

ASSOCIATED GAS PRODUCTIVE USE – NPDC PLANS: SHORT, MEDIUM AND LONG TERMS

JUNE 2021

PRESENTATION OUTLINE

- Introduction
- Productive Use of Associated Gas
- Brief on NPDC Short, Medium and Long Term Plans
- NPDC Current Associated Gas Development Efforts
- Oredo Field IGHF Plant – Schematics
- Challenges
- Recommendations

Introduction

Some petroleum reservoirs contain oil and gas, and as the natural gas is brought to the surface and c1annot easily be used, it is burned for disposal or "flared." Flaring mainly happens when gas is produced as a byproduct of oil extraction. If there is no infrastructure to put this "associated gas" to productive use, it is simply burned off.

Flaring creates serious environmental consequences. CO2 from flaring represents around 0.6% of anthropogenic greenhouse gas emissions [According to an energy paper review of 2018 by Christopher D. Elvidge et al, regarding mitigating greenhouse gases]

Directly venting the gas as methane would be even worse.

Flaring creates local air and noise pollution.

Flaring is also a huge economic loss

However, The index of flaring (deflation) of associated petroleum gas (APG) in flare devices should not exceed 5% of the volume of the produced associated gas – According to International Journal of Energy Economics and Policy Issues

In order to achieve this result, it is necessary to introduce systems for its targeted use that will significantly reduce emissions of harmful substances into the atmosphere.

Productive Uses of Associated Gas Production

Some Uses of The Produced Associated Gas

- **Power Generation: To supply gas to our power plants to generate electricity**
- **Large-Scale Industrial Applications: As feedstock in the in the manufacture of petrochemicals**
- **Local Gas –fired power plants to supply power for hydrocarbon operations, local industrial uses, residential electrification, etc.**
- **Build Compressed Natural Gas (CNG) Stations to fuel vehicles and Other uses**
- **Household Use in the Liquefied Petroleum Gas (LPG)**

NPDC Plan

- Our mandate is to Monetize all NPDC Gas Resources for Domestic and Export Utilization by Initiating and Executing Programs that will completely wipe out gas flaring in our assets.
- We executing this in line with NPDC's Gas Master Plan with focus on maximizing the gas value chain through highly beneficial and profitable monetization concepts across all our assets
- Our short and medium term priorities are to eliminate gas flaring in our producing assets and meet our Domestic Supply Obligation (DSO) targets
- Our long term plan is to consolidate and scale up our gas supply commitments and put our committed and contractual reserves to full utilization and monetization.

We hope to meet up our existing and future commitments to the various gas markets such as IPP, LNG, LPG and others

NPDC Current Associated Gas Development Efforts

OML 111 Operational Gas Plants:

