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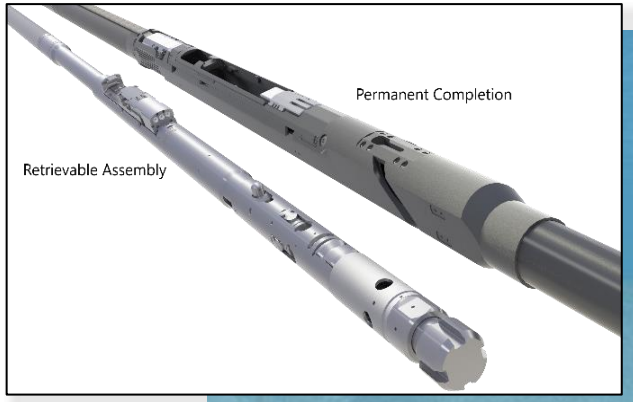
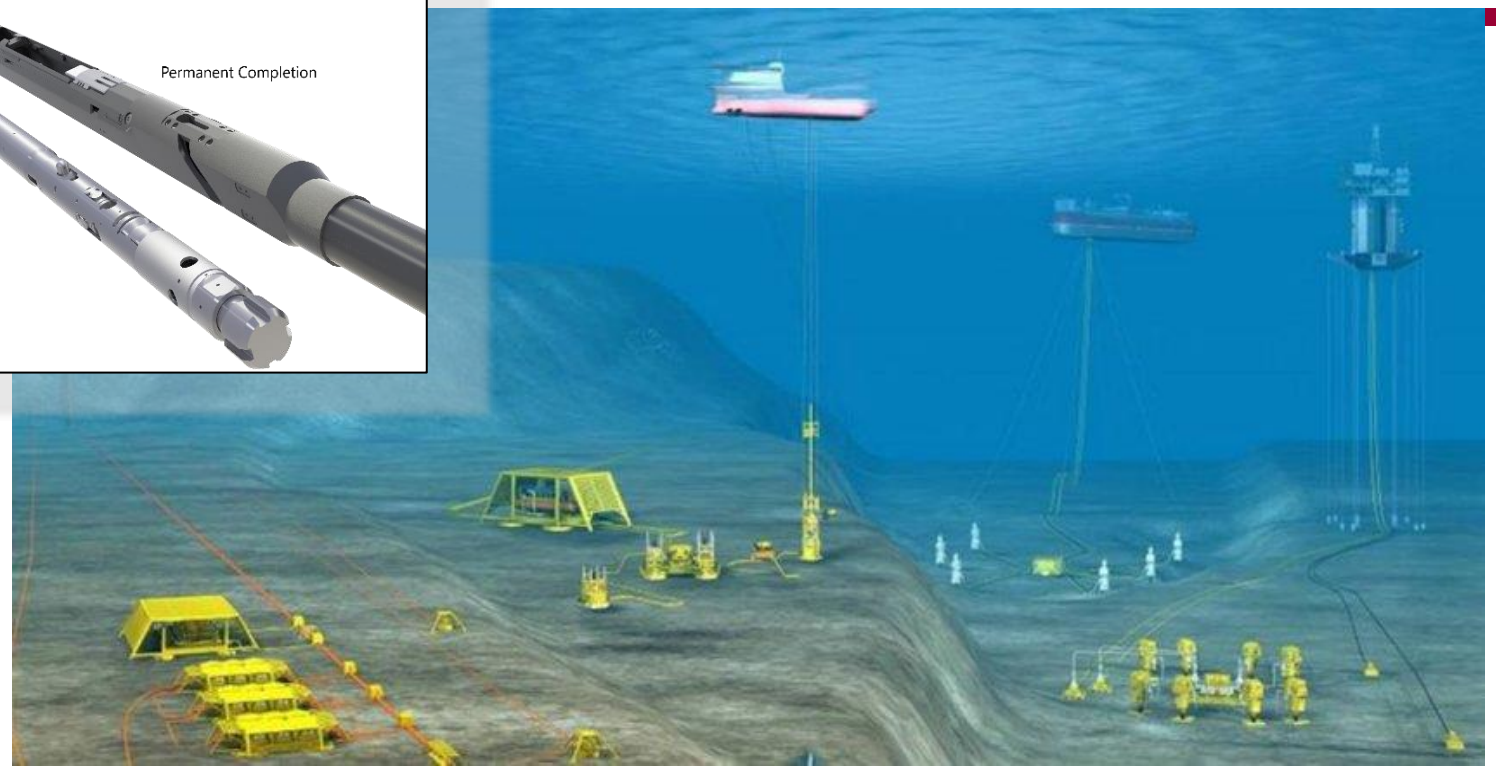
The Viability of Rigless ESP Technology for Subsea Applications





