



SOLVAY

asking more from chemistry®

Thermoplastic Composites in the Oil and Gas Industry

November 6, 2018

**COMPOSITE
MATERIALS**

AGENDA

- **Who is Solvay?**
- **The Oil & Gas Industry – today and looking toward the future**
- **The evolution of thermoplastic composites**
- **The value proposition of carbon fiber thermoplastic composites**
- **Summary**

SOLVAY IS AN ADVANCED MATERIALS & SPECIALTY CHEMICALS COMPANY



61
countries¹



124
industrial
sites¹



21
major
R&I centers¹



0.65
occupational accidents at
Group sites per million
hours worked²



€ 10.1
billion of
net sales¹



24,500
employees¹



5.53
greenhouse gas
intensity
kg CO₂ eq. per € EBITDA



49%
sustainable
solutions
Group net sales

1. 2017 underlying results

2. MTAR: Medical Treatment Accident Rate

WITH A LONG STANDING SPIRIT OF INNOVATION

Solvay Physics Conferences

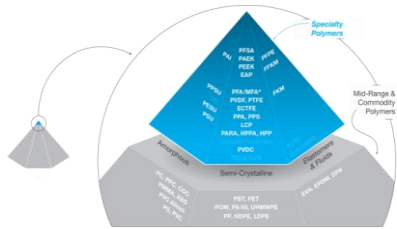
1911 & 1927



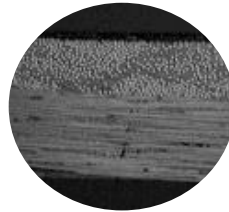
Solar Flight

Solar Impulse 2 accomplished the first trip around the world in 2016, without a single drop of fuel.

