

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

From Cl₂ to PVC via EDC/VCM : TechnipFMC expertise

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

TechnipFMC

Company Introduction

TechnipFMC in figures

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018

Monterrey - Mexico

2

Stock Exchange listings – NYSE and Euronext Paris

\$18B

Revenue

21

Vessels⁽²⁾

48

Countries in which we operate

\$16B

Total company Backlog⁽³⁾

44,000

Employees

Footnotes:

⁽²⁾ With four vessels under construction.

⁽³⁾ Backlog as of Sep 30, 2016 (FMC Technologies: \$3.02 billion; Technip: €12,28 billion), EUR/USD exchange rate of 1.09072 as of Oct 28, 2016; Source: individual company data as found in the European Prospectus filed on Jan 13, 2017

Onshore/Offshore Engineering footprint

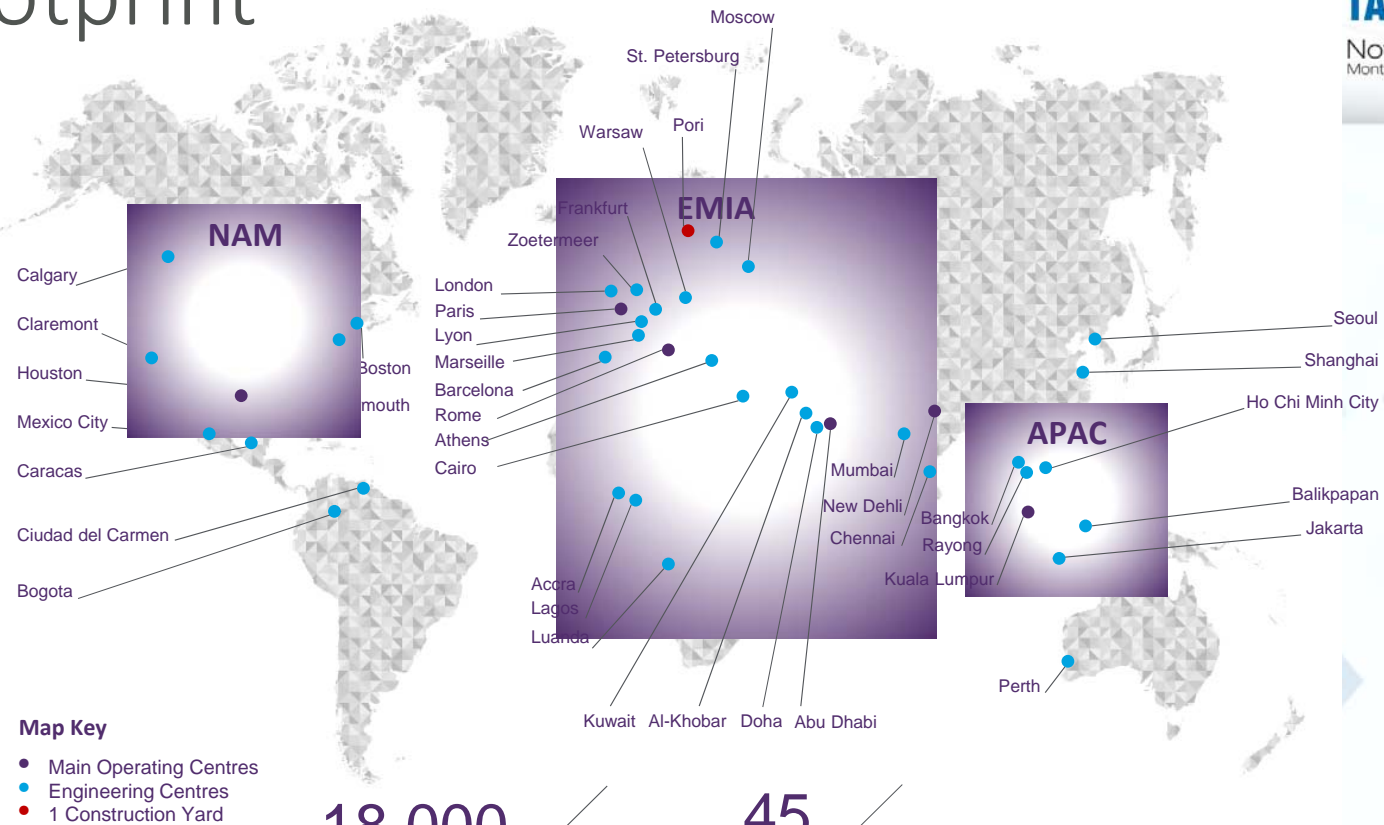
cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico



