

# Group Investment Proposal

## Summary Information

Business unit and company	Upstream International Operated. Nigeria/Gabon. Shell Petroleum Development Company of Nigeria Limited (SPDC)
Group equity interest	100% in SPDC, whereas SPDC is the Joint Venture (JV) operator of an unincorporated JV with a 30% interest.
Other shareholders/partners	Nigeria National Petroleum Company (NNPC: 55%), Total Exploration and Production Company Nigeria (TEPNL 10%) and Nigeria Agip Oil Company (NAOC: 5%)
Business or Function	Project & Technology (P&T)
Amount	This IP seeks approval for further investment of US\$ 47.0million (Shell share) MOD 50/50. (US\$ 6.0 million already spent). Previously, US\$ 62.9 million (Shell share) was approved on GIP 29.10.09, which is now fully spent. With this proposal, Shell's total investment in the project becomes US\$ 109.8 million of which US\$ 68.8 million is sunk cost.

Project	Eastern Domestic Gas Interim Project (Agbada-2 NAG Plant)
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Main commitments	Description	Previous IP (100%)	Previous IP (Shell Share)	This IP (100%)	This IP (Shell Share)	Total IP (100%)	Total IP (Shell Share)
	Drilling of 2 Wells & 1 Recompletion	54.6	16.4	14.4	4.3	69.0	20.7
	Flowlines & hookup	24.3	7.3	31.9	9.6	56.2	16.9
	Agbada NAG Plant	82.3	24.7	71.0	21.3	153.3	46.0
	Project Management	9.0	2.7	27.5	8.3	36.5	11.0
	Contingency	30.5	9.2	11.7	3.5	42.2	12.7
	<b>Total Capex</b>	<b>200.7</b>	<b>60.2</b>	<b>156.5</b>	<b>47.0</b>	<b>357.2</b>	<b>107.2</b>
	SCD (opex)	3.2	1.0	0.0	0.0	3.2	1.0
	Pre-FID (opex)	5.6	1.7	0.0	0.0	5.6	1.7
	<b>Total (50/50, MOD)</b>	<b>209.5</b>	<b>62.9</b>	<b>156.5</b>	<b>47.0</b>	<b>366.0</b>	<b>109.8</b>

Source and form of financing	This investment will be financed with JV funding and Shell share of the expenditure will be met by SPDC's own cash flow.
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Summary cash flow	<p><b>EASTERN DOMGAS INTEGRATED PROJECT (AGBADA NAG) - Forward Look Cashflow</b> (Shell Share PSV RV-RT15)</p>
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Summary economics	Summary Economics	NPV7(USD mln)	RTEP (%)	VIR
	Low Case	17.8	>50%	0.51
	Base Case	24.5	>50%	0.70
	High Case	35.4	>50%	1.01

## Detailed information including management summary

### Section 1: The proposal (Management Summary)

This investment proposal seeks support for the funding (Shell share) of US\$ 47.0mln (US\$ 6.0mln already spent) having previously obtained approval for US\$ 62.8mln (Shell share) in October 2009 to develop the Agbada NAG field comprising drilling of wells, installation of flowlines, procurement and installation of a NAG plant along with related miscellaneous/integration works at Agbada-2 AGG plant/flowstation required to deliver the Eastern Domestic Gas Interim Project (EDGIP).

The EDGIP project was initiated to meet (on an interim basis) SPDC's projected supply commitments to the Eastern Domestic Gas market and this project predates current wave of Domgas supply obligations being imposed on gas producers by Government, but it rolls into the short-term volumes. Two independent power plants; Alaoji and Geometric have signed gas supply agreements with SPDC and are billed to utilize the gas to be supplied by Agbada NAG plant.

Agbada NAG took FID in October 2009. From commencement of project till date; 2 NAG wells have been drilled, flowlines and associated facilities awarded to Daewoo Nig Ltd are completed, while the NAG plant, which was awarded to Makon Eng & Tech Services (METS), a local contractor as part of the DOMGAS and AG Solutions contract S17893 in September 2009 has progressed to about 70% completion. Overall, the project is progressing towards completion, but has experienced challenges and changes, which have led to cost growth with initial IP being fully spent; hence this revised IP requesting management approval for additional budget to complete the Agbada NAG development.

