



Enhancing The World's Energy Industry Performance

*France – Norway Technology Partnership
Solutions for Cleaner Energy*

May 30th, 2018 – Leonardo da Vinci University – Paris



2025 & Beyond : The World of Energy is Changing



« Our goal is to have low-carbon energy account for close to **20% of our businesses in 2035**, while also growing this portfolio profitably. »



« Our strategy is to decrease the **exposure to commodity prices** »



« We need to offer practical solutions that will help shape the energy transition. **Carbon capture and storage** is one of these solutions. »



Statoil



equinor

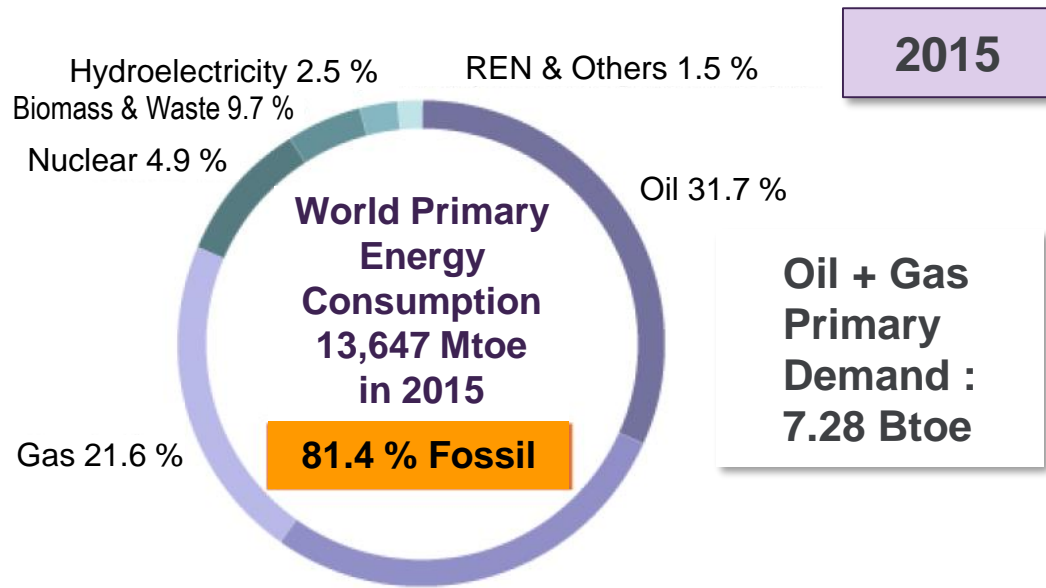
“Statoil no longer wants ‘oil’ in its name “and will change its name to Equinor as it seeks to broaden its energy reach beyond oil & gas production”

“**The world is changing, and so is Statoil**” said Chairman Jon Erik Reinhardsen in a statement. “The biggest transition our modern-day energy systems have ever seen is underway, and we aim to be at the forefront of this development.”

ExxonMobil

« We continue to advance a range of technologies to help meet growing demand for energy while also **reducing greenhouse gas (GHG)** emissions associated with energy use. »

Opportunities for Cleaner Energy from Upstream & Downstream



Remaining proved oil reserve = 1.7 Tbo
= 30 yrs of production with 3% growth per year

