TechnipFMC GENESIS

FPSO Research Forum

Digitalization: The transition is now

October 16, 2019

Hotel Zaza, Houston

Organized in the framework of the JIP Week

TechnipFMC

Welcome – Keynote
Introduction of the thematic
“Digitalization: The transition is now.“

FPSO Research Forum, October 16 2019, Houston

Jean-Marc Letournel, SVP Business and Technology Offshore

Agenda

- ❖ TechnipFMC Introduction
- ❖ TechnipFMC Onshore/Offshore & Genesis Overview
- ❖ Collaboration & Digitalization

TechnipFMC

TechnipFMC

TechnipFMC in figures

2 Stock Exchange listings – NYSE and Euronext Paris	**$10B** Total company market capitalization	**20** Vessels
48 Countries in which we operate	**$25B** Total company Backlog[1]	**37,000** Employees

Footnotes:

[1] Backlog as of Q2 2019

TechnipFMC

A comprehensive offering from concept to project delivery and beyond

Subsea

Onshore/Offshore

Surface

Three major operating segments

A comprehensive offering from concept to project delivery and beyond

Subsea

Subsea products

- Trees, manifolds, controls, templates, flowline systems, umbilicals, flexibles & risers
- Subsea processing

Subsea projects

- Field architecture, integrated design
- Engineering, procurement, construction and installation

Subsea services

- Drilling systems
- Installation using high-end fleet
- Asset management & production optimization
- Field IMR and well services
- ROVs and manipulator systems

Onshore/Offshore

Onshore

- Refining, hydrogen
- Petrochemicals
- Fertilizers
- Gas monetization
- Mining & metals

Offshore

- Fixed platforms (jackets, self-elevating platforms, GBS, artificial islands)
- Floating platforms (FPSO, semi submersibles, Spar, TLP)
- FLNG

Surface

- Drilling, completion and production wellhead equipment, chokes, compact valves, manifolds and controls
- Treating iron, manifolds and reciprocating pumps for stimulation and cementing
- Advanced separation and flow-treatment systems
- Flow metering products and systems
- Marine, truck and railcar loading systems
- Installation and maintenance services
- Frac-stack and manifold rental and operation services
- Flowback and well testing services

TechnipFMC Spin-off

RemainCo

SpinCO

Subsea

Onshore/Offshore

Surface

TechnipFMC Spin-Off

- In August 2019, the TechnipFMC Board of Directors has unanimously approved a plan to separate TechnipFMC into two industry-leading independent, publicly traded companies:
  - RemainCo, a fully integrated technology and services provider, continuing to drive energy development; and
  - SpinCo, a leading engineering and construction (E&C) player, poised to capitalize on the global poised to capitalize on the global energy transition.
- Looking ahead, upon completion of the transaction, Catherine MacGregor, who currently serves as TechnipFMC's President, New Ventures, will lead SpinCo as its CEO. Doug Pferdehirt, Chairman and Chief Executive Officer of TechnipFMC, will hold these positions with RemainCo.
- SpinCo will be incorporated in the Netherlands with its operational headquarters in Paris.
- RemainCo will remain incorporated in the United Kingdom, with operational headquarters in Houston.
- Until we receive all final approvals, which we expect to occur in the first half of 2020, our structure will stay the same and we will remain focused – as always – on meeting and exceeding our clients expectations.

Onshore/Offshore & Genesis Overview

TechnipFMC

Onshore & Offshore at a Glance

15,000 people

Over **100** nationalities

in **45** countries

Over **400** Current Projects

World leading Contractor for

Gas monetization/LNG, Refining, Ethylene & Petchems, Fertilizers, all types of Offshore facilities

Engineering offices on all continents

6 main centers

Paris, Rome, Houston, Kuala Lumpur, Abu Dhabi, India

TRCF @ 0.25

151 Million man-hours worked

Proprietary technologies for

ethylene, hydrogen, petchems, refining (FCC)

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Genesis Global Headcount and Organisation, September 2019

Managing Director

John Cambridge

Transverse roles

Global VP of Engineering

Terry Halliday

Global Advisory Steer Co

Roddy MacPherson
Carlos Moreira
Alix Mouret

Strategy, Corporate Development & Digital

Siddarth Ragoowanshi

(QHSES, IT, Legal, HR, Finance, Communications & Marketing)