UNIQUELY POSITIONED TO PROVIDE THERMOPLASTIC COMPOSITES TECHNOLOGY LEADERSHIP



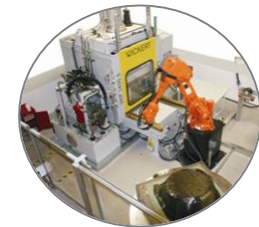
Broad portfolio of specialty polymers



Fiber/Resin interface



TP prepreg manufacturing



Application Engineering

Key markets for thermoplastic composites



Aerospace

- Supports more cost-effective fabrication
- Enables higher build rates



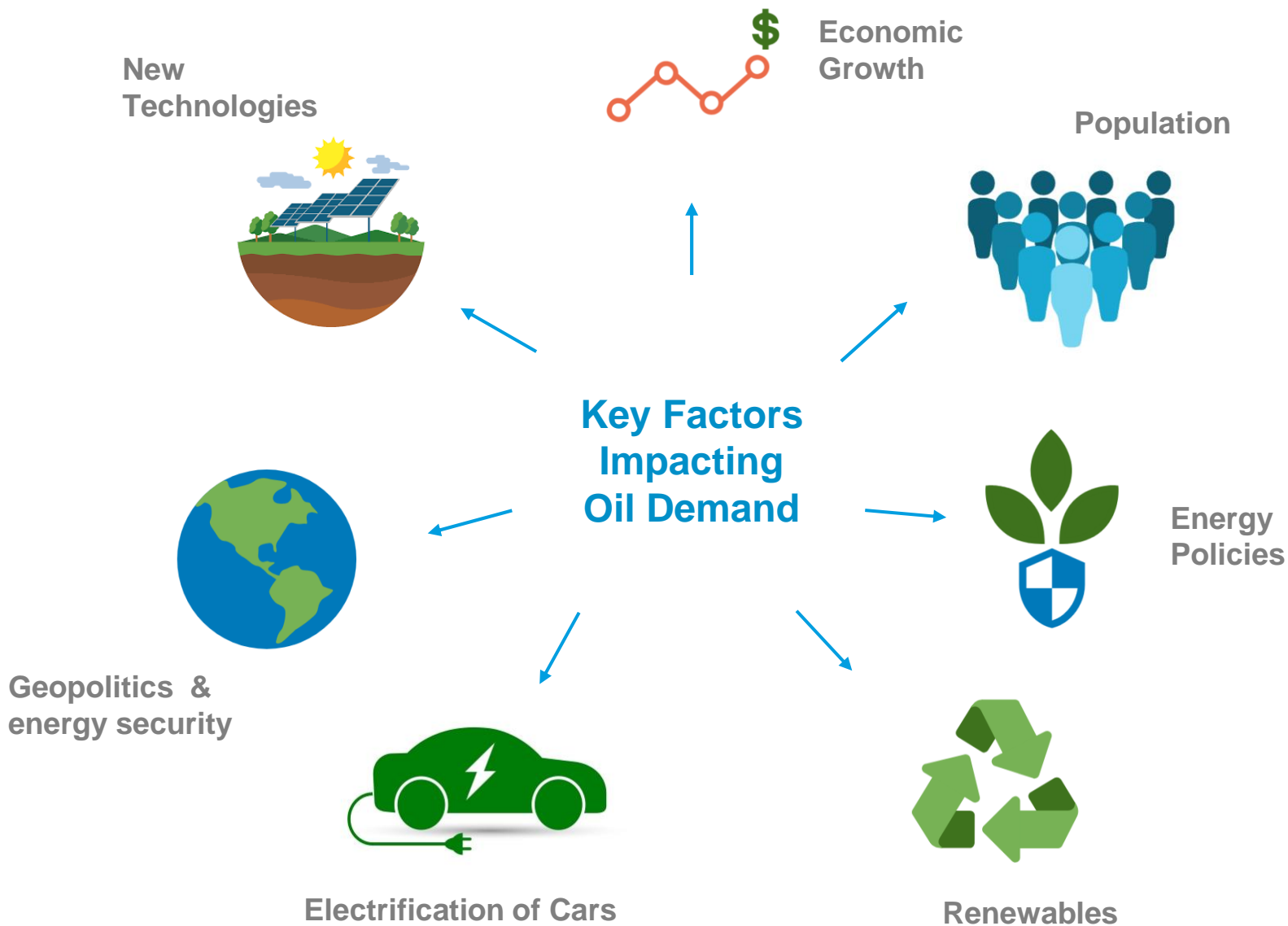
Oil & Gas

- New cost effective offshore extraction
- Weight reduction and flexible pipe design optimization
- Corrosion resistance

