From: Bichsel, Matthias M. /777264
To: Darley, John J.
CC: Lohr, Fran F.A. /157182; Malouta, Dean D.N. /172958; WARD, BRIAN B.J.
BCC:
Sent Date: 2002-01-20 09:30:41.000
Received Date: 2002-01-20 10:41:57.000
Subject: FW: SHELL BRASIL TECHNOLOGY PLAN
Attachments: SBEP TechPlan final.doc

John,

see attached the technology plan for Shell Brazil. When browsing through it, you will note the emphasis on several key challenges that you have mentioned such as oil production of intermediate API crude and cluster development (=novel engineering concepts), but also further effort in hc prediction from seismic and drilling/operating in ever increasing waterdepths to allow us to monetize both the current as well as future discoveries within the time frame stipulated by the PSCs.

I would like to suggest that you spend some time on your February visit to Houston with the Brazil teams and Dean Malouta and his technology focal points to satisfy yourself that your requirements are met and concerns addressed. We realise that Brazil poses a huge challenge and we know we need to pull in all resources that we can to deliver BS-4 and other discoveries successfully.

We will include a summary of the plan into the Deepwater Business plan.

Regards,
Matthias

-----Original Message-----
From: Haney, John BRAZIL-UT
Sent: Friday, January 18, 2002 6:04 AM
To: Bichsel, Matthias SIEP-EPT-D
Subject: SHELL BRASIL TECHNOLOGY PLAN

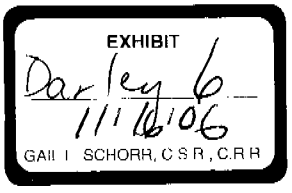
Matthias,

First of all, Happy New Year and congratulations on your new ExCom assignment!

I understand that you will be giving a deepwater presentation at the ExCom on Monday with one area being Technology. Attached for your information is the SBEP Technology Plan that we completed in December with SDS's assistance:

The first monthly meeting (which I will chair as the owner for this process) will be held at the end of January to ensure progress and management alignment.

Regards,
John
Asset & Agreements Director
Shell Brasil S.A.
Tel. 55-21-3984-7343
e-mail - John.Haney@shell.com.br



SHELL BRASIL EP

Technology Plan 2001

December 2001

SUMMARY

Summary

Shell Brasil E&P (SBEP) is an NVO based in Rio de Janeiro with technical support provided by SDS in Houston. It was staffed up between 1998 and 2000 as a division of Shell Brasil S.A., with the challenge of building a balanced deepwater portfolio. During the past year significant progress was made against this mandate. Current assets include exploration blocks (3 Shell operated and 4 non-Shell operated) and the Merluza field, operated by Petrobras. SBEP has concluded an initial nine well exploration program in the BC-10, BS-4 and BC-2 blocks resulting in five discoveries. Appraisal planning and evaluation of remaining exploration potential has started, and the Stena Tay drilling unit has been committed to remain in country to execute the extended drilling campaign.

Having achieved initial success we must move decisively to appraisal and development planning to achieve effective FID by August 2003, the license expiry date of our Round "0" blocks. The present SBEP deepwater portfolio consists of predominantly satellite sized discoveries and prospects with intermediate gravity oil. The successful development of these discoveries will depend on novel cluster development solutions and the application and progression of the Group's latest technologies. In addition to the deepwater oil portfolio, the Brazil focus has been extended to consider non-associated gas opportunities.

The SBEP technology plan has been developed to provide a framework for the technology effort required to mature the Brazil portfolio. The document describes the technology requirements and an implementation plan. Key themes are hydrocarbon prediction from seismic, intermediate API oil production, cluster development and pushing the deepwater envelope. The technology Plan will serve as a vehicle to raise awareness and will enable SBEP to apply new technologies ahead of the competition.

The document is intended for the SBEP and SDS-Brazil community and will be kept evergreen and updated with the latest Technology views and requirements as information comes available.

