Implementation of the enclosed flare solution instead of the conventional stack flare/ground flare allowing for the flare to be installed very close to process units in order to fit in a small size area.
- World's largest capacity extruder (2009).
- Pneumatic conveying system for product transfer from pelleting unit to logistic terminal with large capacity associated with the long distance.
- Improvement in the hydrocarbon recovery system adopting the membrane technology integrated with the Licensor Unit.

EPC Contract | Lump Sum Turn Key Contract | Start-up 2009



PETROCHINA SBR/SSBS ELASTOMERS COMPLEX



- Styrene-Butadiene Rubber continuous mode
60,000 tpa
- Styrene-Butadiene Rubber batch mode
40,000 tpa
- Styrene-Butadiene-Styrene
80,000 tpa

Field location: **China**

The project is part of a major development programme of the mega size Dushanzi Integrated Refinery and Petrochemical complex, which dates back to 1990.

The plant, based on Polimeri Europa's (Versalis) Technologies, consists of four reaction lines and six finishing lines.

Key constraints were mainly due to the severe winter climatic conditions, with temperatures exceeding minus 30° C. This issue implied to customising the Process Design Package in accordance with the Licensor's instructions in order to implement a different solvent to avoid icing problems as well as specific detailed engineering design regarding the winterization aspects.

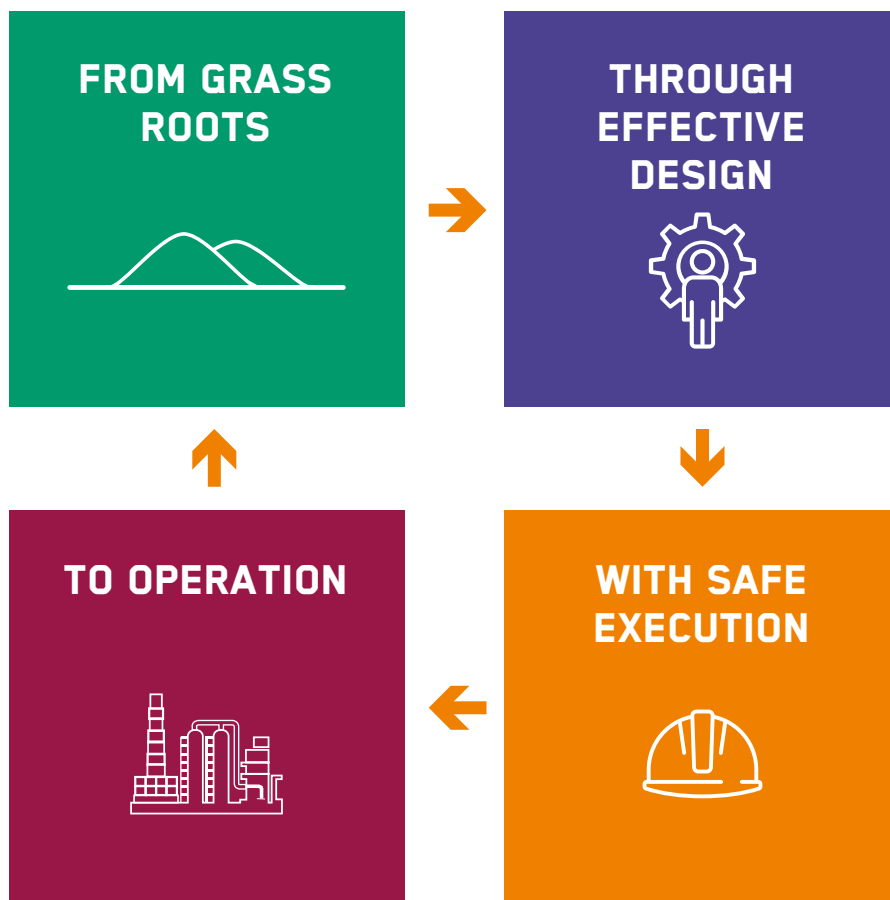
Another challenge was the simultaneous presence of numerous contractors engaged in the construction of the other units. This involved intense efforts to interface and coordinate effectively with teams from all over the world.