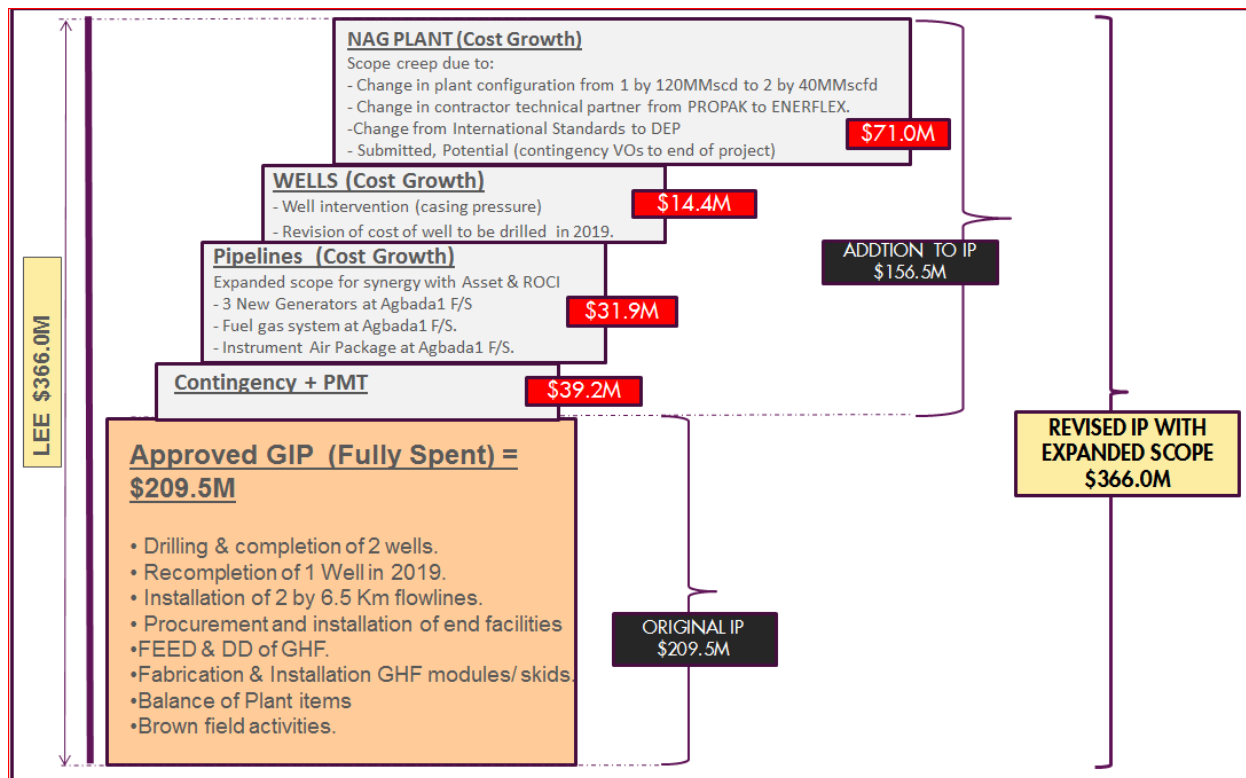
### Cost Growth

The budget approved under the existing GIP is US\$ 209.50mln. Figure 1 below provides a breakdown of the cost of the initial as well as the additional scope required to complete this project.

Following the last GIP approval, there have been changes to the project scope and delivery due to:

1. The need for the project to conform to Asset Integrity Process Safety Management (AIPSM) standards which stipulated a list of minimum mandatory DEPs. This requirement has now been built into the scope of this project which was initially based on international standards. Key changes include full segregation of SIS & PAS and replacement of threaded with flange connections.
2. Change in plant configuration from 1 by 120MMscf/d to 2 by 40MMscf/d due to revised production forecast and operational exigencies in order to achieve better plant turn down ratio. This led to a duplication of most vessels and equipment.
3. Breakdown in relationship between GHF contractor (METS) and technical partner (PROPAK) leading to the engagement of new technical partner (ENERFLEX). New contract of 2011 based on ENERFLEX price was significantly higher than that of the 2008 contract.
4. Pipelines contract with Daewoo Nigeria Limited was awarded at a significantly higher cost than anticipated due largely to additional scope required to synergize project objectives with that of asset operations and ROCI at Agbada-1 flowstation. This involved installation of bigger generators, new fuel gas system, new instrument air packages and ancillary works.
5. Unplanned well intervention activities to address casing pressure buildup in Agbada well 68 and review in cost of recompletion well planned for 2019.

