The Phoenix Project
A marginal field (re-)development using several alternative methodologies
Helix Energy Solutions Group provides life-of-field services and development solutions to offshore energy producers worldwide. Helix actively reduces finding and development costs through a unique mix of offshore production assets, service methodologies, and highly skilled personnel.
## Services For Each Stage of the Field Life Cycle

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**Changing the way you succeed.**
Hurricane Rita

- Typhoon tension-leg platform (TLP) capsized
- All production risers, export risers and umbilicals severed
- Major seabed debris field - tendons, flare tower, etc.
- Typhoon and Boris subsea wells intact and isolated
- Remaining reserves determined not to be material for Typhoon Lease Owners
The Typhoon Field Post Hurricane Rita

- Helix ESG created **The Phoenix Project** to focus its offshore service, E&P and production facilities experience on redevelopment of the Typhoon field and production of remaining hydrocarbons.

- Helix ESG’s E&P subsidiary, ERT, acquired the Typhoon and Boris leases from took Chevron and BHP in 2006, as part of the company’s marginal field production strategy.

- A new field production concept was developed to economically produce this field and other fields that are not viable to produce using traditional moored production assets.
Helix Service Lines and Assets being used

- Seabed Remediation and Recovery (clean-up)
  - Q4000
  - Olympic Triton
- Installation
  - Express
  - Intrepid
  - Island Pioneer and T750 (burial)
  - Q4000 (buoy)
- Well Completion
  - Q4000
- Drilling (Future)
  - Q4000
- Future Tie-backs
  - Express, Intrepid
- Production
  - Helix Producer I
- Abandonment (future)
  - Well P&A (Q4000)
  - Flowlines (Express / Intrepid)
Seabed Remediation and Recovery

- Survey of debris field and identification of debris
- Survey trees
- Route selection for new flowlines
- Recovery of certain pieces of debris as agreed to with MMS
- Removing of oil from severed flowlines
Seabed Remediation

Phoenix project marks first time hydrocarbons present in severed flexible flowlines recovered

- Development of tooling
- Development of QC/DC hubs
- Sea trials
- Proof of concept testing

**Recovery sequence:**
1. Flowline preparation and survey
2. Cut back to undamaged flowline section
3. Plug and straighten flowlines
4. Subsea hot tap
5. Flushing
Seabed Remediation – flushing flowlines

Flowline flushing and abandonment schematic
• **Reduce storm-related downtime**
  – No property damage from storms
  – Minimal disconnection and reconnection lead time
  – Employees stay on FPU after disconnect- not dependent on helicopter evacuation
  – Maintenance and overhauls can be done during storm downtime, for longer production uptime

• **Cost-effective marginal field deployment**
  – Easier to relocate than permanent moored facilities
  – Takes advantage of existing subsea infrastructure
  – Ensures maximum production from fields that are still viable, but no longer cost-effective for permanent moored platforms
Extreme Makeover

MV Karl Carstens roll-on roll off train ferry

Helix Producer I
The Floating Production Unit is a new concept for the GOM, taking advantage of existing infrastructure to export produced oil and gas via a disconnectable transfer system.

Widening the HPI hull
Reinforcing the main deck
Installing production topsides
Vessel Dimensions
• Length: 161 m
• Breadth: 29 m
• Draft: 8.6 m

Thrusters
• 7 Electric: 12 MW
• 2 Hydraulic: 4,000 HP

Processing Capacity
• 45,000 BOPD
• 70 MMCFD
• Gas export compression (1565 psig)
• Oil export pumps (1850 psig)

Turret Capacity (designed by FES UK)
• 6 slots for 6” flexible risers
• 3 I-tubes for E/H umbilicals
• Swivel rating 10K

Future use as either marginal field FPU or Early Production and Test Vessel
Disconnectable Transfer System (DTS)

Departs with DP FPU

Disconnects with Buoy
Subsea Infrastructure – Installation Scope

- Installation of 6/8-inch Export Pipelines, PLET’s and jumpers
- Installation of 6-inch flexible flowlines and lazy wave risers
- Installation of E/H umbilicals
- Installation of DTS Buoy

Helix Ingleside Spoolbase and Fabrication yard

Buoy installation by Q4000
Boris Flowline Burial

Rationale

- Heat Conservation
- Extended Shutdown
- Hydrate and Wax inhibition

Execution (scheduled for February 2010)

- Flowline to be pre-trench surveyed, trenched, backfilled, in 1970fsw utilizing the T750 Jet Trenching ROV from the MV Island Pioneer
- Offshore duration 15 days
- Flowline to be lowered (trenched) to depth of 5ft below mean seabed
- On completion of lowering a cover of 3ft mechanical backfill will then be jet induced on the top of the lowered flowline. To ensure thermal encasement
- Trenching speeds 350m/hr, backfill speeds 400m/hr over the flowline
Little Burn Well Completion

(maybe performed by traditional drilling rig if Q4000 is not available)

**Q4000 MODU- Little Burn Completion Operations**

- Tubing head spool on existing 18 ¾” wellhead
- Gravel pack completion
- 12 ¼” tubing hanger set in tubing head spool
- Existing intervention riser system used to deploy subsea tree
- FMC Enhanced Vertical Subsea Tree used for production

**Surface BOP technology**

- All pumping and fluid handling from the Q4000
- Riser tensioners enable deployment
- 16” casing riser
- Subsea shut off and disconnect capability at wellhead
- Provisional MMS approval for completion and workover operations
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**Intervention, Maintenance and Stimulation**

Well Ops’ Q4000 in combination with the Intervention Riser System provide:
- Well diagnostics
- Enhanced recovery options
- Flow assurance
- Final abandonment

**Well Ops’ Intervention Riser System**
- 7 3/8” through-bore
- 10,000 psi rating
- Emergency disconnect capability
- 7 year field operational history
Some of Helix Assets that were not used on Phoenix:

- Olympic Canyon ROVSV
- MSV Well Enhancer Well intervention Vessel
- Caesar DP2 Pipelay Vessel
- MSV Seawell Well intervention Vessel
- Seacor Canyon ROVSV