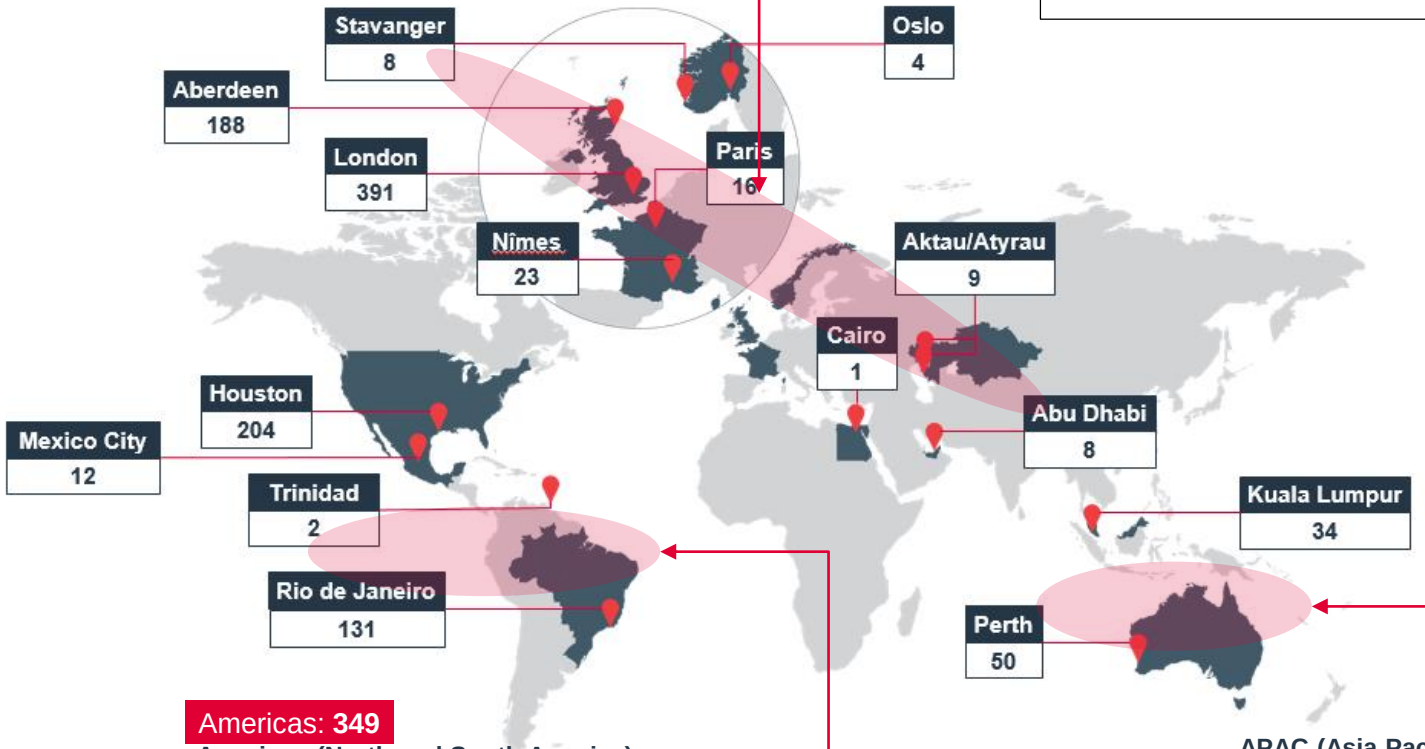
Support Functions

Global Headcount: **1081**

EMIA: **648**

EMIA (Europe, Middle East, India and Africa)

Regional VP: Roddy MacPherson



Americas: **349**

Americas (North and South America)

Regional VP: Carlos Moreira (interim)

APAC: **84**

APAC (Asia Pacific)

Regional VP: Alix Mouret

GENESIS

Who We Are

CLIENT-CENTRIC ORGANIZATION

We prize our client relationships. We endeavor to understand our clients' needs and drivers as if they were our own and to use that understanding to deliver high quality, successful outcomes.

HIGH VALUE SOLUTIONS PROVIDER

We develop high value solutions to meet the energy industry needs. We achieve this through our global expertise, innovative technologies and digital tools.

WE WORK WITH OUR CLIENTS TO HELP TRANSFORM PROJECT ECONOMICS AND DELIVER GLOBAL ENERGY

BEST FRONT-END DEVELOPER & ADVISOR

We cultivate front-end thinking through a laser focus on what the best solutions are for our clients' unique needs and drivers. We leverage our operations experience, delivery capability and digital/design tools to provide the highest quality data and information to support key decisions

RELIABLE & COMPETITIVE PROJECT DELIVERY

We design to predictably build, to lower fabrication cost, to improve reliability and availability. We ensure project delivery continuity through the project life cycle. We believe in the value of collaboration and partnership, relying on key personnel, and leverage TechnipFMC EPC processes, systems and experience.