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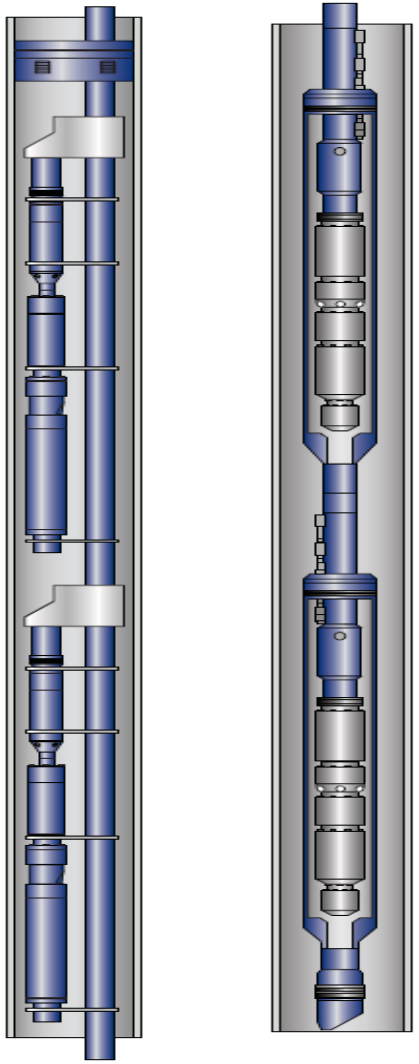
GoRigless UpCable GoSafely GoGreen AccessESP

Subsea ESP Status Quo

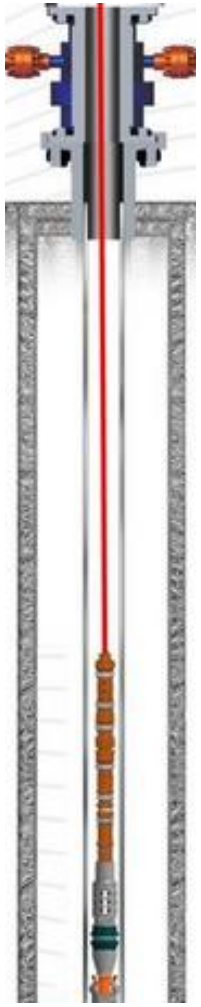
- First deployment In Brazil – 1994 - (RJS-221) operated for 32 months without failure (Mendonça, et al., 1999)
- Heavy intervention cost > $ 12 Million
- In well and mud line installations



Why Rigless ESP in a Subsea environment?