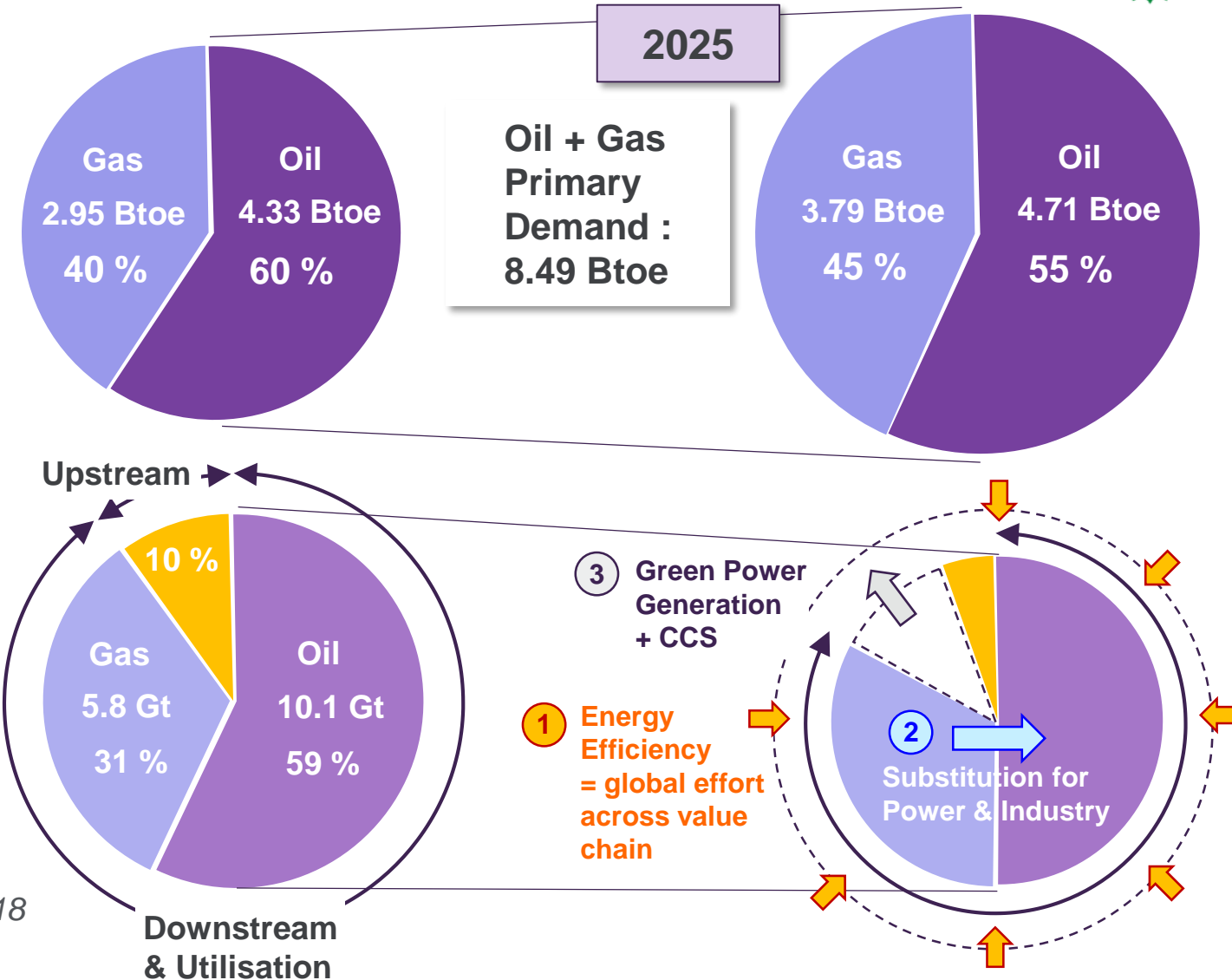
CO2 emissions per unit of energy :

- NG = - 50% CO2 / Coal
- NG = - 30% CO2 / Crude Oil
- NG = No SOX, 10% NOX, No particulates

Oil + Gas Primary Demand : 7.28 Btoe

Oil + Gas CO2 Emission Due to Energy Combustion : 17.6 Gt

Source : BP Energy Outlook 2018



Our Contribution to Better Energy and Less CO2 Emissions, in our Core business

On / Off Energy efficiency of ethylene plants



- Lowering CO2 emissions by maximizing energy efficiency
- Over the last 20 years, **TechnipFMC reduced CO2 emissions / ton of ethylene by 30%**
 - better thermal efficiency of the furnaces, above 95%
 - a reduction of the steam demand
 - Lower Opex and Capex

Subsea Subsea 2.0



- **Reducing size and weight while keeping same performance**
 - 50% lighter
 - 25% of the footprint
 - 70% less parts

Surface Eliminating tanks



- **Eliminating and optimizing**
 - Eliminated 33% of emissions and CAPEX
 - More safe