**Figure-1: EDGIP COST GROWTH**



### Forecast Changes & Opportunities:

There has been a significant reduction in volumes of Agbada NAG post drilling, with gas reserves dropping from 137 Bcf to 41 Bcf. This is as a result of wells meeting the reservoir deeper than the prognosis. This reduction in reserves and forecast has created spare capacity in the NAG plant. It is however planned to fill this spare capacity and create value by the processing of 15 – 40MMscf/d off specs Agbada AG to full DomGas specifications through the Agbada NAG plant.

The long term plan to keep the plant full will be via the development of the Rumuekpe field with a potential of 600 Bcf. Study work on this field will commence in 2015.

### Project Completion Strategy:

In view of delays and slow progress with the completion of the GHF by METS, the need to meet gas supply commitments and in order to ensure that the company starts deriving value for investments on this project, a 2 phase project completion approach which will enable gas production in 2015, pending the full completion of the overall project will be adopted.

*Phase 1 – Early Gas Production:* This involves a fast-track of some aspects of the NAG project adopting existing and already installed facilities such as Wells, Flowlines and GHF modules and then utilizing available ullage at existing AGG and Agbada-1 Flowstation to achieve early gas production latest by 31<sup>st</sup> December 2015. Works related to this scope are being executed independent of main EPC contractor.

*Phase 2 – Main EPC Project:* This involves the continuation of work being executed by EPC contractor METS. PMT will continue with support and implementation of already agreed measures such as tripartite agreements/direct payments to vendors to ensure progress and completion of project (OSD) by January 2017.

**Delivery Target:**

First gas (early gas production) from this project is 31<sup>st</sup> December 2015, while overall project on stream date P50 and P90 are October 2017 and March 2018 respectively. On stream is Gas export to Eastern Domestic Gas Network from the main Agbada NAG plant. The slippage in project on-stream date from the initial GIP promise of June 2010 to October 2017 is attributable to the following reasons:

- Management directive in November 2008 to seek alternative development options for the Agbada NAG field. Based on this, the project was placed on hold between December 2008 and August 2009.
- Need for project to conform to Asset Integrity Process Safety Management (AIPSM) standards with stipulated list of minimum mandatory DEPs contrary to International standards previously agreed with contractor. This change process led to considerable schedule elongation since contractor's technical partners were not conversant with DEPs.
- Change of technical partners by contractor METS from Propak to Enerflex after completion of FEED, leading to delays and need to redo the FEED.
- METS had financial challenges which meant that project could not progress significantly between June 2012 and January 2014.

Following intervention by SPDC Management on the contractor's cash flow challenges, METS has now remobilized to site and construction and site installation activities have recommenced.

**Project Scope**

The revised Agbada NAG field development entails the installation of a new 2 by 40 MMscf/d NAG plant with a mechanical refrigeration processing system at Agbada-2 adjacent to existing AGG plant and flowstation at the site of the disused gas lift compressor station, which has now been fully decommissioned. The gas from this plant will be exported into the eastern domestic gas network via gas export line at the AGG plant, while condensate will be exported via the flowstation delivery line.

Two new wells have been drilled and completed in 2011 at Agbada-1 and the gas produced from the wells will be piped via 8 inches flowlines and sent to the Gas Handling Facility (GHF) at Agbada-2. The flowlines and end facilities are completed.

FEED and Detailed Design for the GHF have been completed, procurement and fabrication of all modules of the GHF have also been completed and transported to Nigeria. Outstanding works involves completion of Balance of Plant (BOP) procurement, site installation and commissioning works. Summary of project scope to ensure delivery of 80 MMscf/d of gas into the eastern domestic gas network is as follows:

**Sub-surface scope**

- Drill and complete two NAG wells on G6000 and G8000 reservoirs. Done in 2011.
- Abandon the G8000 completion and re-complete on the G4000 reservoir in 2019.