Saipem also provided technical assistance on site and staff training.

EPS Contract | Lump Sum Turn Key Contract | Start-up 2009



GRASSROOT REFINERY



SAIPEM OFFERS A COMPLETE RANGE OF PROJECT DEFINITION AND EXECUTION SERVICES: FROM FEASIBILITY AND CONCEPTUAL STUDIES TO COMPLEX INTEGRATED SOLUTIONS COMBINING DESIGN, ENGINEERING, PROCUREMENT, FIELD CONSTRUCTION, FABRICATION, COMMISSIONING AND MAINTENANCE



AEGEAN REFINERY PROJECT



→ Hydrocracker
66,000 bpsd

→ Hydrogen
160,000 Nm³/h

→ Diesel Hydrotreater
68,000 bpsd

→ Saturated Gas Plant
48,103 bpsd

Field location: **Turkey**

Project description

The scope of work includes 15 Process Units, 10 Auxiliary units and Utilities plus offsites with 3 marine terminals for the import of crude oil and export of final products.

The refinery is located adjacent to the Petkim Petrochemical Complex to which it will provide the main feedstock for petrochemical chains.

The site of the plant presented a high degree of challenge due to its configuration on different heights needing multilevel site-reshaping and marine terminal reclamation.

EPC LSTK Contract



THAIOIL



→ **Hydrocracker**
66,000 bpsd

→ **Hydrogen**
160,000 Nm³/h

→ **Diesel Hydrotreater**
68,000 bpsd

→ **Saturated Gas Plant**
48,103 bpsd

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EPC LSTK Contract | Ongoing

BOTTOM OF THE BARREL

A PIONEER IN THE DEVELOPMENT OF A NOVEL PROCESS TO CONVERT ALMOST COMPLETELY ANY TYPE OF HEAVY OR UNCONVENTIONAL RESIDUE INTO LIGHT PRODUCTS AND DISTILLATES

EST: THE FIRST INDUSTRIAL APPLICATION



→ Capacity
24,000 bpsd

→ Instrument cabling
1,300 km

→ Equipment weight
17,000 ton

→ Reactor Thickness
300 mm

Field location: **Italy**

Saipem's extensive know-how in bottom of the barrel hydroconversion was applied in the development of EST, Eni Slurry Technology, a revolutionary refining process that allows almost complete conversion of heavy feedstock into lighter components. EST is based upon an innovative hydro-conversion process scheme featuring a nanodispersed (slurry) non-aging catalyst and a homogeneous and isothermal slurry bubble column reactor.

Saipem completed the Basic Design Package and FEED of the first full scale commercial plant in 2008, then performed Detailed Design, procurement services and construction supervision during site activities completed in 2013 with the unit start-up.

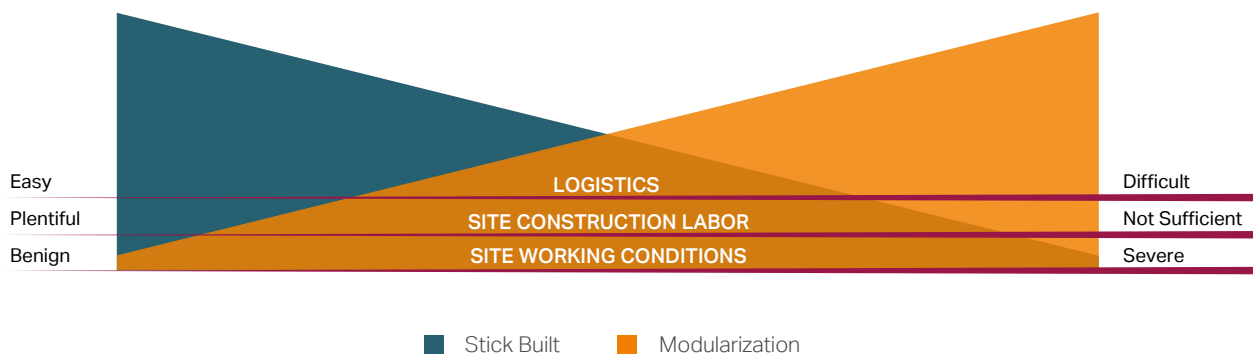
EST is licensed by Eni; Saipem is the sole authorized contractor for the preparation of the Basic Design Package.