But we are also present in adjacent energy business

Marine Renewable Energy - Naval Energies Partnership

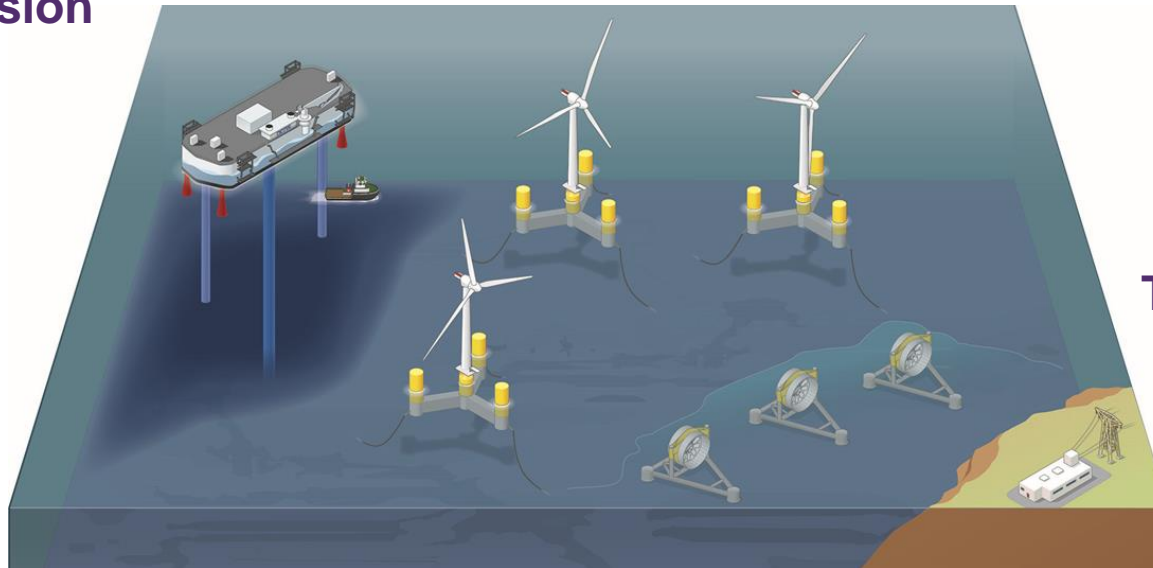
Naval Energies, majority-owned by **Naval Group**, the European leader in Naval Defence and the SPI fund (Industrial Projects Company) financed by the “Programme d’Investissements d’Avenir” (Investments for the Future programme) and managed by Bpifrance, is a new industrial player in Marine Renewable Energies, which also includes **TechnipFMC** and BNP Paribas Development as minority shareholders.

Naval Energies development is nowadays structured around three Marine Renewable Energies technologies:

**Ocean thermal energy
conversion**

**Floating offshore wind
turbines**

Tidal turbines



Marine Renewable Energy - Hywind Scotland Pilot Park

Client

Equinor

Timing (overall start to finish)

19 months

Main offshore campaign Q2 2017 to Q3 2017 in Stord and Peterhead

Project Description

TechnipFMC Scope of work

- 5 off Floating Wind Turbines, 6 MW each
- Transport of 5 off. Substructures (6000t each) from Spain to Stord Norway
- Transport of 20 tower sections from Spain to Norway
- Installation of a floating quay
- Upending and Solid ballasting
- Installation of 15 offshore suction anchors and mooring chains
- Hook-up of 5 off floating wind turbines

Project Highlights

- World first floating wind turbine park installed by TechnipFMC
- Semi-submersible transport vessel used for transport from Spain
- Deep Explorer used for installation of suction anchors. The project implemented Splash Zone Mode on Deep Explorer to install large structures in rough weather
- 3 off. floating quays successfully used for assembly of wind turbines
- Project delivered and producing above all expectations



Marine Renewable Energies – Power Conversion

Involved in PMC of :



Courtesy of ABB



Dolwin Alpha (HVDC)

- Capacity: 800 MW, \pm 320kV
- Jacket & Topside

Dolwin Beta (HVDC)

- Capacity: 916 MW, \pm 320kV
- Gravity Based Design (\approx semisubmersible)

Borwin Alpha (HVDC)