**Surface scope**

- Installation of a 2 by 40MMscf/d capacity GHF complete with inlet gas heating, gas/liquid separation, dehydration, dew point control, metering, gas/condensate stabilization and liquid export pumping at Agbada-2.
- Decommissioning of disused gas compressor station and site preparation works for the new NAG plant. Completed.
- Installation of Surge Vessel (SV) gas compressor to gather currently being flared at Agbada-2 Flowstation.
- Lay 2 nos. 8" by 6.5Km carbon steel NAG flowlines from Agbada-1 to Agbada-2 GHF, including hookup. Completed in Q4 2013.
- Install 2 nos. 450KVA Gas and 1 no. 320KVA Diesel Generators, Instrument Air Package, Fuel gas system and ancillary utility works. Completed.
- Procure and install well-kill manifold, corrosion inhibitor injection system and associated stainless steel tubing to the NAG wellheads. Completed.

## Section 2: Value proposition and strategic and financial context

This Investment Proposal is to provide addition funds required to complete ongoing development of the Agbada NAG field, which is already at an overall completion of 70% thereby ensuring that SPDC meets its commitment to the Nigerian Government of supplying additional 80MMscfd of gas into the eastern domestic gas network as well as derive benefit for the amount already expended on this project.

Apart from the Agbada field, which is being developed via this project, there are NAG fields at various maturation stages whose development strategy involves the utilization of Agbada NAG spare capacity for producing gas from these fields. Also completed Agbada NAG plant will be utilized for additional processing of current Agbada AG to achieve required domestic gas specifications. Failure to complete this project will lead to value erosion and missed opportunities.

### Summary Economics

This economics evaluation was carried out on a forward-looking basis using Latest Estimate (LE) costs forecasts provided by the project team.

Two scenarios were evaluated

- I. Base Case Scenario: Project scope includes an AG dew pointing facility installed
- II. NAG Only Scenario: Project Scope is NAG facility only

Sensitivities were carried out to access the impact of the following on the project value:

- a. high and low Realization as well as
- b. high and low capex on the project value,
- c. 1 year production delay.

A project Full life cycle evaluation was also carried out with its value evaluated at different PSVs.

The result shows that the Project is sufficiently robust. However, the FLC is not so due to the high cost overruns and lower UR. It is also observed that the value derivable from further treating the AG is about 25% of the total project value.

The result also showed that the project value is most sensitive to production thus efforts should be directed at ensuring that the uncertainties around the realization of the volumes promised are reduced to as low as reasonably practicable.

The details of the economics evaluation results are presented in tables below

**Table 3: Economic Grid (Shell Share)**

PV Reference Date: 1/7/2015	NPV (\$/S \$ mln)		VIR	RTEP	UTC (RT \$/bbl or \$/mln btu)		Payout-Time (RT)	Maximum Exposure (RT) \$mln (yyyy)
Cash flow forward from: 1/1/2015	0%	7%	7%	%	0%	7%		
<b>Base Case</b>								
SV (\$70/bbl)	29.0	18.0	0.52	>50%	7.7	8.5		
RV (\$90/bbl)	38.5	24.5	0.70	>50%	7.7	8.5	2017	7.1 (2016)
HV (\$110/bbl)	50.6	33.4	0.95	>50%	7.7	8.5		
<b>Sensitivities (using RV)</b>								
Low Capex		25.2	0.78					
High Capex		22.2	0.51					
Low Reserves		17.8	0.51					
High Reserves		35.4	1.01					
1 yr Production Delay		23.4	0.67					
Full Life Cycle		1.3	0.01					