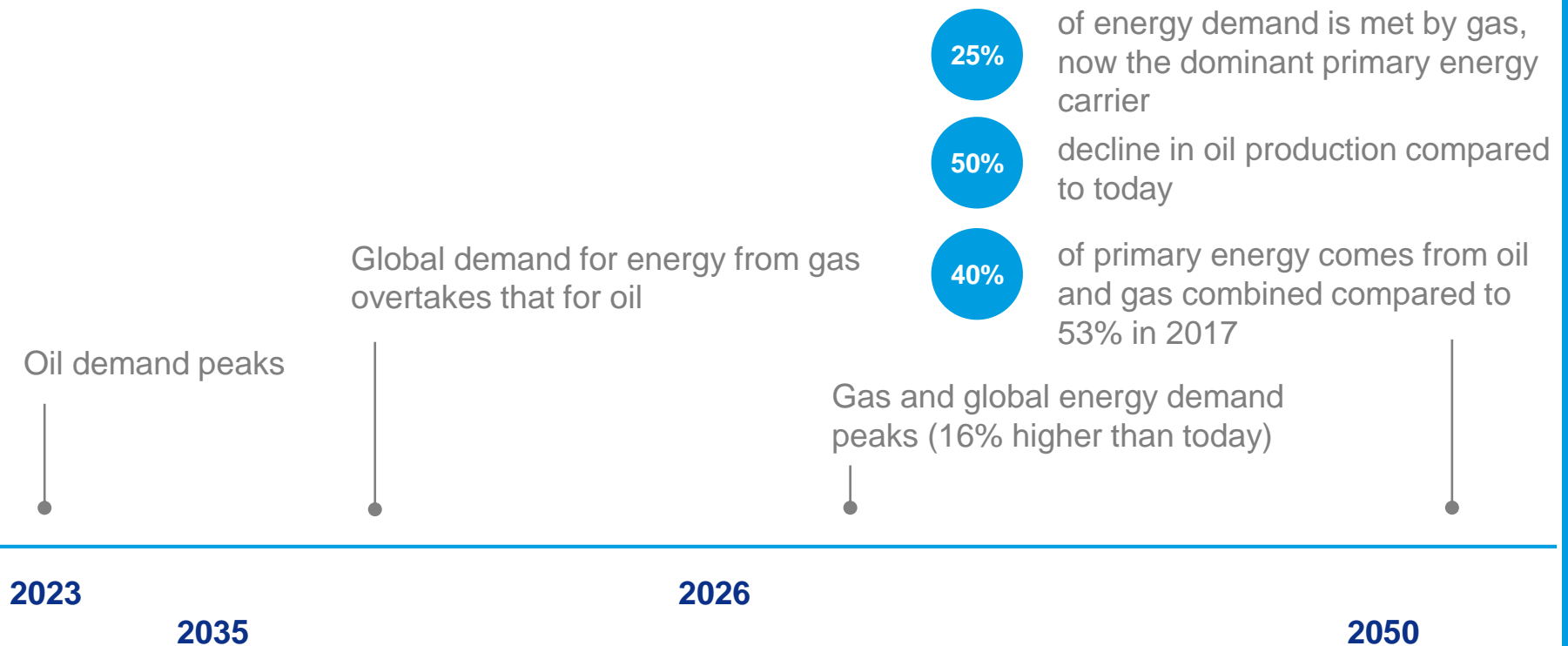


Automotive

- Design freedom
- More efficient part assembly
- Outstanding crash & safety performance
- Improved recyclability



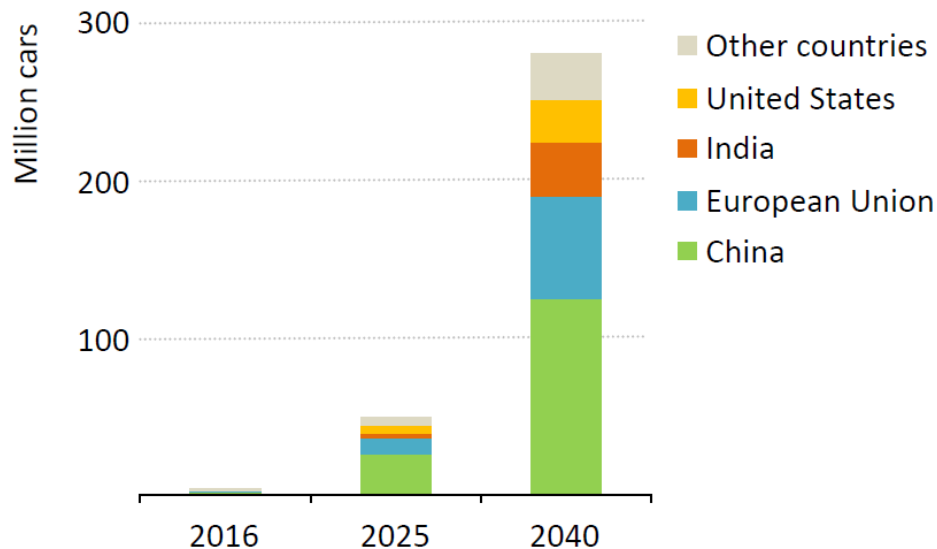
PEAK OIL DEMAND – The Sooner Scenario...



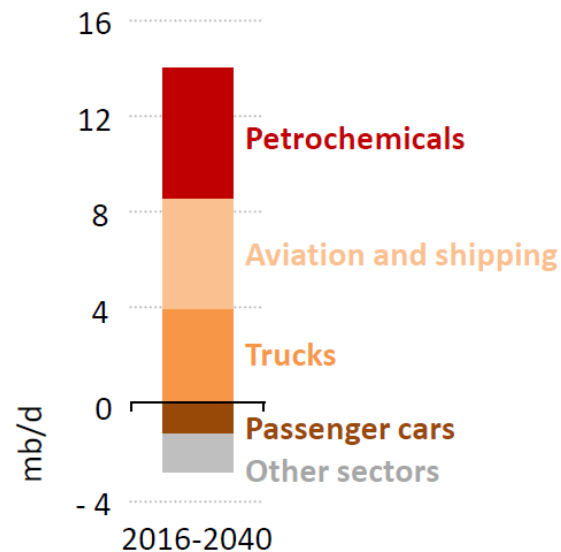
Having reached its **peak within the next five years**, DNV GL forecasts global demand for oil to be 50% of today's production levels by 2050...however, **continued investment** in new oil and gas development will **still be needed** as global reserves decline at a rate of about 5% per year.