OUR SERVICES AT GLANCE

Development Planning Appraise/Select

- Portfolio management studies
- Rapid screening options
- CAPEX, OPEX, ABEX
- 3rd party review of sub-surface data
- Pre-tax economics for
- Risk based selection
- Delivering pre-FEED level engineering

Basic Engineering & FEED

- Value engineering
- Facilities design
- Gathering system design
- Export system design
- Detailed discipline analysis
- Operations readiness assurance
- Cost estimating
- QHSE management

Execute

- "Lite" EPCs
- PMC
- QHSE management
- Detail design
- Risk management
- Operations readiness assurance
- Procurement & transport
- Expediting
- Construction management
- HUC

Operation

- Operator training
- First oil/gas support
- Online systems
- Benchmarking
- Operations audits
- Feedback for portfolio design assurance
- Asset integrity management
- Data mining and analytics

TPFMC global: 37,000

Genesis Global : 1,100

> 400 on-going projects

RD & Technology Services

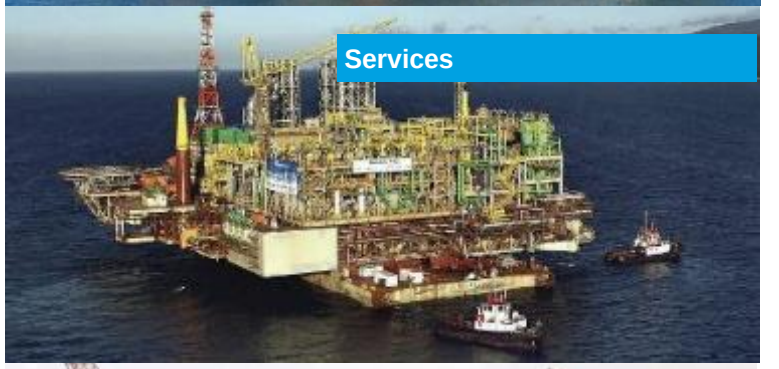
TechnipFMC Offshore Activities

TechnipFMC Offshore provides:

- **E**ngineering
- **P**rocurement
- **C**onstruction (management & supervision)
- **I**nstallation services

For

- Topsides (including FLNG & HP/HT)
- Substructures (Fixed & Floating)



TechnipFMC Offshore – a history of breakthroughs

1st floating LPG platform Elf Nkossa

1st TPG 500 platform BP Harding

1st semi deck floatover P52 Petrobras

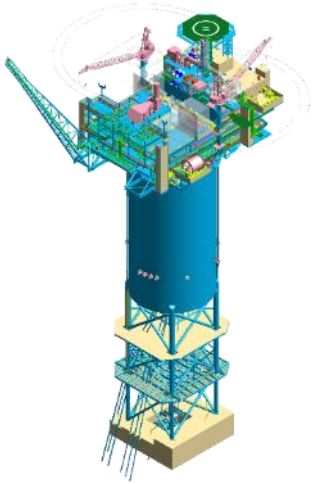
World's largest FPSO Total AKPO

Petronas FLNG1 Satu

1st FLNG Shell Prelude

Malikai, Malaysia's 1st Tension Leg Platform (TLP).

1st Production Spar with storage Statoil Aasta Hansteen



Energean - Karish FPSO
1st extended iEPCI

1st open-sea floatover ADMA OPCO ZAKUM

1st SPAR platform Kerr-McGee Neptune

1st Spar deck floatover Murphy Oil Kikeh

Umm lulu
UAE's largest platform
(32,000 metric tonnes)

1983 **1996** **2006** **2008** **2012** **2016** **2019**

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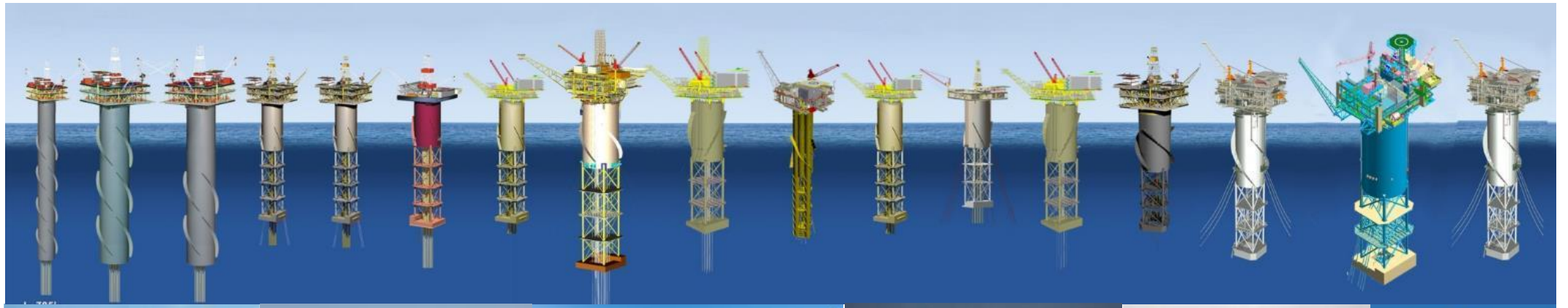
A worlwide player for Offshore facilities