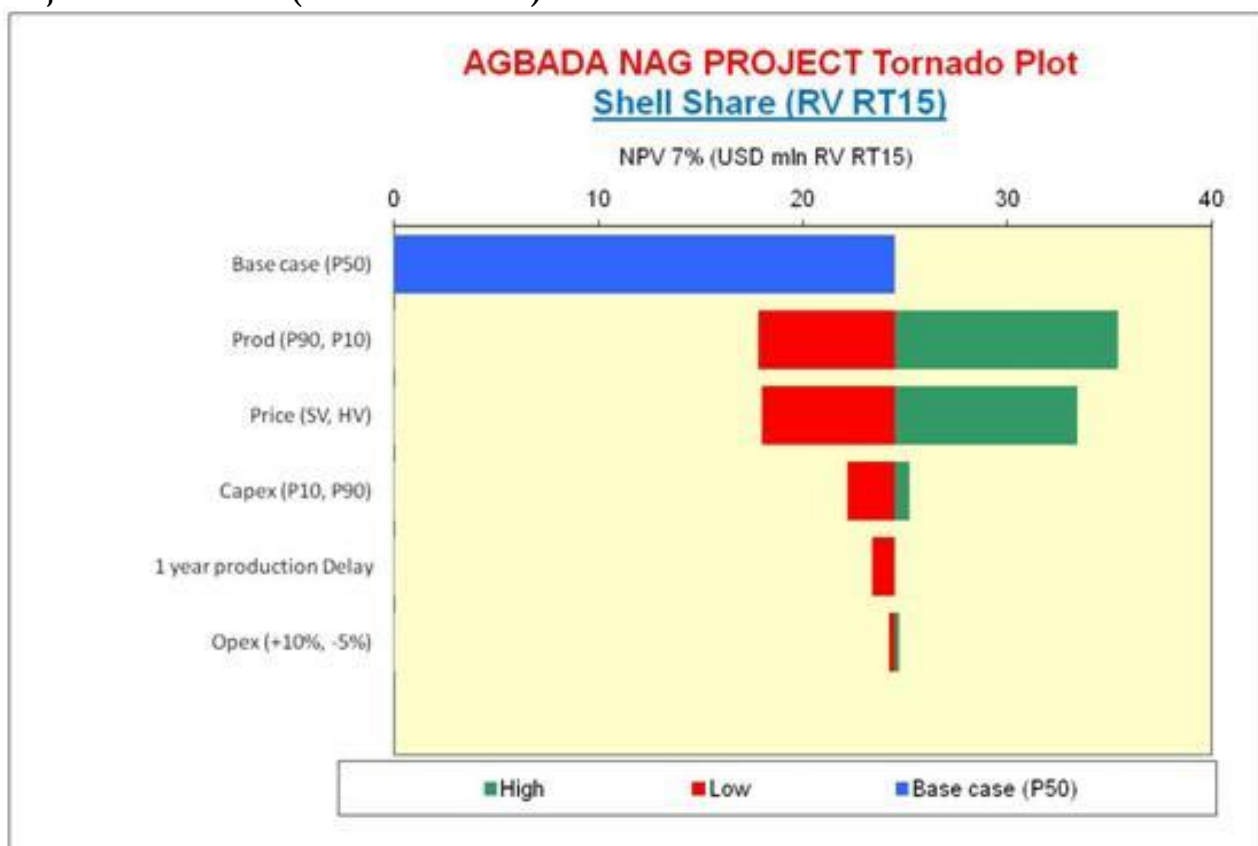
## KEY PROJECT PARAMETER DATA (SHELL SHARE)

Parameter (Shell Share)	Unit	Bus Plan (RV)	Low	Mid	High	Comments
Capex (MOD)	US\$ mln	40.9	37.6	40.9	52.0	
Production Volume	mln boe	7.0	6.0	7.0	8.8	
Opex (MOD)	US\$ mln	14.6	14.5	14.6	14.9	ABCM
Start Up Date		Dec-15	Mar-16	Dec-15	Sep-15	Early Gas Production