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INTRODUCTION

1. *Introduction*

SBEP has concluded an initial nine well exploration program in the BC-10, BS-4 and BC-2 blocks resulting in five discoveries. The NE discovery (in BS-4) is being pursued with hub development potential. The Curio (in BC-2) and A-west (in BC-10) discoveries also have development potential. The development potential of B-west and O discoveries in BC-10 is under review. The review will include joint development options with Petrobras BC-60 discoveries, technology application and optimization.

- An appraisal program is being developed and executed to mature and increase SBEP's reserves and significant efforts are required to prepare for the development phase.

1.1. *The Challenge*

Use existing portfolio to anchor the venture and reach FID by August 2003 for at least one commercial development in BC-10 or BS-4.

- Progress the technology to commercially develop the ultra deepwater opportunities.
- Develop techniques to unlock the large, intermediate and heavy gravity, hydrocarbon resource base.
- Create integrated EP&GP project solutions to support non-associated gas opportunities.

1.2. *Technology Achievements*

This section provides a brief overview of the technology achievements to date. The annual overview, which is part of the Business plan volume 2 submittal is included in attachment 5.1.

Strategic Technologies
We review at regular intervals the potential of strategic technologies (Expandables, Underbalanced drilling, 4 D seismic, Smart wells) in our business. SBEP has participated in the first phase of the Petrobras Underbalanced Drilling Joint Industry Project where simulators and applications were developed and tested. The initial phase has been promising and Petrobras is preparing a proposal for a next phase to further develop the technology.

Seismic Processing and Interpretation
SDS is using state of the art technologies in seismic processing and interpretation. Application of the latest techniques like fluid and lithology cubes for seismic interpretation, use of Cauldron-Strategem, full 3-D inversions and optical stacking have resulted in significant time savings and improved hydrocarbon identification.

Surface BOP
A concept screening study has been performed that demonstrates the feasibility of using the Surface Blow Out Preventer (SBOP) Concept to enable the use of a moored, 3rd generation semi-submersible drilling unit for development drilling offshore Brazil in 2000 m water depth in prevailing environmental conditions. Further detailed design and operability studies will be required before the Surface BOP systems can be deployed. The application of SBOP Technology can reduce the drilling and completion costs by 30% compared by to using a 5th generation semi-submersible drilling vessel.

INTRODUCTION

Intermediate Gravity Oil Production
A large element of the discovered volumes in Brazil is intermediate API oil. Integrated studies have been kicked off to identify options to enhance the viability of intermediate API oil production. These studies cover the full product cycle from reservoir engineering, drilling, processing up to product upgrade and marketing. Further detailed study work will be performed in 2002.

Novel Deepwater Systems
The ongoing NDS 1.1 Develop Remote Infrastructure system development has used Brazil conditions as its reference case. This means that Group wide development will be suitable for Brazil conditions and that the technology maturation timetable matches the planned Brazil development planning. The aim of this exercise is to reduce surface development costs by 30%.

1.3. The Way Forward

Realizing maximum value from the portfolio will require robust deepwater development concepts for 2000 to 3000m water depth. The key components to support this drive are:

Organisation
The Rio organisation requires reconfiguring to strengthen asset management capacity, prepare for production operations and support a sustainable EP business in Brazil. In addition, the SBEP and SDS teams must be strengthened in the areas of exploratory appraisal and development planning to meet the tight timeline set by license expiry in August 2003.

Exploration and Appraisal
Effective execution and full completion of our appraisal program. Deepwater exploration successes need to be rapidly followed-up through appraisal and potentially extended well testing.

Upgrade the Regional Database
The current seismic database and regional V2V studies lack sufficient resolution to support optimum evaluation of current assets and the active management of this increasingly important EP portfolio. A Brazil Regional study will be completed Q1 2002, which will enable SBEP to properly evaluate new opportunities and actively manage the portfolio.