Spars (17 out of 21)



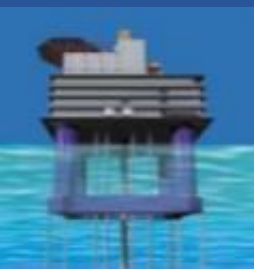
Fixed platforms
- TPG 500 x3
- Numerous Fixed platforms
- Martin Linge, topsides
- Numerous Unideck (deck floatover)
- Umm Lulu Complex

HVDC platforms
- PMC only: Dolwin Alpha, Beta; BorWin Alpha...

FLNG; first mover
- Prelude, Shell
- Satu, Petronas
- Coral, ENI

FPSO's
- N'kossa, Total
- Girassol, Total
- Dalia, Total
- Akpo, Total
- P 76 JV Techint
- P 58 Petrobras
- P 62 Petrobras
- Ichtys, Inpex
- Karish, Energean
- Tortue, BP

Semis
P 51 Petrobras
P 52 Petrobras
P 56 Petrobras



TLP
Malikai TLP, Shell

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Gas FPSOs

- Natural gas is a short term answer to climate change & de-carbonization
- Gas FPSOs (and FLNGs) are an important building block for gas developments
- Depending on location and environment, Gas FPSOs can be either Spar or ship-shaped
- TechnipFMC had an early involvement in Gas FPSOs of both types, as a result of:
  - Experience in gas processing
  - Experience in FLNG projects

Aasta Hansteen Spar FPSO (courtesy of Equinor)

Karish FPSO (courtesy of Energean)

Tortue FPSO (courtesy of BP)

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AKPO FPSO

A Step into Gas FPSO

Client: Total E&P Nigeria
Consortium with HHI
EPC for a FPSO unit

Oil: 185,000 BPD
Gas: 530 million SCFD
Topsides weight: 38,000 tonnes
Hull size: 310 x 61 meters
Oil storage capacity: 2 million BBL
Water depth: 1,400 meters
First Oil: 2009

Remained the largest Offshore production facility in the world for almost 4 years

Lessons of First Generation FLNG

- FLNG feasibility is demonstrated
- Development of new modeling tools and safety standards
- Minimize on-deck integration of modules including topside/hull interfaces
- Consider specialized yards for topsides

PETRONAS

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Petronas FLNG1 Satu

Delivering the first FLNG in Malaysia

Award: 2012
Delivery: 2015
Location: Malaysia

38 000 t topsides (dry)
1.2 Mtpa of LNG
177 000 m^3 LNG Storage
Hull dimensions: 365 x 60 x 33 m
70-200 m Water depth

1st FLNG in Malaysia leveraging a unique mix of technologies

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PETRONAS

SHELL - Prelude FLNG – EPC

Prelude: an industry breakthrough..

Award: 15/12/2011
1st LNG cargo
Delivered: 06/2019
Location: Australia

3.6 MTPA LNG
1.3 MTPA Condensate
0.4 MTPA LPG
240m Water depth

First FLNG project ever sanctioned
Largest steel floating structure ever built
EPCIC, TechnipFMC in Consortium with SHI

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FLNG + SURF: FEED + EPCI Competition