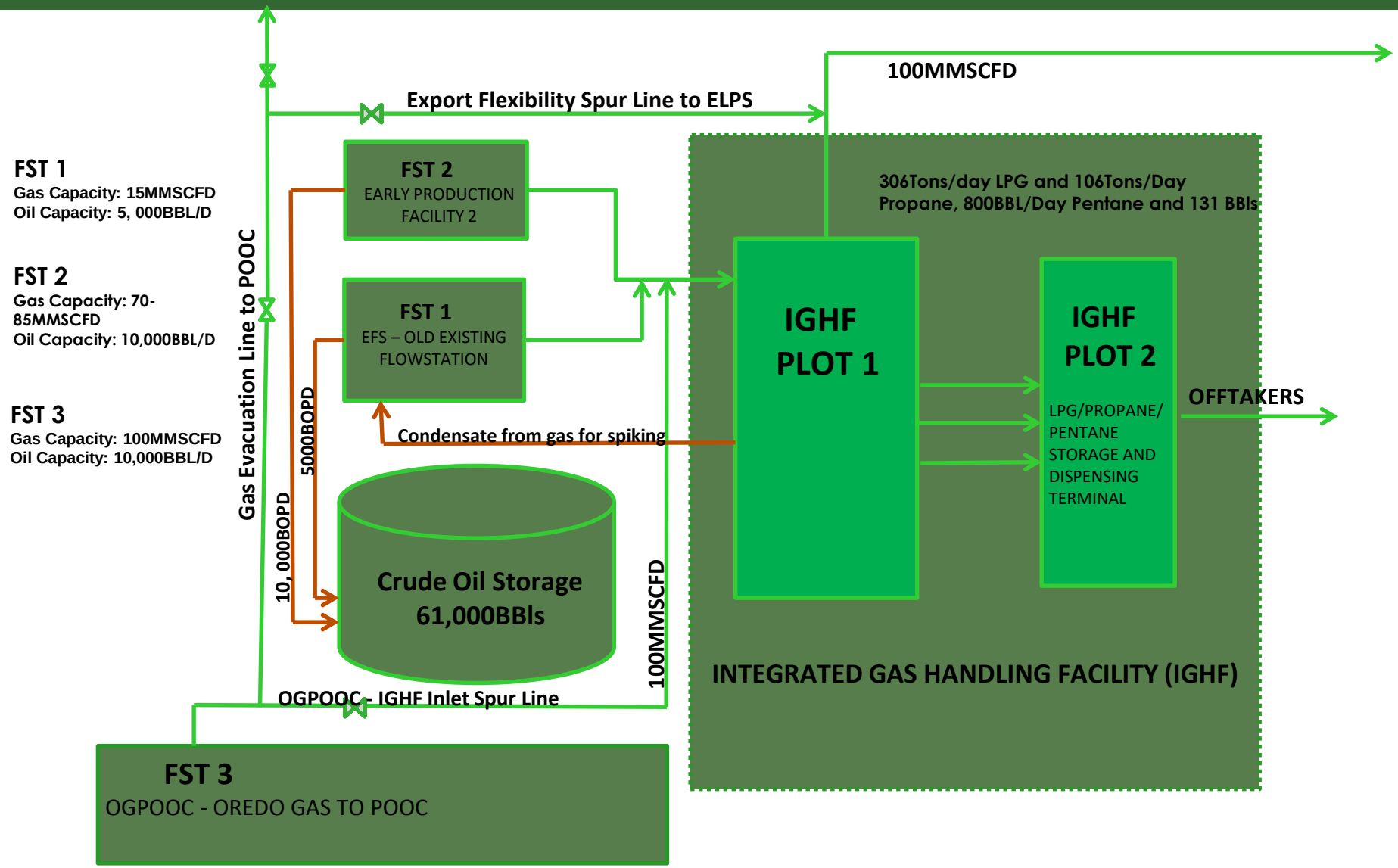
Plant type/Feed Sources: Associated Gas Plants / Oil Separators Overhead

1)Oredo Integrated Gas Handling Facility (IGHF) – 100MMSCFD

2)Oredo Gas Supply To PanOcean Gas Plant (OGPOOC) - 100MMSCFD

- **Product Slates:**
  - ✓ Lean Gas: 170 MMSCFD
  - ✓ Liquefied Petroleum Gas (LPG): 330 MT/D
  - ✓ Propane: 300MT/D
  - ✓ Condensate: 2000 BOPD
- **Product Destination**:
  - ✓ Lean Gas: Domestic Gas Market via Escravos Lagos Pipeline System (ELPS)
  - ✓ LPG: Domestic Gas Market via Tankers
  - ✓ Propane: Indorama Petrochemicals vis Tankers
  - ✓ Condensates: Export Market (currently spiked into crude oil)

Oredo Field Facilities' Schematics



NPDC Current Associated Gas Development Efforts

OML 42 Operational Gas Plant:

Plant Type / feed Source: Associated Gas Plant / Oil Separators Overhead

- ❖ Installed Capacity: 600 MMSCFD
  - ➢ MCM-1: 40MMSCFD
  - ➢ MCM-2: 40MMSCFD
- ❖ **Product Slates:**
  - ✓ Lean Gas: 35 MMSCFD
  - ✓ Condensate: 2000 BOPD
- ❖ **Product Destination**:
  - ✓ Lean Gas: Domestic Gas Market LPG: Domestic Gas Market
  - ✓ Condensates: Export Market (currently spiked into crude oil)

Challenges

Some of the Current Challenges we are facing include:

- **Having significant quantities of associated gas** where reinjection is not an option
- **Underdeveloped Markets** for Natural Gas: This gives rise to low gas pricing
- **Inadequate Gas Infrastructure:** Some of the fields holding substantial amount of associated gas are far from population centers
- **Low subsidized gas prices**: This reduces incentive to bring associated gas to market
- **Limited Financial Resources**: Lack of financial incentives to exploit associated gas

Recommendation

Some feasible and viable Recommendations:

- ✓ **Develop deep, economically viable gas markets:** Targeting power generation, large scale industries
- ✓ **Build local fired power plants:** To power local industrial uses, residential electrification, etc.
- ✓ **Piping of Gas to Local Industrial Enterprises:** For heating and / or power generation
- ✓ **Build Compressed Natrual Gas fueling Stations:** To fuel vehicles across the nation
- ✓ **Provide Incentives for use of LPG:** Make more it available for domestic cooking