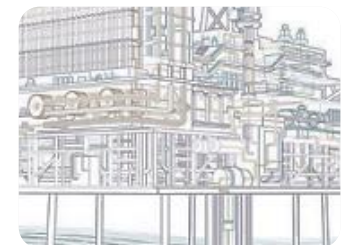
- Capacity: 400 MW, \pm 150kV
- Compact design
- Jacket & Topside

Thornton Bank (HVAC)

- Capacity: 325MW, 170kV
- Jacket & Topside

Next Generation HVDC

- \approx 850 - 1,100 MW, 320kV
- Compact / modularized structure
- reduced weight / cost / schedule



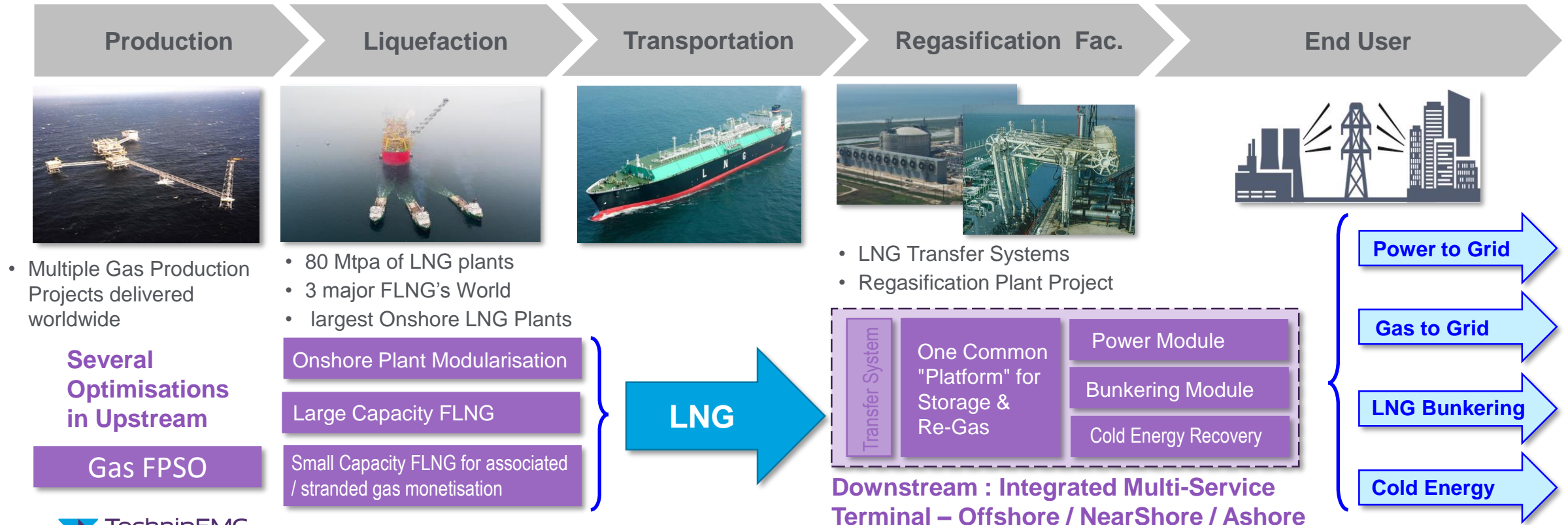
Acquisition of Green Chemicals technology

- The technology converts glycerol to high purity epichlorohydrin (ECH) for use in coatings, composites and adhesive applications in various industries.
- Epicerol® offers many advantages compared to the production of ECH from propylene including optimal integration in vinyls facilities for feedstock and recycles.
- It reduces energy, water and chlorine consumption and minimizes chlorinated by-products.
- The technology was developed by Solvay and has been successfully implemented and operated in plants in Europe and Asia, with a proven capacity of 100,000 tons per year.



Extended Presence in the LNG value chain

- Gas / LNG ready to be a Cleaner Bridge to Low Carbon Future
- Natural Gas is the main alternative to oil : 15 Mb/day of oil can be displaced by gas
- However, the Gas Value Chain including LNG still needs significant efforts in energy efficiency and cost reduction (e.g. \$ Capex / t production) to help gas play this role



Take Aways

Oil remains and its production will grow in the coming years but :

- Energy efficiency
- Gaz
- Renewables & Energy hybridization

will account for more in our business