Map Key

- Main Operating Centres
- Engineering Centres
- 1 Construction Yard

18,000

people

45

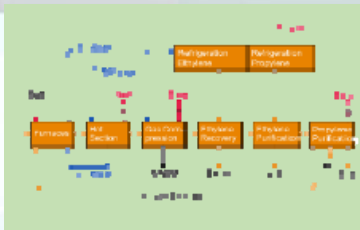
countries

TechnipFMC

cloroSur

From conceptual to start-up : TechnipFMC experience

cloroSur
11th TECHNICAL SEMINAR
WCC GST SAFETY WORKSHOP
TABLE TOP EXPO
 November, 14-16, 2018
 Monterrey - Mexico



Licensed proprietary technologies
 Early Feasibility Studies



PDP, Pre-FEED, and FEED based on TechnipFMC or third party technologies

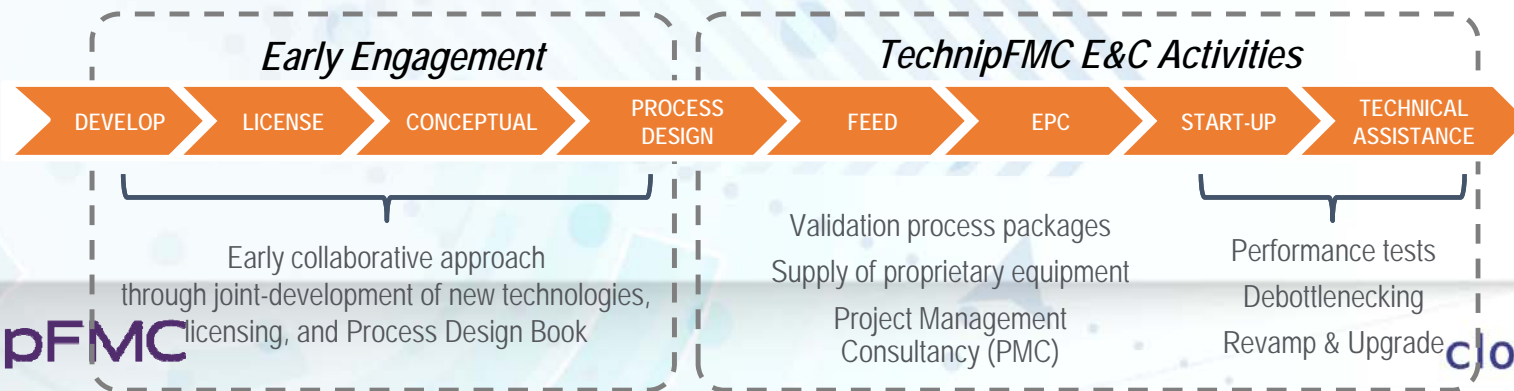


Design, supply and installation of proprietary equipment



Complete EPC or EPCM project delivery
 Project Management (PMC)
 Start-up Assistance