Rigless ESP Options Reduce Risk

Cable or CT deployed systems

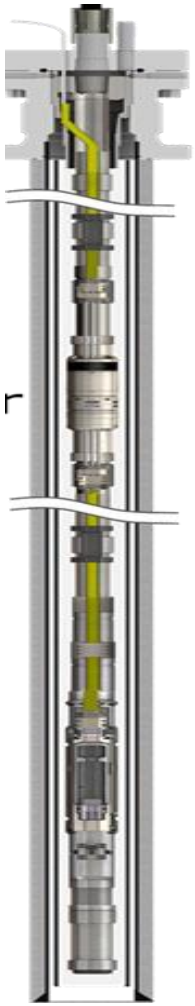


Cable exposed to produced fluids

Wellhead must accommodate cable

Reduced Manpower

Tubing deployed systems

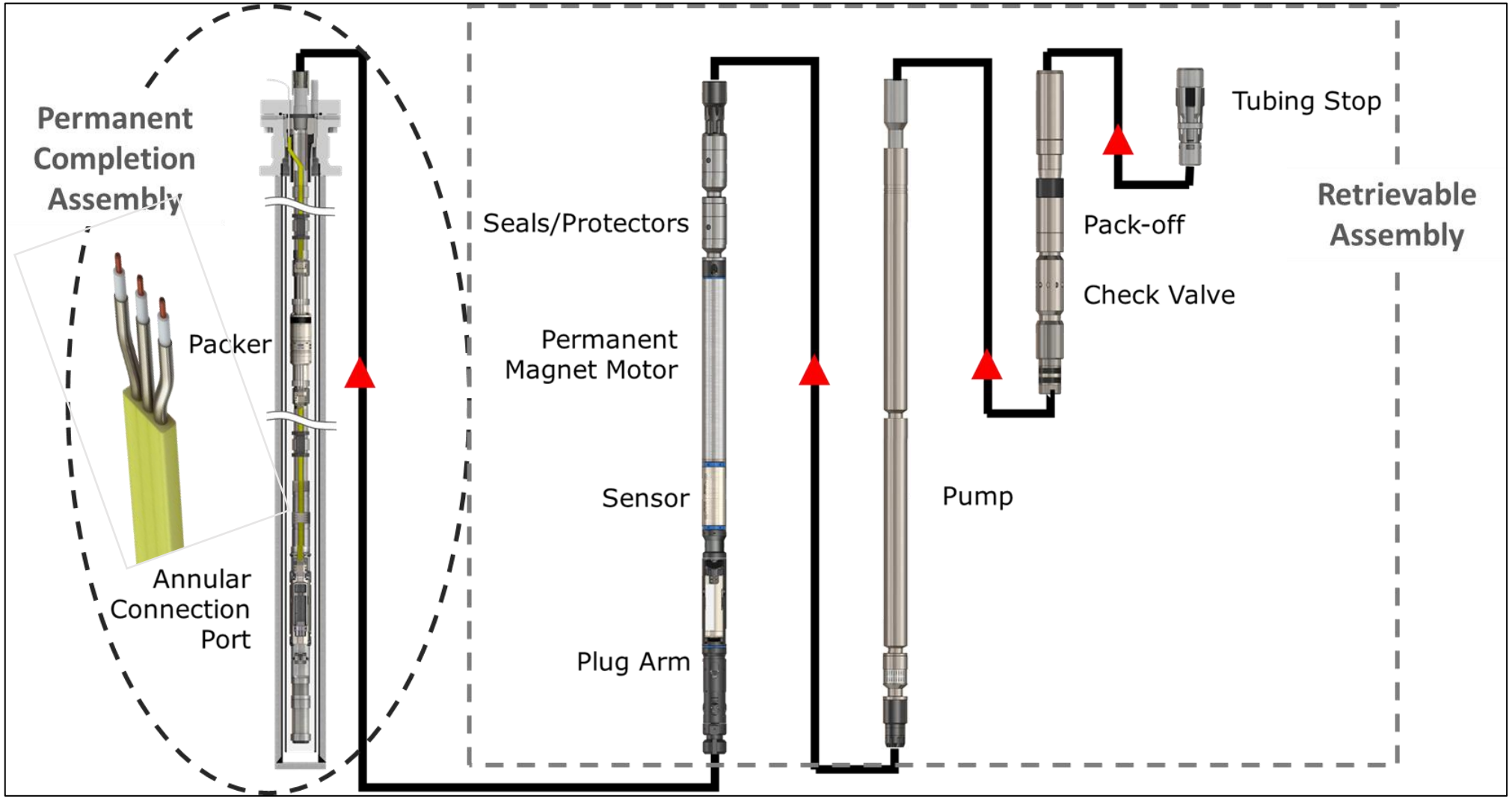


Rigless ESP with port fixed to tubing

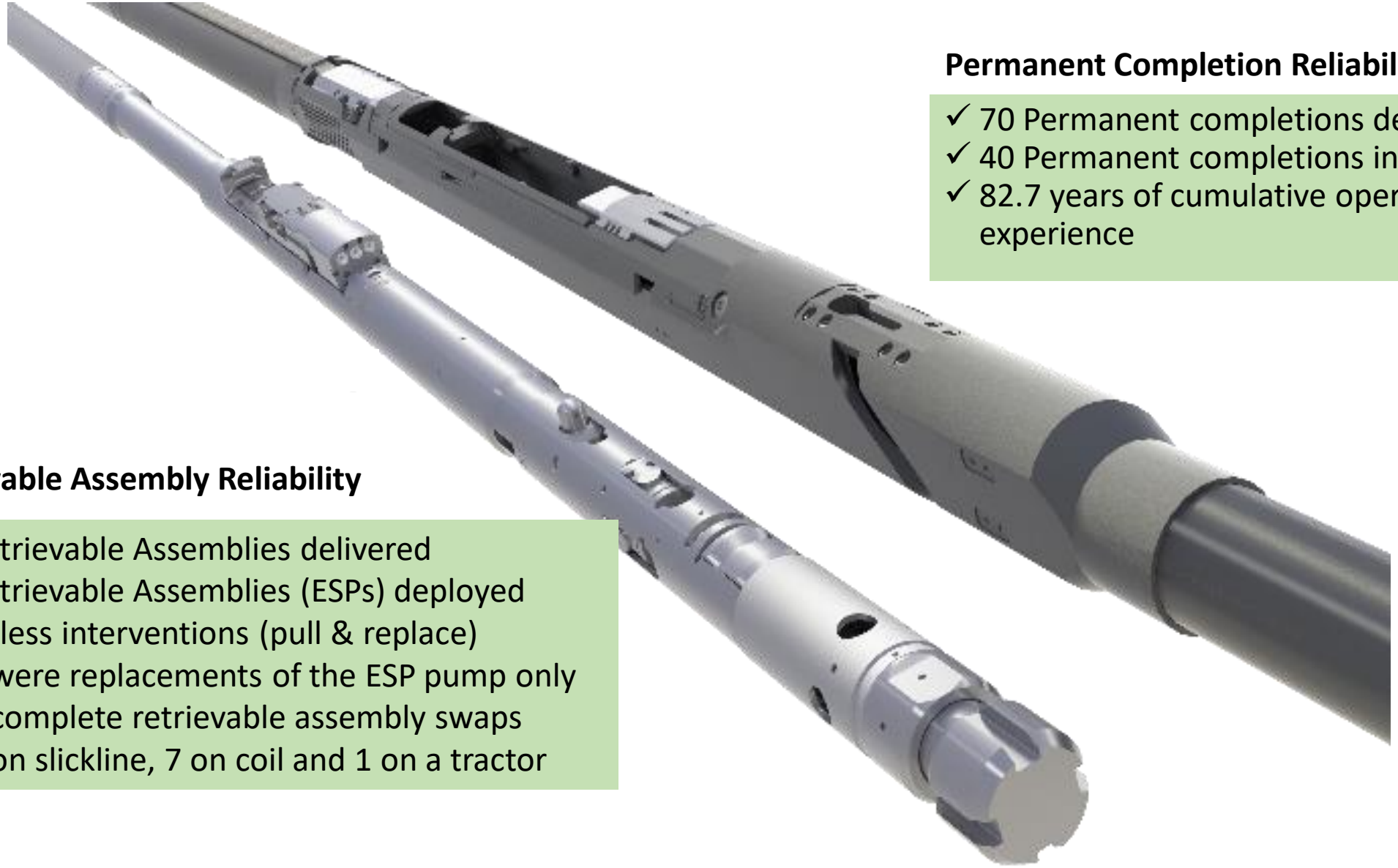
