

# Tengizchevroil Expansion: Benefitting Future Generations of Kazakhstan

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**FLUOR**

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# Agenda

- Fluor Overview
- Tengiz Project History
- Overview of the Future Growth Project & Wellhead Pressure Management
- Update on the Pipeline and Project Scope



Onshore Oil and Gas Projects - Pipeline Tie-In in Cold Climate





# Fluor Overview



1915

First Cross Country Petroleum Pipeline



1977

Trans-Alaska Pipeline



2003

Chad to Cameroon Pipeline



2014

Ramones II Sur Gas Pipeline



2015

NEXUS Project

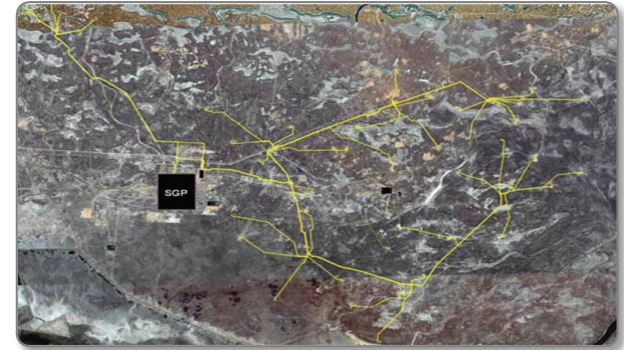


1998 – 2016

Tengizchevroil Project

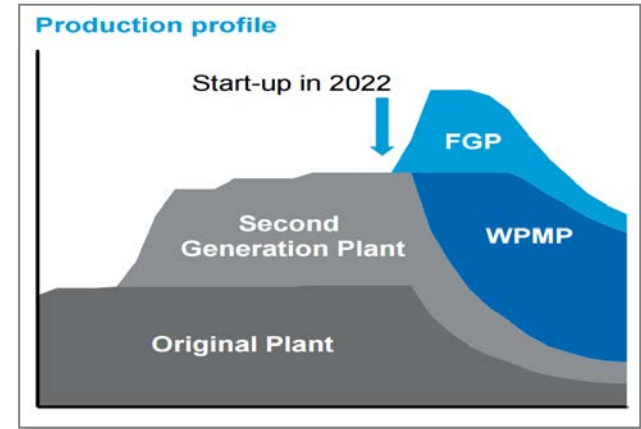
# TCO Project History

- Location: Tengiz, Kazakhstan - 1998
- Pipeline Details:
  - Very sour field /H2S Content <=16%
  - 480km of pipeline (2 to 40")
  - Design Pressure (max): 650 Barg
  - Design Temperature (max): 110°C
  - Fluids: Crude / Multiphase / Tech Water/Gas
- Description:
  - Designed to allow the Tengiz gathering system to provide a minimum of 12MMTPY (crude oil) at solution GOR during early well life or 10MMTPY (crude oil) at 120% GOR plus a 10% design margin for mature well life
  - Original Facility was stick built
  - Reinjection compressors were first of a kind with combination of Pressure and Sour Gas
  - Many lessons learned were incorporated into the new facility
  - TIC: Approximately \$8 B
  - 1998-2003, Then debottlenecking thru 2010. The new facility conceptually developed next.



# TCO FGP & WPMP Project Update

- Final Investment Decision was made in 2Q16 – TIC Approx \$36 B
- Wellhead Pressure Management Project (WPMP)
  - Lower back-pressure on wells to maintain the existing plants at full capacity
- Future Growth Project (FGP)
  - Increasing capacity ~ 260 MBOED utilizing proven technology
  - Improves reservoir recovery
  - Extends the production plateau by increasing TCO gas handling capability



# TCO 3GP/3GI – Gas System Expansion

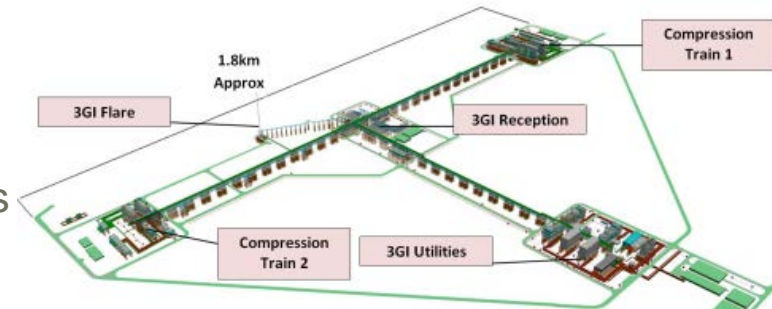
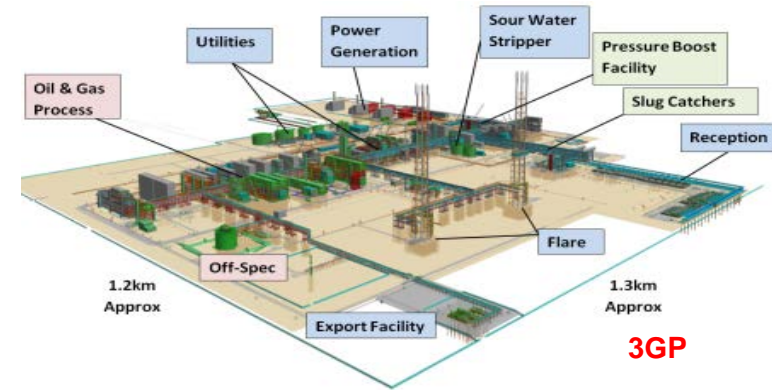
- Expanding the oil gathering network
  - New multi well pads
  - New manifolds and metering stations
  - New flow gathering and trunk lines
- Debottlenecking the existing gathering
  - Debottlenecking existing manifolds including the main manifold
  - Debottlenecking existing metering stations
- Expanding the gas reinjection
  - Expanding on SGI technology
  - High pressure sour gas re-injection
- Addition of associated infrastructure and utilities for all of the above