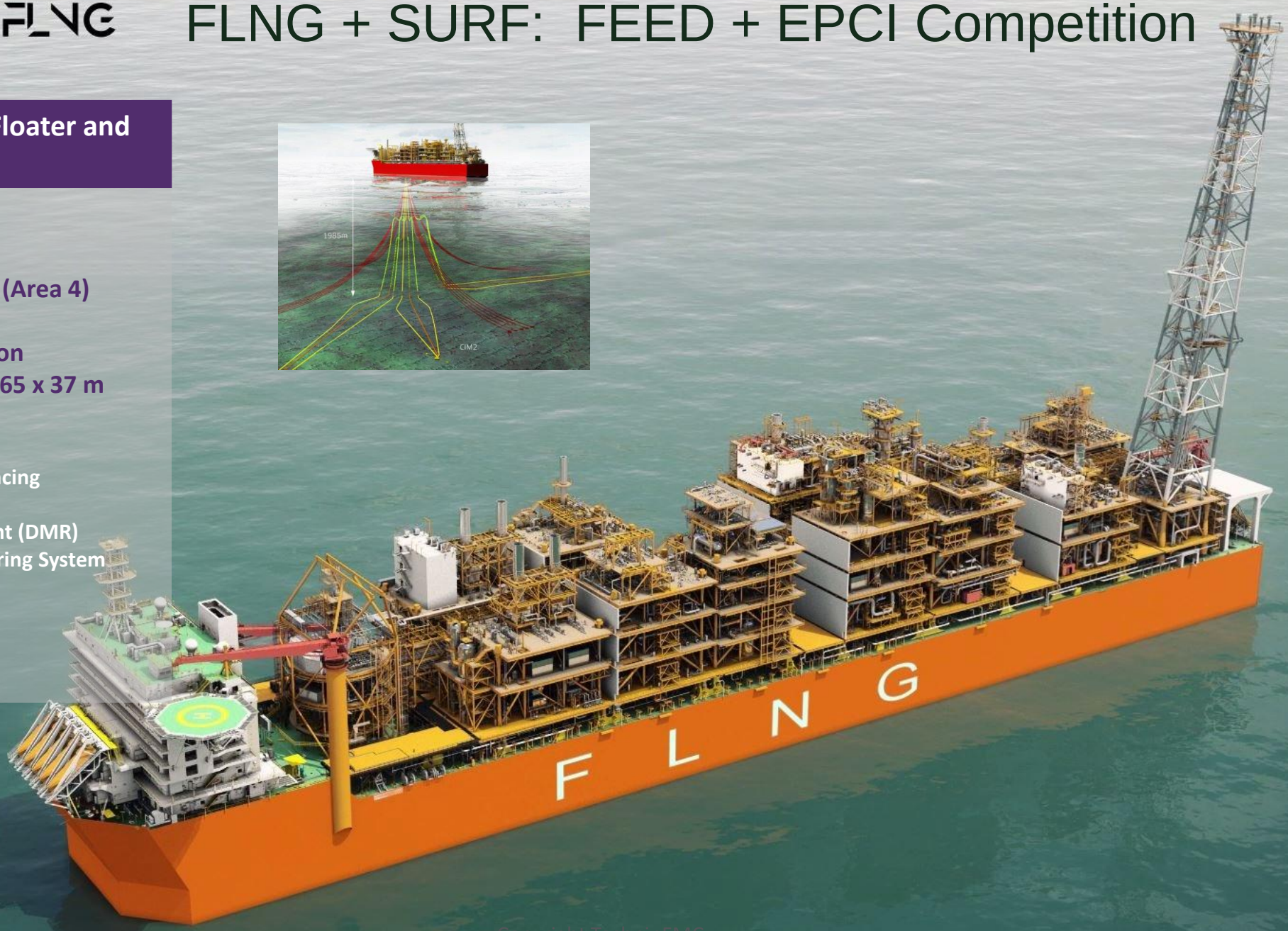
1st FLNG combining Floater and Surf

Award: 01/06/2017
Delivery: 2022
Location: Mozambique (Area 4)

3,4 Mtpa LNG Production
Hull dimensions: 395 x 65 x 37 m
2 000 m Water depth

1st FLNG with project financing

APCI Dual Mixed Refrigerant (DMR)
SOFEC Internal Turret Mooring System
6 Flexible Risers
350 people Living quarters
LNG Membrane Tanks
Side-by-Side Offloading



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Equinor - Aasta Hansteen Spar Hull - EPC

A project that accumulates Firsts & Superlatives

Award: 21/12/2012
Delivery : 2014
Location: Norway

45 000 t Hull
1275 m Water depth

HYUNDAI HEAVY INDUSTRIES GROUP

equinor

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BP - Central Tortue / Ahmeyim FPSO – EPC

The first major offshore gas discovery crossing 2 African countries

Award: 01/03/2019
Delivery (Planned): 2021
Location: Mauritania/Senegal

24 000 t Topsides
1.4 Mbbls (Condensate and MEG)
Spread moored
120m Water depth

Full pressure rating

Gas FPSO in shallow water
Gas export throughput of 500mmscf/d

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bp

Energean - Karish FPSO - EPCI

1st extended iEPCI

Award: 01/03/2019
Delivery: 2021
Location: Israël

10 000 tons Topsides
2*400 mmscfd/d Capacity
33 000 tons Hull (227m length)
1700 m Water depth

A project fully developed at TechnipFMC functional specs

ENERGEAN OIL & GAS

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ENERGEAN OIL & GAS

Why TechnipFMC succeeded in FLNG?

An FLNG is built on industrial experience

Natural Gas Liquefaction

Volume and weight optimization is the key to move Offshore.