MODULARIZATION

A NEW AND POPULAR WAY OF BUILDING EVEN VERY COMPLEX PROCESSING PLANTS, IN ORDER TO FACILITATE CONSTRUCTION IN REMOTE AND HARSH AREAS TO REACH FRONTIER MARKETS

WHEN SHOULD WE MODULARIZE?



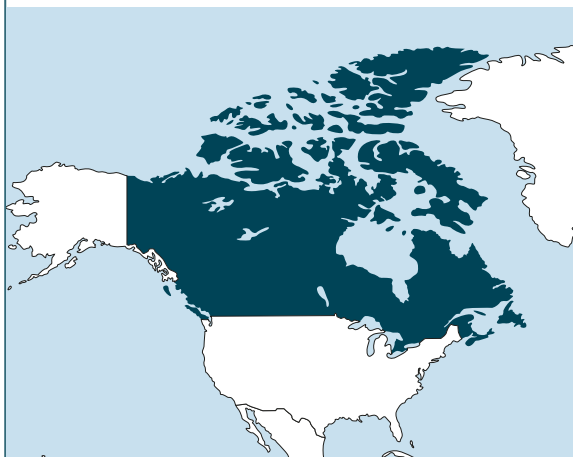
As some projects present logistic difficulties in performing work at site, the utilization of a Module Construction Approach can help to reduce the construction manhours at site thus mitigating the risk and time impact associated with site specific limitations.

Saipem has performed module construction for several projects to mitigate constraints such as security at site, climatic conditions and lack of manpower availability in the host country.

During the preliminary constructability phases of a project, an analysis is performed to determine if the project would benefit more from a module construction or a standard stick built approach.



HORIZON OIL SANDS PROJECT (SECONDARY UPGRADER)



- Gas Oil
44,800 bpsd
- Distillate
29,200 bpsd
- Weight of plant modularization
54%

Field location: **Canada**

The Combined Hydrotreaters Unit, licensed by UOP, consists of two reactors in parallel with a distillate feed to one reactor and a gas oil feed to the other.

The reactor effluents join at common separation and stabilization sections hence all equipment downstream from the Hot Separator are common.

The Unit was engineered with an extensive level of modularization (Piperacks and Equipment modules). A total of 63 modules, Alberta size, were fabricated in less than 9 months at Saipem fabrication yard in Edmonton (Alberta, Canada) and delivered to the CNRL Horizon Site by June 2016, in line with the project baseline schedule.



ESCRAVOS GAS TO LIQUID PROJECT



- **Single Heaviest Module**
2,500 tons
- **Total Module Weight**
22,000 tons
- **Weight of plant modularization**
50%

Field location: **Nigeria**

The scope of the project is a Gas to Liquids Processing Facility utilizing Sasol Fischer – Tropsch & Chevron technology to convert 320 MMSCFD of natural gas to approximately 34,000 bpd of product, consisting of 80% diesel blend and 20% naphtha, for export. The project met a government mandate to eliminate gas flaring in the oil and gas sector.

In order to simplify construction at site, with little available space and with a shortage of skilled labour, 23 very large modules (average weight about 1,000 t with the largest module weighing 2,500 t) were built in UAE and Thailand fabrication yards, under Saipem's overall management, then shipped to the site for local erection.

Modules were completed with steelwork, equipment, piping, electrical, instruments painting, fireproofing and insulation, corresponding to around 50% of the total weight of the plant.



TOUT LUI FAUT REFINERY EXPANSION PROJECT



- Vacuum Distillation
15,000 bpsd
- Visbreaker
2,700 bpsd
- Hydrocracking
10,330 bpsd
- Hydrogen Production (HPU) including PSA
24,999 Nm³/hr
- Catalytic Reformer
3,100 bpsd
-

Field location: **Suriname**

The key objective of the project was to increase the refinery capacity from 7,000 BPSD to 15,000 BPSD with the overall objective being the production of diesel, gasoline and fuel oil as the main products, as well as the maximization of EURO IV through the installation of new systems with a high technological content.