PEAK OIL DEMAND PEAK – The Later Scenario...

Electric car fleet



Change in global oil demand

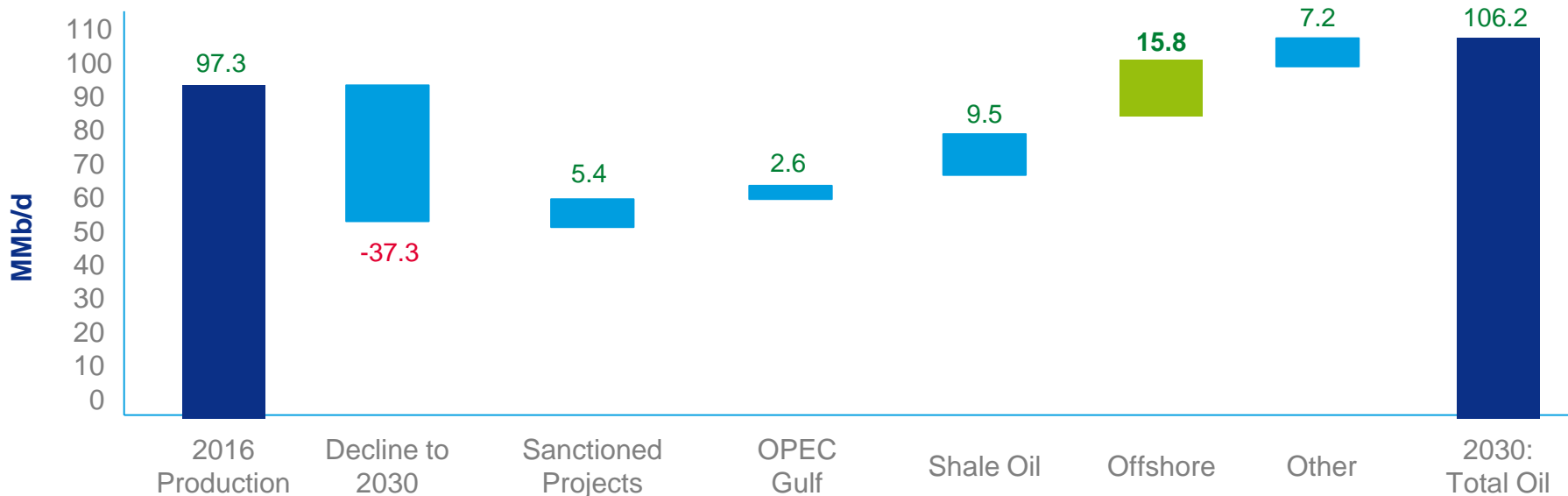


Electric cars are helping to transform energy use for passenger cars, slowing the pace of growth in global oil demand, however, **trucks, aviation, shipping and petrochemicals** keep oil on **rising trend**.

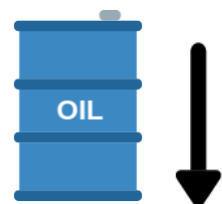


The view from Deep Offshore...

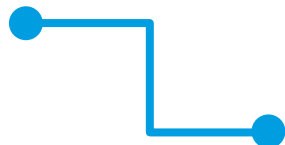
Global Oil Supply Growth 2016-2030



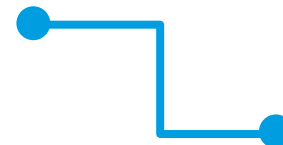
Unsanctioned projects



\$ 40/bbl



Cost Reduction



Supply & Demand Gap

EXCITING TIMES FOR THERMOPLASTIC COMPOSITES

Good Times in Thermoplastic Composites

March 30, 2018 by [Karen Haywood Queen](#) - Contributing Editor, Smart Manufacturing magazine

I want to say two words to you:
“Thermoplastic tapes”

USA: Aerospace Technology

Solvay to launch PEKK Resin Production for Thermoplastic Composites

Japan's Toray to buy TenCate to boost carbon-fiber business

Hexcel, Arkema forge thermoplastic composites alliance

Thermoplastic composites consortium aims for high volume production for Automotive and Aerospace

Solvay launches Evolite F1050

0 comment

Solvay launches *Evolite F1050*, a high-performance thermoplastic composite with continuous carbon fibre reinforcement for demanding offshore oil and gas applications, at the Offshore Technology Conference (OTC), which takes place from 30 April to 3 May in Houston, TX.