## Economic Grid (Full Life Cycle - Shell Share)

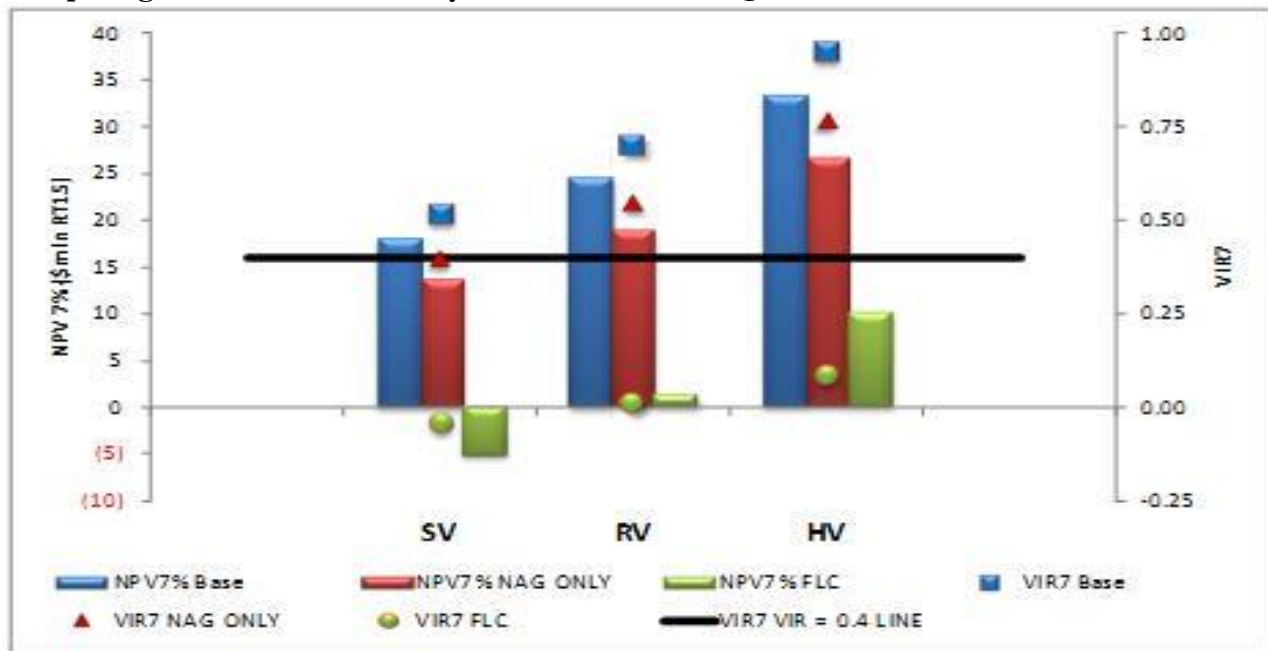
PV Reference Date: 1/7/2015	NPV (S/S \$ mln)		VIR	RTEP	UTC (RT \$/bbl or \$/mln btu)		Payout-Time (RT)	Maximum Exposure (RT) \$mln (yyyy)
Full Life Cycle Cashflow from: 1/1/2012	0%	7%	7%	%	0%	7%		
Base Case								
SV (\$70/bbl)	14.4	-5.1	-0.04	5%				
RV (\$90/bbl)	24.0	1.3	0.01	8%	19.4	27.4	2017	7.2 (2016)
HV (\$110/bbl)	36.1	10.2	0.09	11%				

## Project Tornado Plot (Shell Share RT15)





## Comparing Base Case, NAG Only Case & FLC Value @ Different PSVs



The Project is sufficiently robust. However, the FLC is not so due to the high cost overruns and lower UR. The AGs contribute about 25% of the total project value.

### Economics Assumptions:

- Condensate PSV of \$90/bbl @RV-RT15 (Base) with applicable offset.
- Gas PSV of \$1.55/Mscf@RV-RT15 based on Nigeria Gas Master Plan (NGMP).
- Condensate treated as Oil and taxed under Petroleum Profit Tax (PPT tax rate of 85%).
- Gas taxed under Companies Income Tax Act (CITA) with Associated Gas Framework Agreement (AGFA) incentive.
- ABCM OPEX was used for the evaluation.
- Education Tax of 2% of assessable profit.
- NDDC levy of 3% total expenditure.
- Gas Heating Value (GHV) of 1000 btu/scf).
- Flare Fees of NGN10/Mscf was applied and is not tax deductible.
- Abandonment cost is estimated at 10% of total project RT CAPEX.
- AG before hydrocarbon dew pointing is priced at 75% of gas price and 100% of gas price after hydrocarbon dew pointing.

### Risks and Alternatives

#### 1. Lack of understanding of scope, delayed and incomplete award of subcontracts.

Contractor has not executed a project of this type and magnitude and may under estimate the work scope and resource required leading to cost overrun and schedule delays.