Focus on Technology
Maturing the development opportunities in BC10 and BS4, full acceleration in BM-C-10 (which straddles 3000m) and the development of innovative techniques to "make intermediate gravity oil work" underpin the success case . This will require additional input and investment in 2001 to the Group Technology program. SBEP will take a higher profile in deepwater technology development and implementation to ensure its business needs will be met. The SBEP Technology Plan has been developed to provide SBEP with a process to manage the technical challenge.

Non-Associated Gas
SBEP will support the Southern Cone Gas business by identifying offshore gas opportunities and pursuing these depending on overall economics and gas strategy fit.

TECHNOLOGY PLANNING PROCESS

2. Technology Planning Process

The SBEP organization has been structured on a global staffing model, with minimum staffing in Brazil and with the technical work carried out by SDS, based in Houston. These technical activities are executed in numerous locations (e.g. Houston, New Orleans, Rijswijk).

A monthly technology management meeting will be held to coordinate and monitor the progress of the technical studies. SBEP-UT is responsible for the coordination and will include the relevant study focal points in the meetings as required. A Technical Issues Register will be maintained to capture the issues and current status.

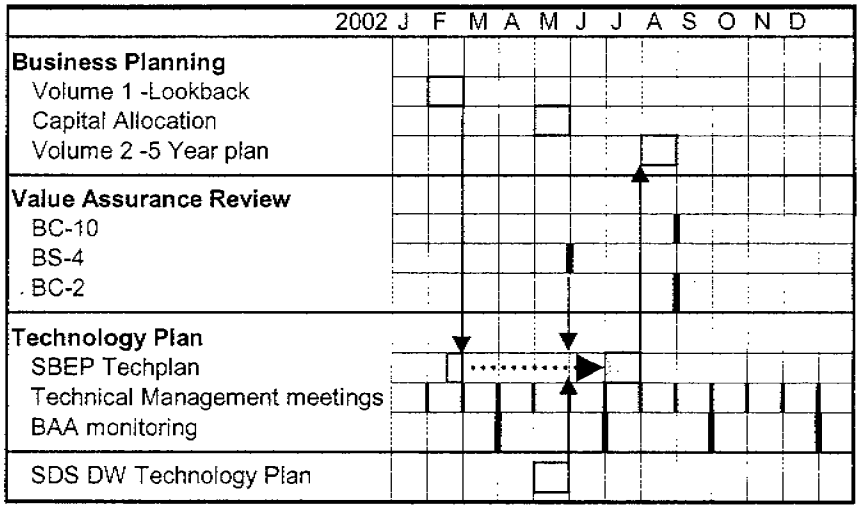
The Technology Plan will be updated annually in August, prior to the Business Plan Volume 2. The Technology plan schedule and interaction with various planning and review activities is shown in the Technology Plan Schedule Figure.

2.1. Administration

SDS Strategic Contract

Shell Deepwater Services (SDS) is service provider and accountable to Shell Brazil for all technical work (process, quality, peer review, link to new technologies and global knowledge) according to annually renewed or call-off CTR's. SDS will provide requested technical support to business and planning processes, as well as provision of technical advice to Shell Brazil when required. SDS will act as "Project Execution Manager" for the agreed scope of work, with the SDS Brazil team being a "virtual" department for Shell Brazil, thus delivering work in line with Group and Partnership budgets. SDS will have audit verified business controls including HSE-MS to carry out this role.

Technology Plan Schedule



SBEP will monitor current activity in Brazil and Brazilian industry capabilities and will update SDS on this to increase the SDS knowledge base. SDS will provide technical support as requested to enable Shell Brazil to fulfill these responsibilities.

SIEP Service Agreement

Shell Brazil operates as a Shell Operating unit of SIEP under two service agreements. The Non-technical services agreement which includes all Shell Deepwater Services is a tax efficient method for cost recovery. The technical service agreement includes SEPTAR R&D and other direct charges is still awaiting finalisation by local authorities, and involves payment via an annual license fee, currently of US$ 1million/year. Brazilian tax law is not conducive to cost-sharing concepts.