Saipem's scope of work included the design and execution of new processing units, new and revamped utility systems and new storage facilities.

The execution was based on a modularization approach with the fabrication of pre-assembled racks, units and spools.

The project was completed in 2013.



Photo courtesy of Staatsolie.

OIL TERMINALS

OIL TERMINALS REPRESENT A LOGISTIC CHALLENGE DUE TO THE LARGE VOLUME OF MATERIAL AND EQUIPMENT TO BE MOBILIZED. OIL TERMINALS ARE A STRATEGIC ASSET THAT ARE NEEDED BOTH IN REFINERIES AND IMPORT/EXPORT TERMINALS

AL ZOUR REFINERY PROJECT - STORAGE TANKS FARM



→ Storage tanks
66 tons

→ Piping
40,000 mt

→ Steel plates
75,000 mt

→ Cables for power and control systems
2,000 km

→ Concrete
150,000 m³

Field location: **Kuwait**

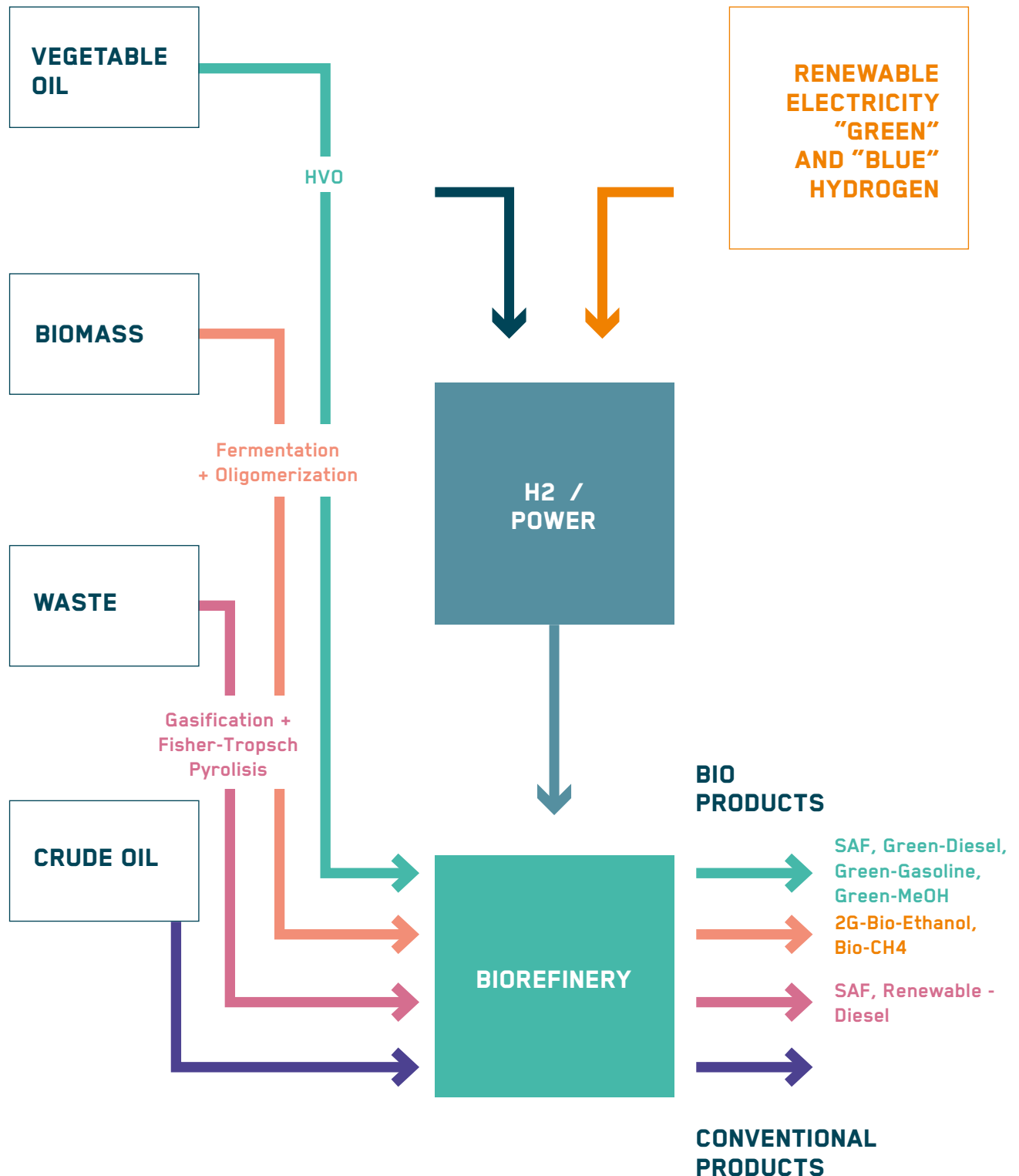
The project consisted of Engineering, Procurement, Construction, Pre-Commissioning and Assistance during Commissioning/Start-up/Performance Testing of tanks for a storage capacity of up to 2,600,000 m³ of feed oil and refined products.