#### Mitigation:

- Provide close supervision and guidance on project planning/ management and Qa/Qc requirements.*
- Ensure thorough review of RFQs by project discipline engineers for completeness before the contractor reaches agreement with subcontractors.*
- Deploy SPDC owned project resources as necessary to assist contractor deliver complete work scope.*
- Hold bi-weekly progress review meetings.*

## 2) Potential Project Cost Overrun

Variation orders issued to EPC contractor for un-scoped brownfield activities at Flow-station and AGG Plant leading to approved GIP cost being exceeded. .

### Mitigation:

- a) *Provide adequate contingency and realistic P90 dates based on Cost Schedule Risk Analysis.*
- b) *Compute Latest Estimated Expenditure (LEE) to completion and track monthly.*

## 3) Security and Preservation of the Pipeline till the completion of Facilities:

The NAG wells and flowlines are completed. However due to the delay in facility completion, laid pipelines and associated facilities are exposed to vandalization and theft, thereby causing delay in facility commissioning. Furthermore the integrity of the installed flowlines may be compromised due to the delay.

### Mitigation:

- a) *PMT in collaboration with the Asset team has put up a surveillance contract, currently active, to ensure security of the already installed assets including flow lines and accessories on the project.*
- b) *Plans concluded and contractor has introduced nitrogen into the installed flow lines to prevent corrosion.*

## 4) Delay in getting Regulatory Approval

Inability to reach an agreement with DPR on the DOMGAS project monitoring schedule may cause delay in getting requisite approvals on the project which could lead to delay in 1<sup>st</sup> gas or possible facility shutdown.

### Mitigation:

- a) *Engagement of senior management to agree on an optimum monitoring schedule.*
- b) *Development and implementation of Regulatory Compliance matrix to help monitor the compliance status of the project.*

## 5) Contractor's cash flow challenges.

Contractor financial constraints as a result of delayed payments from SPDC and general inability to fund the project may lead to delays and/or contractor being unable to complete the project as planned.

### Mitigation:

- a) *Re-distribution of milestones to help contractor's cash flow.*
- b) *Tripartite payment initiative has been put in place to facilitate direct payments to subcontractors, vendors and OEMs as may be expedient with a view to ensuring continuous progress on project.*
- c) *Execute Early Gas Production solution adopting existing and already installed facilities such as drilled wells, flowlines and GHF skids to achieve 1<sup>st</sup> gas in December 2015.*

## 6) Exposures from High volume of Land transportation

The NAG plant is situated adjacent to Agbada 2 flow station – a location approximately 16Km North-East of Port Harcourt. During the execution of the NAG plant construction activities; there will be lots of land transportation/movement of modules, materials equipment and personnel, with interference from the everyday public and third party road users, thereby engendering high traffic hazards and probable damage to GHF modules. This may lead to Road Transport Incidents, damage to modules, threat to Goal Zero, project cost escalation and schedule delay.

### Mitigation:

- a) *LIRA studies have been conducted with findings and recommendations signed off for guidance during the execution stage of the project.*
- b) *PMT shall ensure that approved journey management plans are followed with strict adherence to road movement and related HSE rules.*
- c) *Provide METS with additional logistic support during transportation of modules to site*
- d) *Drivers' training, retraining and monitoring shall be given adequate attention.*
- e) *Ensure IVMS is fitted into all project vehicles (SPDC & Contractors)*

## 7) Security.

General security situation in the Niger Delta may deteriorate during period of commissioning leading to reluctance of vendors/OEMs of critical equipment to send representatives for installation/commissioning activities leading to project delay and cost overrun

### Mitigation:

- a) *Full compliance with the corporate security plans for operating in the field.*
- b) *Critical equipment which requires Vendors/OEMs presence during commissioning have been identified and plans are in place to provide adequate security coverage for vendors reps before moving to site.*
- b) *Alternatives to physical participation of OEMs reps on site during commissioning are being considered.*



### Carbon management

There are basically two identified types of emissions into the air, on this project. The first is via leak of HC and the other via combustion. In normal operation, leaks from relief valves are routed to the flare and is infrequent. Another source of leaks could be flanges, however the right level of torquing will be applied to flanges to ensure that this does not occur.

Fuel fired engines shall be of low NO<sub>x</sub>, SO<sub>x</sub> and low burning to reduce the emission of GHG.