It is a challenge for…

Space & Organization

Motion management

Weight control & COG management

Safety

Large FPSOs

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Technology & Innovation have Driven Success

Yemen LNG
Frontier Project

Ikra
Russian Experience

QatarGas
World's Largest LNG trains

Yamal LNG
Largest Arctic Project

Prelude FLNG
Innovative Modularization

Offshore floating facilities

Onshore LNG Plant

Floating FLNG

Subsea field development

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Collaboration

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Collaboration

- An EPC Contractor success is highly depending on its ability:
  - To tackle new challenges in an evolving market
  - To interact with its partners
- Its people, their skills, their creativity & their ability to work in good relationship with their stakeholders are key to this success.
  - We have been very successful when we have early engaged with our customers and established a true and open communication channel
- The Offshore Industry was born and raised thanks to collaborative efforts.
  - Today's market situation require new solutions with adherence of all. Joint Technologies development projects which promote team work are key in that respect.
- The actual Digitalization "wave" is an opportunity to open new doors all together, to approach things from different angles, to introduce disturbing new skills in our teams and also to redefine our relationship.

Digitalization

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Digitalisation, a support to:

Enhance project performance

Anticipate trends

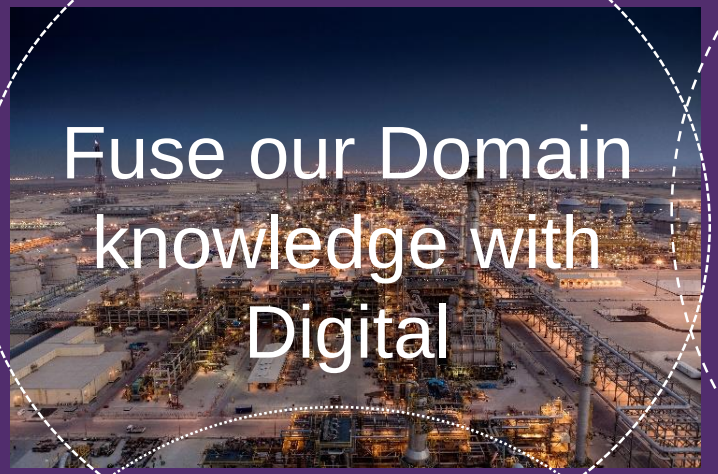
Deliver continuous improvement in HSE & Quality

Digitalisation an enabler for:

Integrated
Expertise

Technology
Development

Transformation



CONCEPT
- Tuned cost estimates
- Execution plan
- Totex driver

FEED DESIGN
- Robust basis of design
- Cost-effectivness

DETAIL ENGINEERING
- Single source of truth
- Accelerated delivery

PROCUREMENT
- Cascaded requirements
- Standardization
- Compliance

CONSTRUCTION
- No rework
- Safety
- No Schedule/Cost overruns

OPERATIONS
- Optimized performance
- Minimized downtime
- Enhanced safety
- Reduced carbon footprint