TECHNOLOGY PLANNING PROCESS

Technology Framework & Group Level Management Process
Attachment 5.2. provides an overview of the Shell Group Technology Management Process with its key processes and actors. This includes the role of the Business Interface Manager.

Role of Business Interface Management (BIM)
The BIM unit plays a key role in representing the customer interests in STEP. The team ensures that STEP's portfolio of products and services satisfy customer needs in an effective manner and that the customer perspective is included in the identification, development and implementation of new, high added value technology. The team plays a key role in executing and supporting the Technology Strategy and Planning (TSP) process and forms part of the SepTAR leadership.

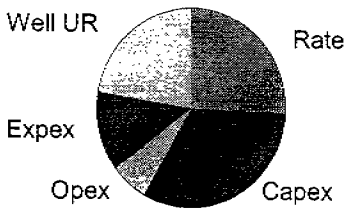
The BIM for Shell Brazil is currently used on an ad hoc basis to resolve technology issues and questions on behalf of Shell Brazil. A more formal contract for BIM services will be arranged during Q1 2002.

2.2. Business toTechnology Mapping

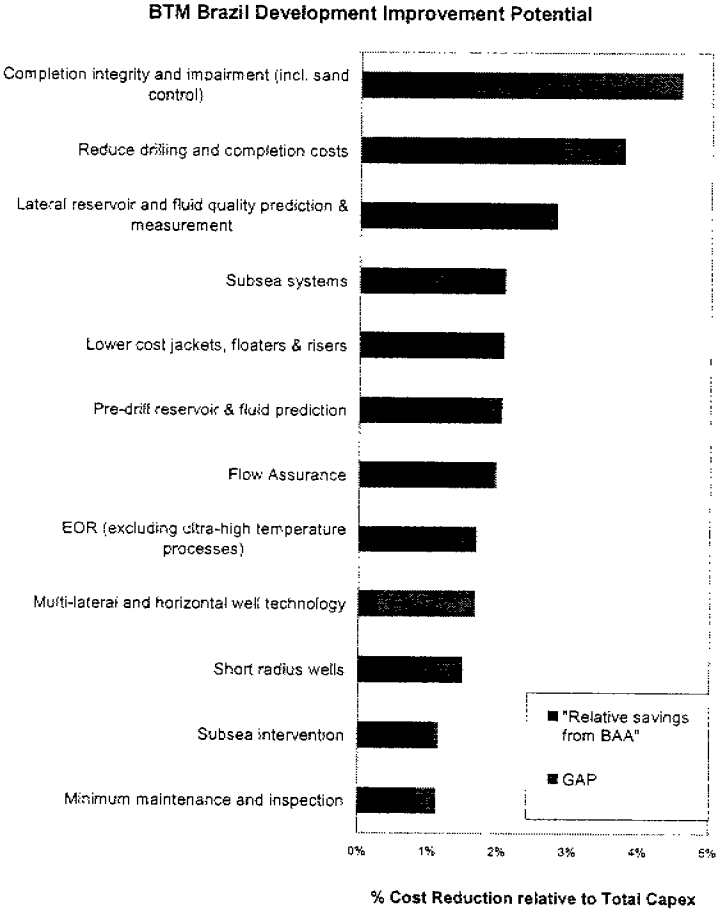
The Business to Technology Mapping (BTM) process is adopted by SBEP. The recommendations of an initial high level BTM have been incorporated in The Technical Issues Register.

A 2001 BTM, with members of the SDS-Brazil team and representation from BTM-ROV team, has evaluated the potential benefits of the Group's Novel Technology Drive. In addition, the BTM-ROV team has assessed the value contributions of the relevant technologies and provided an estimate for the potential savings for each . The pie-chart shows the relative contributions in the key value areas.

Relative Value Contribution



The Tornado diagram shows the Technology Target areas ranked according to value contribution. The blue elements are deliverables of the Shell Technology Development activities whilst the red reflect a gap between SBEP needs and identified Technology Development.