Evolite F1050 is a unidirectional tape combining the recognised chemical and temperature resistance of *Solef PVDF* with the inherent high strength performance of carbon fibre. It is said to offer the performance and ease of processing required by the oil and gas industry, as demonstrated by combination of mechanical and chemical resistance, high temperature applications, compatibility with ATL processes, and customised fibre/matrix translation for maximum performance, the company reports.



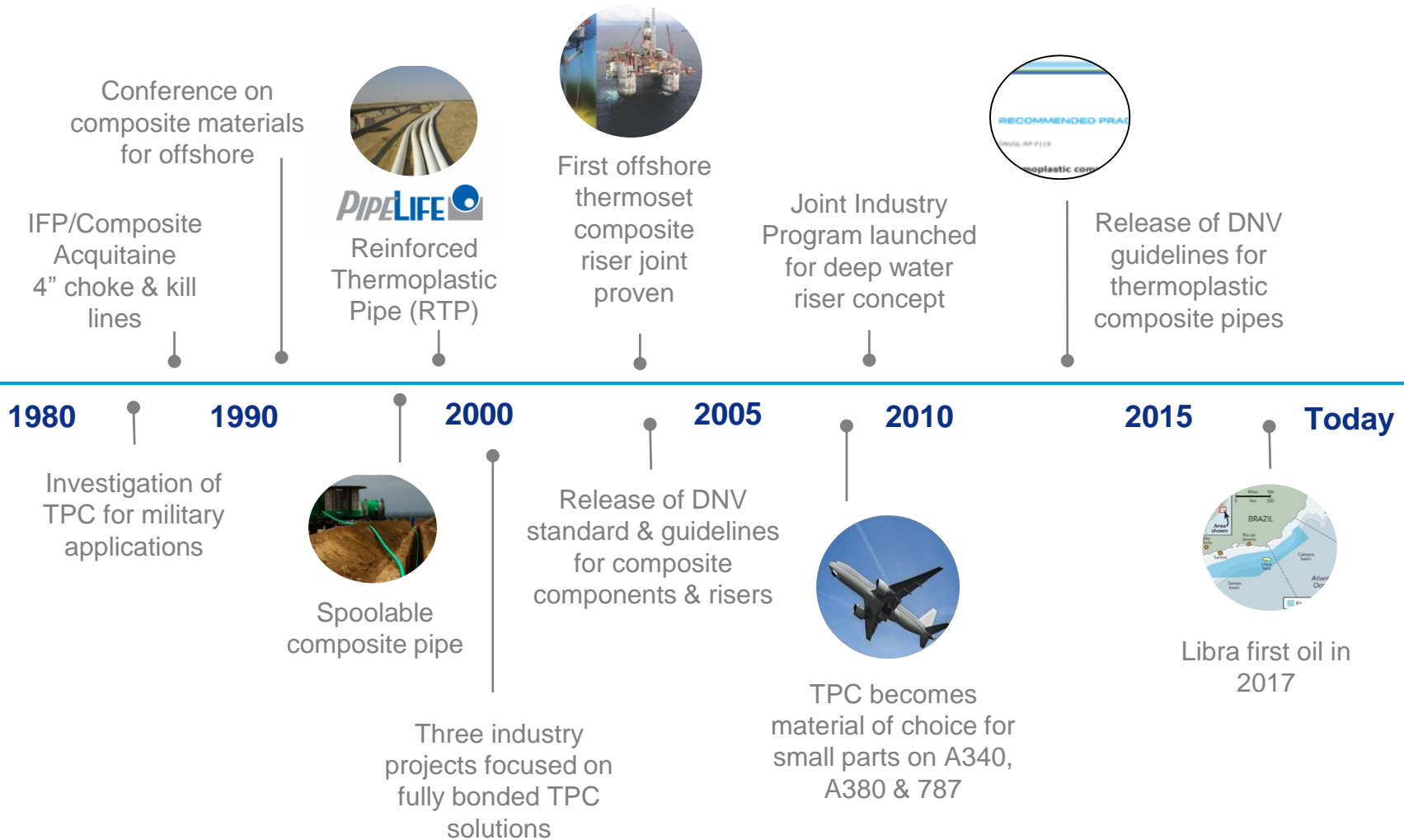
Airborne, Siemens and SABIC partner to mass produce thermoplastic composites