Related facilities such as buildings, pipe racks, pipelines, water systems and control systems for the Al-Zour refinery were also included together with 20 Km of roads outside the refinery for use as public roads.



SAIPEM VISION OF BIOREFINERY

WASTE AND BIOMASS UTILIZATION PATHWAYS



EXPERIENCES IN BIOREFINERY/HVO

SAIPEM RECENT EXPERIENCE

GREEN DIESEL - LIVORNO

→ Capacity
230 kta

FEED for Green Diesel Unit including also the following Units: SWS, ARU, GPL Recovery.

→ Completion date
2007

VENICE GREEN REFINERY

→ Capacity
575 kta

Conversion of existing refinery to produce innovative and high quality bio-fuels (Green Diesel, Green LPG and Green Naphtha) from vegetables oil, animal fats, oils derived from seaweed and scraps of various types. Other Units were also involved: SWS, ARU, GPL Recovery.

→ Completion date
2014

GELA GREEN REFINERY

→ Capacity
275 kta

Conversion of existing refinery treating biomass (veg. oil) through the modification of Sulfur Recovery Unit and adding a new Hydrogen unit to substitute the existing TEXACO plant that was concurrently dismissed.

→ Completion date
2016

WAITING FOR APPROVAL TO DISCLOSURE

→ Capacity
300 kta

Feasibility study for Conversion of Biodiesel unit production to SAF completed. FEED activities ongoing in parallel to the Licensor PDP preparation.

→ Completion date
2025

WAITING FOR APPROVAL TO DISCLOSURE

→ Capacity
10,000 bdps

Feasibility study for Conversion of traditional Refinery to BioRefinery for the production of Biodiesel and SAF completed. FEED activities ongoing in parallel to the Licensor PDP preparation.