MAINTENANCE
- Predictive analytics
- Reduced costs

1 Data-centric engineering

2 4D Management

3 Collaborative solutions

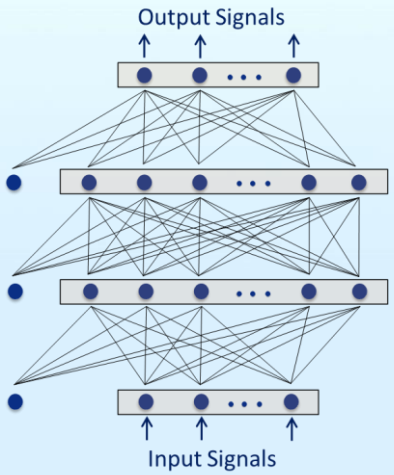
4 Construction Activities platform

5 Augmented operations

6 BEYOND

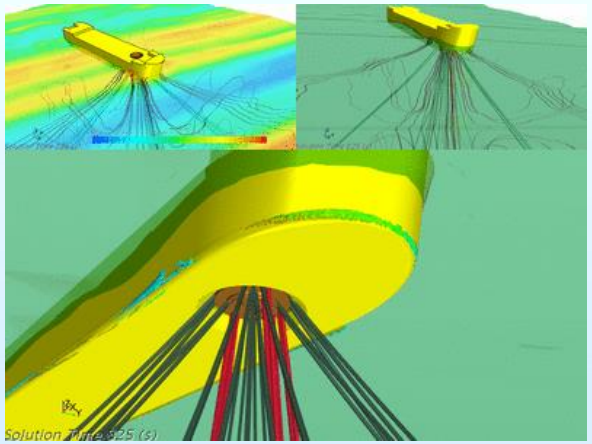
Asset Integrity

AI technology for detecting mooring line failure



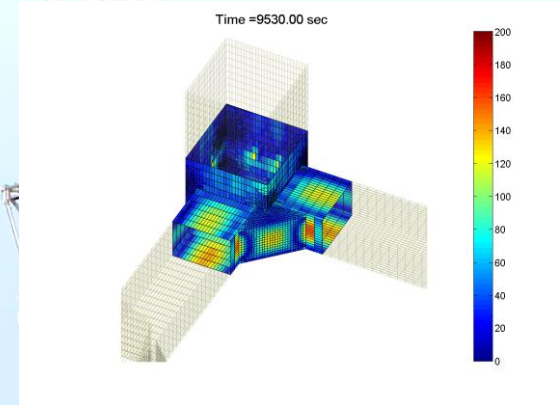
Simulation

CFD Technology



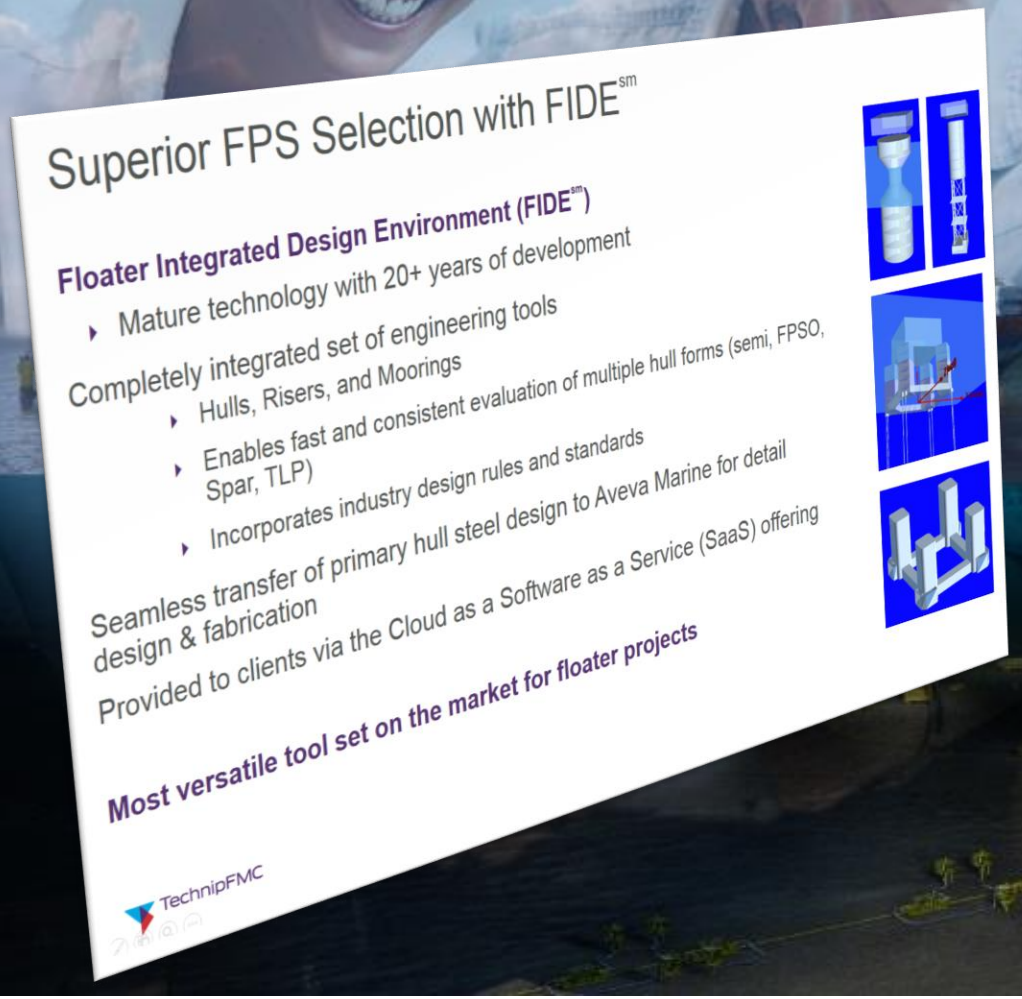
Engineering

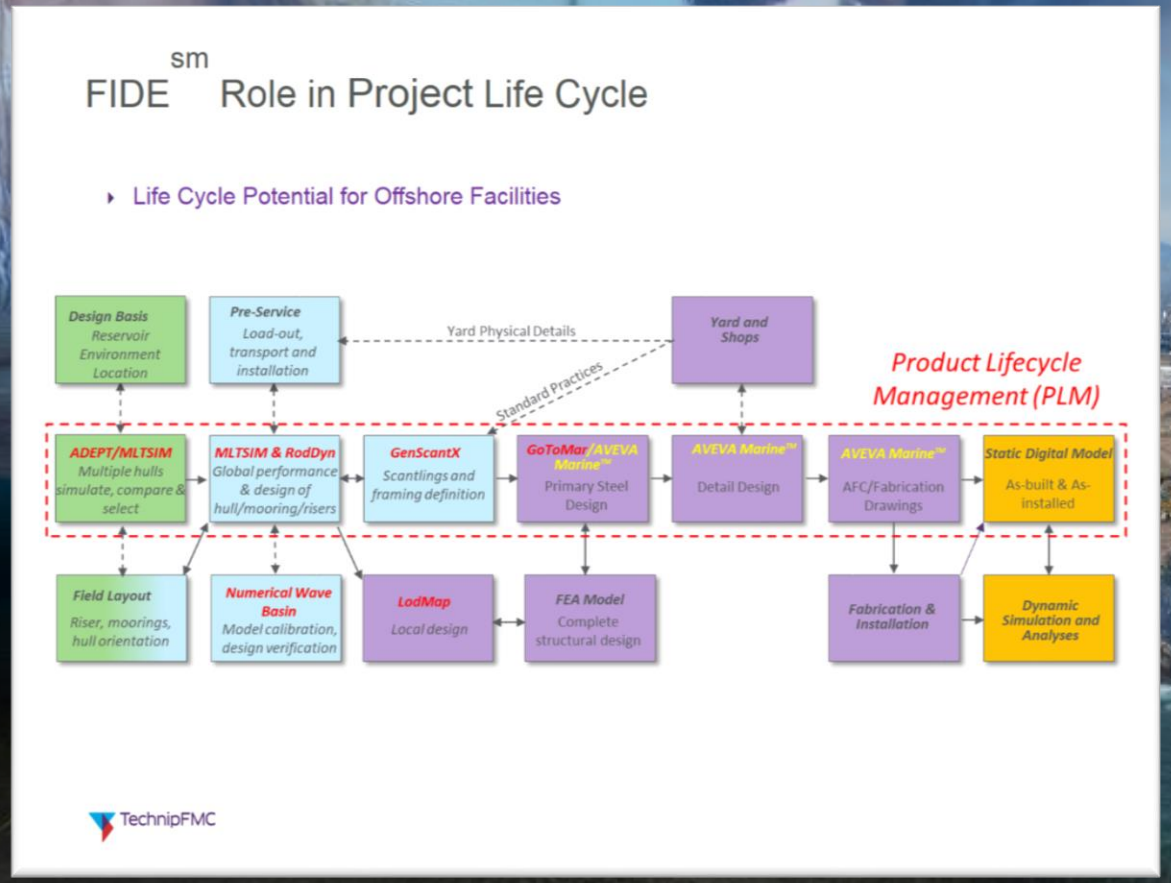
Time domain structural analysis



Digitalization of expertise

FIDE[sm] Automation of knowledge - Suite of Engineering tools





Roadmap to offshore unmanned facilities

Basis

Data flow
Video processing

Teleoperated direct field

Operation simulation
Operation recording & alalysis
Augmented reality
Augmented dexterity

Teleoperated valve manipulation
Teleoperated sampling

Vehicle architecture
Sensors & processing

Teleoperated task automatization

Transfer task from human to machine
Task programming
Machine learning
Advanced Navigation