All liquid emissions shall be routed to the closed drain header and thence pumped back into the export system, to avoid contact with the environment. As much as possible, electric heaters shall be specified instead of fuel fired burners to mitigate the effect on the environment

### Corporate Structure and Governance

This existing corporate structure and governance arrangements of SPDC-JV with SPDC as operator still subsist for this investment.

### Group and Business Standards

There are no significant accounting and/or reporting risks or opportunities associated with this proposal. This proposal complies with Shell Group Business Principles, policies and standards. Functional support for this proposal is provided by Projects & Technology (P&T), Finance, Social Performance, Contracting & Procurement, HSE, Operations, Legal, Security, Treasury, Controllers and Tax functions.

### Project Management, Monitoring and Review

Project Assurance is in place for all work scope and management of change. This is a “P&T” executed project with P&T being accountable for the delivery of technical project integration and execution. A DRB with UI Nigeria and P&T participation is in place.

### Budget provision

The Eastern Domestic Gas Interim Project is in SPDC's OP14 with a 2015 budget provision of US\$25.5 Million, approved by JV Partners.

### Group financial reporting impact

There are no unusual accounting issues related to this GIP. Expenditure related to the project will be accounted for in line with Group Policy. The financial impact for project's full scope on Shell Group Financials is as indicated in the table below:

US\$ mln	2014	2015	2016	2017	Post 2017
<b>Total Commitment</b>	<b>5.5</b>	<b>6.0</b>	<b>13.5</b>	<b>10.2</b>	<b>11.8</b>
<b>Cash Flow</b>					
Capital expenditure	5.5	6.0	13.5	10.2	11.8
Cash Flow from Operations	0.8	1.8	11.0	57.3	45.1
Cash Surplus/(Deficit)	-4.7	-4.2	-2.5	35.3	33.4
<b>Profit and Loss</b>					
NIBIAT +/-	0.1	0.1	8.9	15.2	10.0
<b>Balance Sheet</b>					
Average Capital Employed	2.4	6.9	14.8	8.0	6.9

## Disclosure

Material disclosures, if any, will be done in line with the Group and SPDC Disclosure policies and guidelines.

## Financing

Shell share of the capital expenditure will be met by OU's own resources. Expenditure related to this project will be accounted for in line with Group Policy.

## Taxation

No other unusual taxation features.

## Key Parameters

The following are the main aspects of this proposal:

- Approval of further Shell Equity Investment of US\$ 47.0 million, MOD 50/50 (US\$ 156.5 million 100% JV) in support of the completion of the Eastern Domestic Gas Interim Project at Agbada 2.
- Previously, US\$ 62.9 million (Shell Equity) was approved on GIP 29.10.19.
- This and previous approved GIP bring the total Shell Equity Investment to US\$ 109.8 million (i.e. US\$ 366.0 million JV).

Supported by:

**For shareholder approval:**

.....  
**Erwin Nijssse (FUI/O)**

Date .../... /...

.....  
**Van de Leemput, Bart (UIO)**

Date .../.... /....

*Initiator: Mr Steve Oruerio (PTP/O/ND)*

# ATTACHMENT 1

## **Eastern Domestic Gas Interim Project – AGBADA NAG PROJECT PLAN**

Event Description	Planned Date BP07	Actual/ Forecast Date	Comment.
DG3 (Eastern Interim)	9 <sup>th</sup> April 2007	9 <sup>th</sup> April 2007	Actual
VAR4 Agbada	4 <sup>th</sup> Dec. 2007	4 <sup>th</sup> Dec. 2007	Actual
Pre-FID IP	30 <sup>th</sup> May 2008	26 <sup>st</sup> June 2008	Actual
Award NAG Plant Contract	31 <sup>st</sup> Mar. 2008	1 <sup>st</sup> Sept 2008	Actual
DG4	31 <sup>st</sup> Jan. 2008	13 <sup>th</sup> May 2008	Actual
FID (Agbada)	15 <sup>th</sup> Mar. 2008	29 <sup>th</sup> Oct 2009	Actual
1 <sup>st</sup> Gas (50/50 Date)	28 <sup>th</sup> Jun 2010	31 <sup>st</sup> Dec 2015	Proposed
Project OSD	28 <sup>th</sup> Jun 2010	13 <sup>th</sup> Oct 2017	Proposed