Premium Aerotec presents thermoplastic CFRP A320 pressure bulkhead

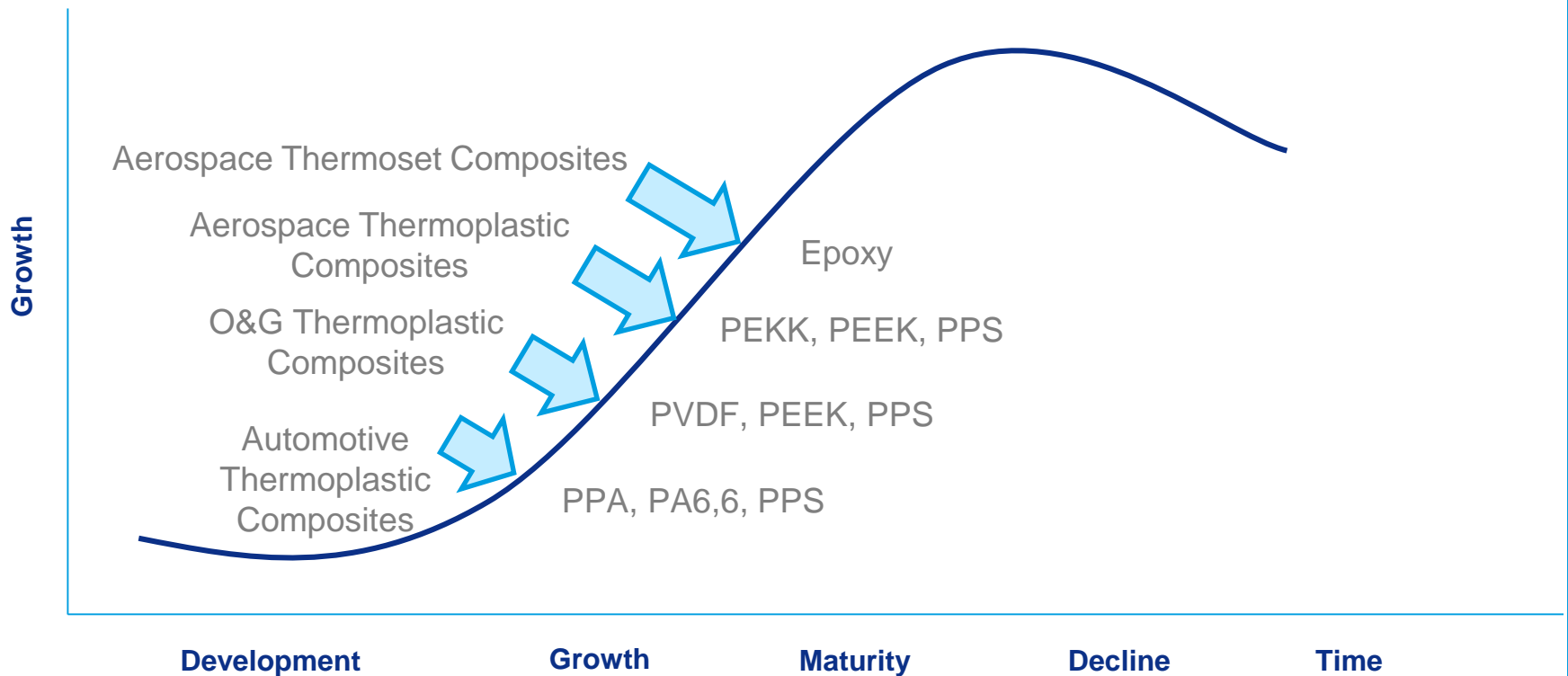
TechnipFMC and Magma Global to Enter into a Strategic Collaboration Agreement for Hybrid Flexible Pipe