Automatized Valves Manipulation
Automatized samplig
Automatic pre programmed inspection

Autonomous subsystems

Autonomous Navigation
Autonomous Decision
Artificial Intelligence : Auto diagnostic
Machine learning (Mission learning)

Autonomous inspection system
Automatic maintenance system

Autonomous system

Vehicle – System integration
Swarm management
Optimize field flow

Unmanned platform
Including process control?

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Digitalization: The transition is now

Data-centric communication

- Full transparency with customers and partners
- Real-time sharing

Leverage ecosystems to accelerate performance

- Use fit-for-purpose tools and technologies
- Multiply PoC, Selecting best-in-class

Platform agnostic

- Customer-centric, no proprietary barriers or lock-in

Collaboration

- Enable domain knowledge, co-create value, focus on the objective
- Support industry standard data formats to achieve interoperability

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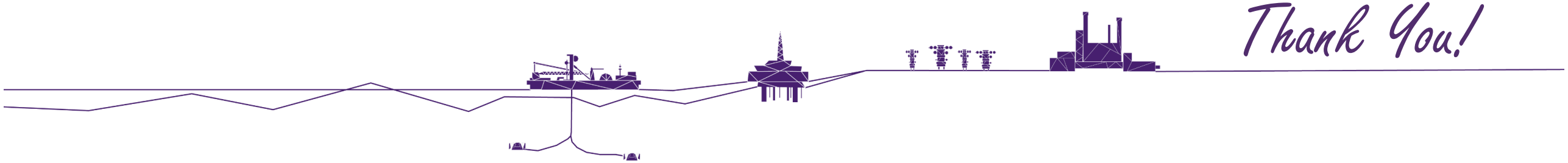

Thank You!