Project Planning, Management, and Control



A worldwide network of technology centers

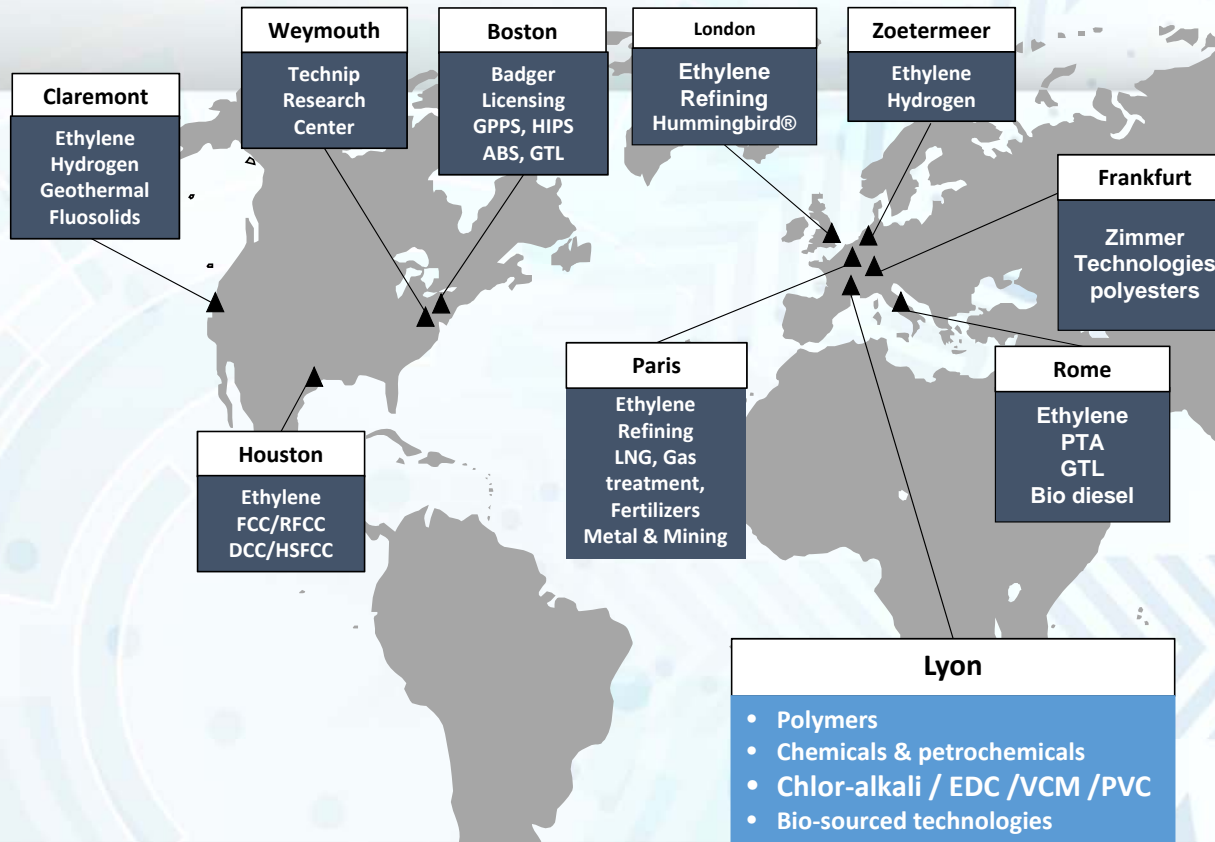
cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico



cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

From Cl₂ to PVC via EDC/VCM : TechnipFMC Experience and New Licensing Agreement

TechnipFMC major player in Vinyls

cloroSur
11th TECHNICAL SEMINAR
WCC GST SAFETY WORKSHOP
TABLE TOP EXPO
November, 14-16, 2018
Monterrey - Mexico

- ▶ Full range of services from feasibility study to EPC,
- ▶ for grass roots, revamping and expansion units

Chlor alkali

> 40 chlor alkali units



BASF (Asahi Kasei),
Ludwigshafen (Germany)

EDC / VCM

> 50 EDC/VCM units



RusVinyl (Solvay), Nijni
Novogorod (Russia)

PVC

> 40 S/E-PVC units



Solvay, Santo Andre
(Brazil)