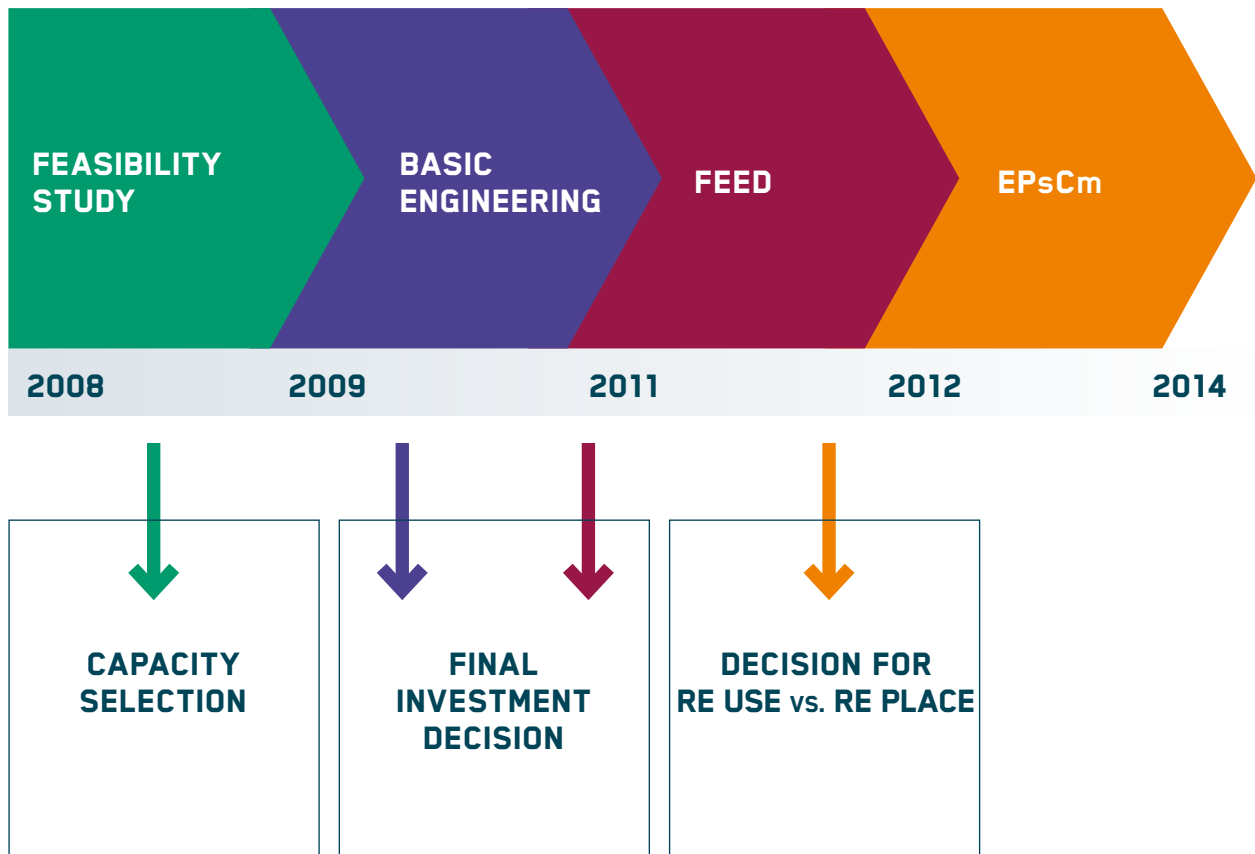
→ Completion date
2025

CASE STUDY - GREEN REFINERY

SUCCESSFUL IMPLEMENTATION STORY VENICE GREEN 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;
- 300,000 TPA of Green Diesel (in addition to Green Nafta and Green LPG) 500,000 TPA in the 2nd step;
- 230,000 TPA of vegetable oil treated & converted.



EXPERIENCES IN BIOREFINERIES

SAIPEM RECENT EXPERIENCE

WASTE TO FUEL - VENICE

- Capacity
150 kta
- Client
ENI R&M
- Completion date
2019

Technical and economic feasibility for the conversion of biomass into bio oil, using Eni liquefaction technology for a 150 kt/year plant, plus preparation of Basic Design package.

WASTE TO FUEL - PONTICELLE

- Capacity
15 kta
- Client
ENI R&M
- Completion date
2019

Technical and economic feasibility for the conversion of biomass into bio oil, using Eni liquefaction technology for a 15 kt/year plant.

WASTE TO FUEL - ISRAEL

- Feedstock Capacity
500 T/d
- Completion date
2025*
- Production
Bio Diesel SAF
- Client
Undisclosed

(*) Estimated Completion date.

Pre FEED study (FEL 2 for a Waste to Fuel complex based on sorted Municipal Solid Waste for the production of renewable diesel and SAF Expansion to 1500 T/d foreseen in the subsequent years The technology applied in the process are Gasification, Primary and Secondary Clean Gas system, Fisher Tropsch reaction and Product Up Grader together with all the Utility units and OSBL.

PLASTIC TO FUEL - BRINDISI

- Capacity
10 kta
- Completion date
2021

Feasibility Study to assess the viability of an innovative technology for plastic waste conversion into fuels Study includes Technology Risk assessment for pilot plant scale up and TRL definition.



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LET'S KEEP IN TOUCH