# TCO FGP Facility – Kazakhstan

- **Plant Capacity:** 12 MMTPY Oil (260 MBOPD)  
960 mmscfd Gas
- **3GI Capacity:** 2x 480 mmscfd  
(2x 75% trains)
- **H2S Content:** 16 mol%
- **Module Basis:** 1,800t / 300t
- **3GP Location:** NW Field (4km SW SGP)
- **Pressure Boost:** At 3GP
- **3GI Location:** Central Field (7km S 3GP)
- **Drives:** All Electric w/ Adj Speed Drives
- **Power Plant:** 4x Frame 9



# Technical

- **3GI design parameters**
  - High reinjection pressure (600 bar)
  - Sour service
  - High temperature (110 C)
  - Varying ground conditions
- **Reinjection pipelines**
  - 'Gun barrel' F22 & X60 - 14 " x 57.5mm wall
- **Gathering and trunk lines**
  - 450 km of pipeline (all dims)
  - 205 pig traps
- **Installation methods**
  - Open cut
  - Trenchless crossings
- **Well pad design**
  - One well pad, multiple cellars
  - Self contained utilities, etc





# Summary of Pipelines

## ■ 3GI Sour Gas Injection

- 5 Injection Pipelines, 30km in total, 14" OD, 57.5mm WT, 110C, 600 Barg
- 2 Sour FEED gas lines to 3GI injection island, 18km total, 26", 70C, 93 Barg

## ■ High Pressure Gathering System (Pre-WPMP)

- 16 Flowlines , 21km total, 8" and 16", 95C, 93 Barg
- 21 Trunk lines, 120km total, 14" to 24", 88C, 93 Barg

## ■ Low Pressure Gathering System (Post-WPMP)

- 20 Flowlines, 22km total, 8" and 16", 95C, 40 Barg
- 32 Trunk lines, 177km total, 18" to 24", 88C, 40 Barg

## ■ Utilities & Misc.

- 47 Fuel Gas Lines, 117km total, 4" and 6" and 24", 80C, 40 to 132 Barg
- 35 HDPE Water lines, 46km total, 4" to 16", 25C, 14 Barg
- 9 Misc. Lines: Diesel, Propane, Condensate, Drain, 52km total, Various Temps and Pressures



# Current Status

- Project's safety focus continues:
  - Over 8.7 MM man-hours worked since last recordable incident (3 + years)
- FEED completed
- Detailed engineering 9.9% complete
- Completed update of KC Plan following 4 engagements with KC Expert Group and Kazakhstani Suppliers Forum
- Contracts & Purchase Orders award is underway
- We have offices in Atyrau, Almaty, Aktau, Farnborough (UK), Houston (USA) and New Delhi (India)
- Workforce mobilization to Tengiz.



# Current Status

- Start Dates – Prior to the end of the year
- Pipe Suppliers – In progress
- Coatings – In progress
- First Gas – Scheduled 2022 ???





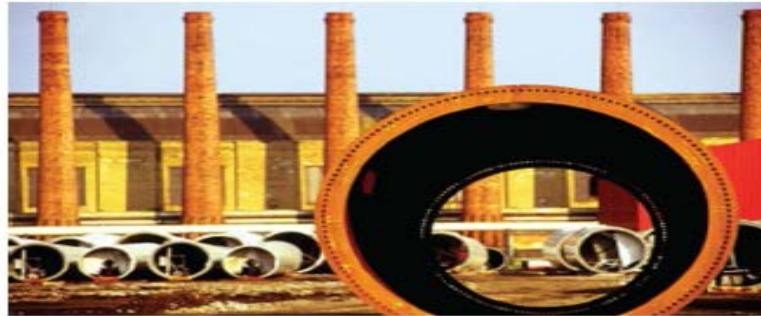
# Modular Construction - A lesson learned

## FGP to use a modular strategy

- Moves work to a more controlled environment
- Provides access to a broader workforce
- Reduced infrastructure needs in Tengiz

## Project requires ~ 253,000 tonnes of module fabrication

- About 88 modules and 75 pipe racks
- Weighing from 300 to 1800 tonnes
- Modules fabricated in and outside Kazakhstan



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# Thank You for Your Attendance

- Questions ???