Cable in annulus

Reduced Manpower

Rigless ESP Systems Allow Production Optimization



Rigless ESP Systems Proven in Dry Trees



Permanent Completion Reliability

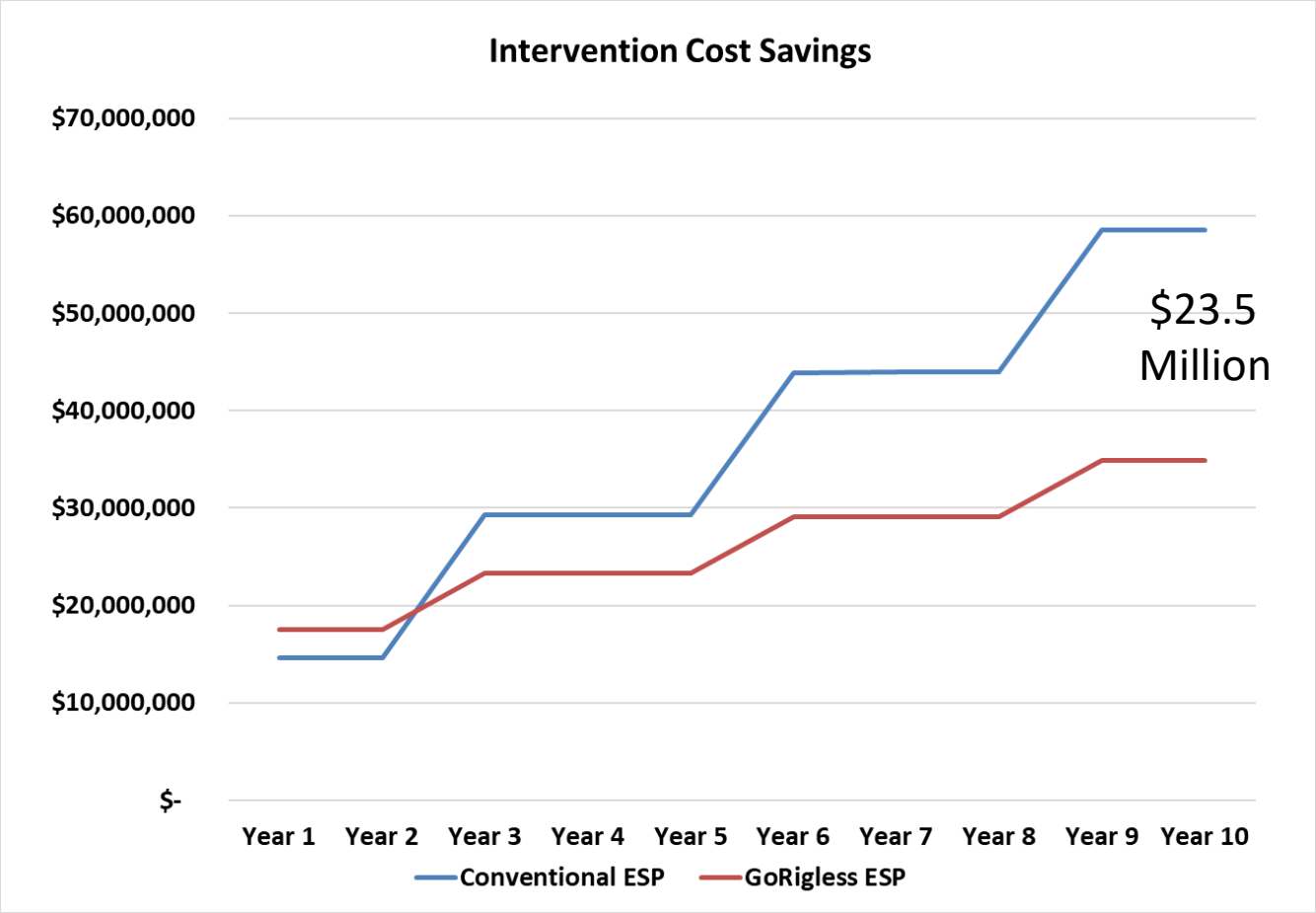
- ✓ 70 Permanent completions delivered
- ✓ 40 Permanent completions installed
- ✓ 82.7 years of cumulative operational experience

Retrievable Assembly Reliability

- ✓ 90 Retrievable Assemblies delivered
- ✓ 67 Retrievable Assemblies (ESPs) deployed
- ✓ 29 rigless interventions (pull & replace)
  - 10 were replacements of the ESP pump only
  - 19 complete retrievable assembly swaps
  - 21 on slickline, 7 on coil and 1 on a tractor