PEEK vs. PEKK vs. PAEK and Continuous Compression Molding

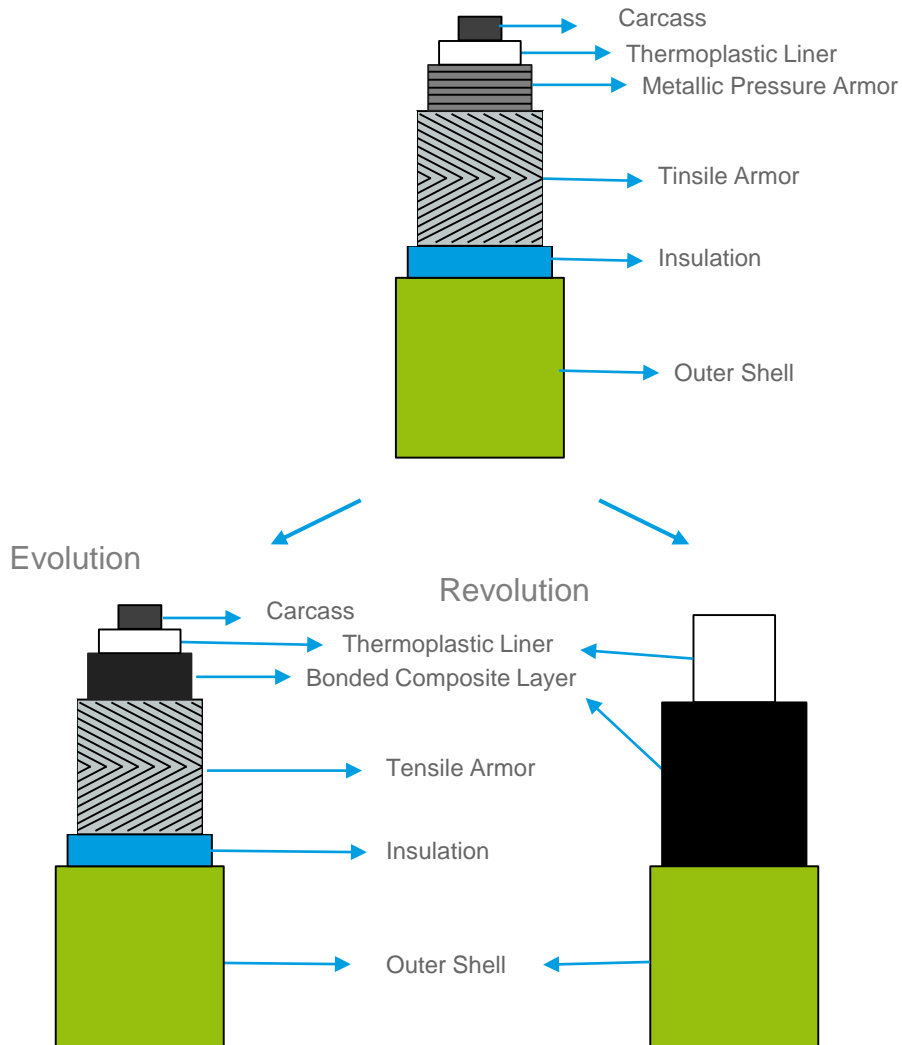
A 30 YEAR JOURNEY TO GET TO WHERE WE ARE TODAY



THE PRODUCT LIFE CYCLE CURVE OF CARBON FIBER THERMOPLASTIC COMPOSITES



THE VALUE PROPOSITION OF THERMOPLASTIC COMPOSITES IN FLEXIBLE PIPES



Whether in a hybrid or fully thermoplastic solution, carbon fiber thermoplastic composites enable:

- **Lower weight** versus steel, **less or no buoys** and shorter pipes
- **Reduced corrosion**
- Maintenance of excellent mechanical **performance and flexibility**

IN SUMMARY – The Oil and Gas Industry...

...is hungry for **new technologies** to bring the breakeven price as low as possible.

...has been exploring the use of composites for **>15 years**.

...understands the value proposition for using **carbon fiber thermoplastic composites** to unlock and deliver **more value**.

THANK YOU

Questions?