TechnipFMC major player in chlor-alkali

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

- ▶ **Extensive expertise and growing knowledge of Chlor-Alkali unit engineering**
- ▶ **Experience in conversion from Mercury or diaphragm to membrane**
 - ▶ Reuse of existing equipment to reduce CAPEX (cellroom, TR, brine treatment)
 - ▶ Conversion of diaphragm caustic evaporation to salt crystallisation
- ▶ **Wide-ranging process technology know-how in:**
 - ▶ Brine treatment : development of new brine treatment regarding salt quality (Al, SiO₂, ...) and environmental issues (ClO₃, Cl₂....)
 - ▶ Electrolysis: experience with Asahi Kasei, Uhde, CEC, INEOS and ODC technologies
- ▶ **Value Engineering Review**
 - ▶ Optimisation of process to reduce CAPEX : 20-40 % savings

High Strength Hypo (HSH)

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

- **Licensing**
 - New Agreement with Arkema for support to marketing & development of basic engineering
- **HSB technology**
 - ▶ Very simple process (one step of chlorination) : low CAPEX
 - ▶ Large unit in one reactor (100 t/d Cl₂)
 - ▶ Integration in chlor alkali plant (recovery of pure salt)
- **HSB solution advantages vs standard**
 - ▶ High Strength bleach solution (>25%) : transportation cost savings
 - ▶ Recovery of pure salt to chlor alkali electrolysis : OPEX savings (145 kg NaCl per t of HSB)
 - ▶ Better quality of bleach solution after dilution @ 12% compared to traditional :
 - Lower density
 - Less salt (3 % versus 11 for standard)



ARKEMA
INNOVATIVE CHEMISTRY

TechnipFMC major player in EDC/VCM

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

▶ TechnipFMC Process group with deep knowledge in

- ▶ Oxyhydrochlorination
- ▶ Direct chlorination
- ▶ Cracking
- ▶ Distillation

▶ Process development

- ▶ ASPEN modelling of mass & heat balance for complete VCM plant
- ▶ Optimisation of plot plan
- ▶ Mechanical Design of critical reactors
- ▶ Hydraulic and mechanical design of distillation columns

TechnipFMC major player in EDC/VCM

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

▶ **New Agreement with OxyVinyls**

- ▶ TechnipFMC part of the club of Approved EPC contractors for support to marketing & development of basic engineering.



▶ **Oxyvinyls Technology**

- ▶ OxyVinyls is the world leader in licensing EDC/VCM Technology
- ▶ Technology leadership and continuous updating and improvement
- ▶ Lowest CAPEX with lowest equipment count, lowest operating cost (high energy integration)
- ▶ Operates the two largest VCM plants in the world - Each capable of 1.1 million kta
- ▶ Single Oxychlorination unit can operate at a feed equivalent of 650 KTA VCM Production

TechnipFMC major player in PVC

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

- ▶ **TechnipFMC PVC Process group with knowledge in**
 - ▶ VCM Polymerisation
 - ▶ PVC Stripping
 - ▶ PVC Drying

- ▶ **Value Engineering Review**
 - ▶ Optimisation of process to reduce CAPEX

TechnipFMC major player in PVC

cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

▶ New Agreement with Kem One

- ▶ TechnipFMC exclusive (except in PRC) approved contractor for marketing and PDP development



▶ Kem One S-PVC technology advantages

- ▶ Lowest CAPEX with much less equipment
- ▶ Continuous technology updating and improvement
- ▶ Highest productivity per reactor
- ▶ Polymerization initiator readily available on market
- ▶ Very efficient proprietary VCM recovery section



cloroSur

11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

Thanks for your attention

For any questions, please contact

Sylvie Dimouchy

Business Development Manager

Tel: +33 6 85 19 32 78

sylvie.dimouchy@technipfmc.com

Jean-Christophe Millet

**Chlor alkali Expert & Vinyls
Licensing Manager**

Tel: +33 6 15 53 23 01

jean-christophe.millet@technipfmc.com