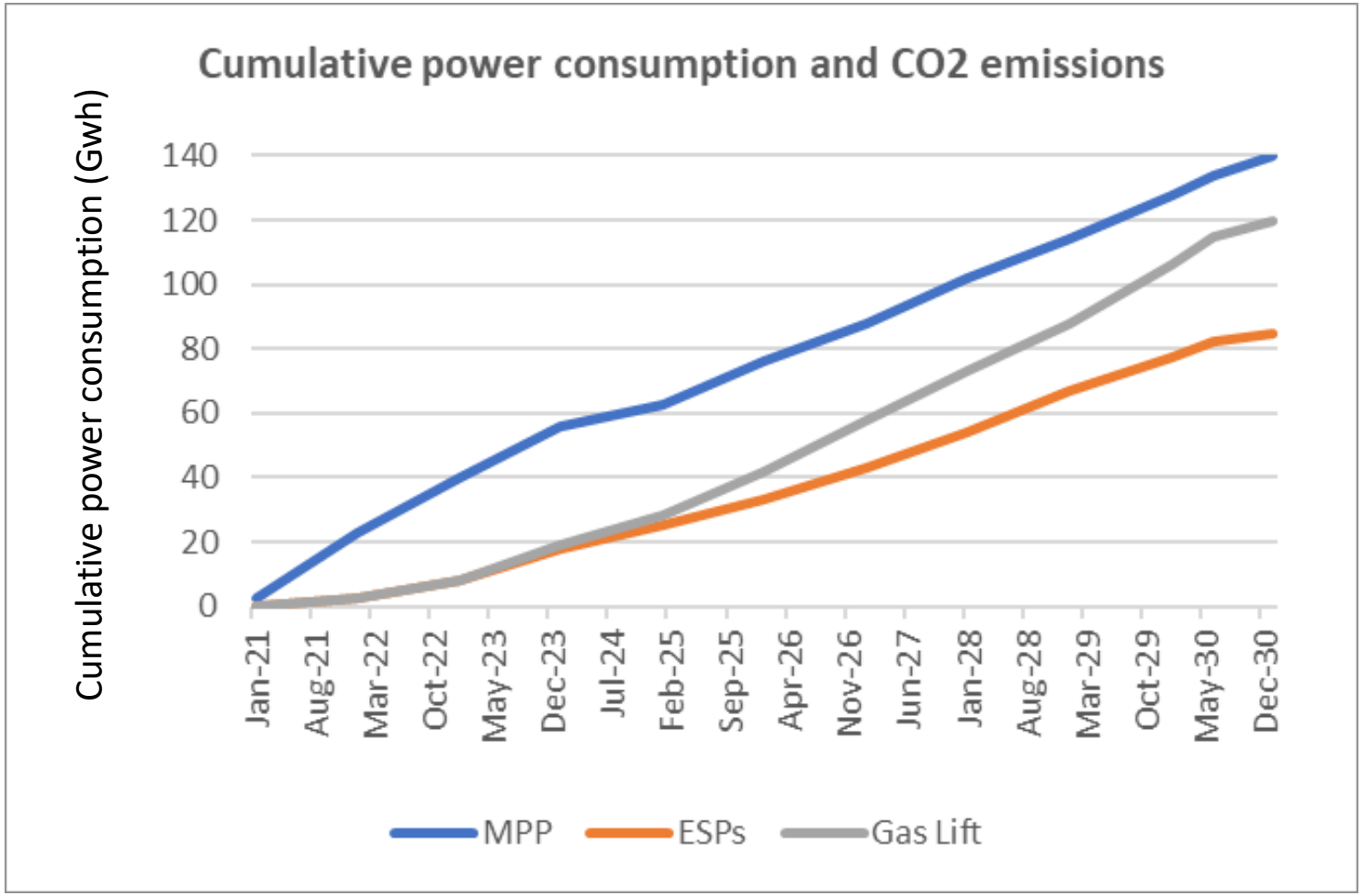
Rigless ESP Deliver Reduced OPEX

- The analysis assumes two ESP failures over 10 years
- 180 days wait time for heavy intervention unit
- 45 days wait time for RLWI unit
- Heavy intervention cost $12 Million
- Light well intervention cost $ 3.5 Million



Rigless ESP Reduce GHGE Emissions

- Akchiche et al. SPE-200607-MS - Exergoeconomic Optimization of Oil and Gas Production Systems
- Examined both economics and CO2 impact of lift systems
- Akchiche, et al., 2020 concluded ¨ …**ESPs are the least energy-consuming method …**¨
- Economically are affected by failures due to high WO cost and deferred production.
- **Rigless ESP can address this issue**



Source: Akchiche, et al., 2020

Rigless ESP - Operational Readiness with Light Well Intervention

- **For ESP changeout**
  - **Light well intervention (LWI) system for exist for interventions**
  - Rigless compatible with wireline/slickline lubricator
- **Rigless ESP system types and retrieval**
  - Slickline - four runs with a maximum length designed for lubricator system
- **Growth in subsea wells = growth in rigless intervention equipment**
- **Geography can dictate availability**

Rigless ESP Ready for subsea - there are few gaps

ESP/Completion

Rigless ESP System commercially available now

>40 Dry tree installations

Any supplier pumps

Proven Permanent magnet motor

NO NEW DEVELOPMENT

Subsea Tree

Existing subsea ESP tree designs apply

Lead time similar for conventional Subsea ESP

NO NEW DEVELOPMENT

Workover Ops

Location specific for operator and existing Slickline/wireline contract

NO NEW DEVELOPMENT

Interface Management

UpCable connection to Subsea connector at tubing hanger

Specific Light well intervention vessel compatibility with tree vendor

ENGINEERING REQUIRED

Subsea Power Distribution

Existing systems from tree to power supply do not change

Umbilical and tree orientation do not change

NO NEW DEVELOPMENT

Conclusion

- Track record of Rigless ESP Systems demonstrates high reliability required for subsea deployment

- The technology exists and is proven for subsea deployment, only the specific interfaces within the tree need to be engineered

- Recent developments in ESP power cable, connectors, completion assemblies and associated completion components are qualified to deliver long-life expectancy

Why Rigless ESP in a Subsea environment?

AccessESP

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