TECHNOLOGY PLANNING PROCESS

2.3. *Business Alignment Areas*

The Group has developed and maintains a Technology Development Plan (TDP), which maximizes the potential value that R&D can bring to the global EP business by concentrating both STEP and agreed OU resources on achieving a limited number of potentially high impact objectives in the coming 3 to 5 (or more) years. These objectives are organized in Business Alignment Areas (BAA) which are fully integrated with operating unit needs and current EP strategic themes and strategy elements. The various BAA´s must have targets that are specific, measurable, attainable, relevant and time-bound. This very important for life cycle planning and funding.

SBEP is involved with various BAA´s, and is a Lead Implementer for: Prospect Analysis for NAS, Turbidite Systems, and Novel Deepwater Systems. SBEP has preliminary assigned focal points to participate and monitor the progress of the relevant technology developments. In 2002, we will strengthen our participation and representation in the relevant BAA core teams and get more involved with a larger selection of applicable BAA activities in support of the effort to reach FID by August 2003.

Attachment 5.3 contains an overview of the BAA 2001 focus areas, the BAA leaders and the SBEP preliminary focal points. Attachment 5.4 contains an overview of the roles of various OU's for the various BAA's. .

2.4. *External Activities*

Petrobras Technology Exchange

Recognising that Petrobras (PB) and Shell are key deepwater players, at least in respect to development experience, a study was initiated to assess potential areas of technological co-operation. For Shell, key drivers are firstly a desire to enhance Shell's EP success in Brazil, in both exploration and development, by accessing PB´s wealth of data and experiences, and secondly a more general wish to seek to identify areas where Shell's deepwater technology strengths and weaknesses are complimentary to those of Petrobras and where a co-operative effort might be beneficial to both. PB´s partnering strategy is noted, i.e. to seek "a partner complementary in terms of strategy and competencies, in addition to closely aligned interests" (Camargo, 2000).

Key to the increase in hydrocarbon production strategy of PB are the various PROCAP initiatives, which seek to allow commercialisation of the substantial (ultra)deepwater reserves already available to PB. The initiatives, effectively 5-year plans, have focussed on ever greater water depths, with the latest addressing water depths up to 3000 metres, and seeking to reduce UDCs to some $2.8/barrel by 2005. Critically, a recent focus has been on containing costs of technological development.

STEP has designated a PB Global Focal Point, SIEP-EPT-DE, who is responsible for the PB engagement plan.

Research in Brazil

The SBEP concessions have an obligation to spend up to 1% of project revenues on research in Brazil. A proposal will need to be developed for converting the future budget into local research.

Local Technology Capabilities

For the successful execution of deepwater projects in Brazil, significant effort will need to be directed towards the maturation of

the local offshore industry. SBEP-UB is responsible for the assessment of the local vendor capabilities, as well as engaging the industry in developing a process to enable the support and execution of major elements of future development projects in Brazil. A flow diagram for the process has been included in attachment 5.5.

2.5. Joint Industry Projects

Deepstar JIP
A large multi-company JIP has been created, which plans and funds a wide range of technology projects focused on Deepwater Development. The JIP is a managed by Chevron-Texaco.

There have been a number of direct benefits to Shell by actively pursuing this work:

- Competitive intelligence. We have gathered a huge amount of data on what the industry considers to be the main systems/ technology prizes to pursue.
- It confirmed that we are working many issues that the industry also values, and gives us a real sense as to our relative position as a "leader" or "follower".
- It has given us a way to influence the DeepStar proposals. These are geared toward providing us with full systems (i.e. what would it take to progress a TLP to 10,000').
- It has identified high value items -- from an operator's perspective -- that may place a higher value on MMS approval.
- The Deepstar Process maps (in detail) all the technologies required for a full chain of functions to work together to deliver a system. Therefore it allows us to better understand all components of a system, the interdependencies, and the industry perceived relative maturity.

Underbalanced Drilling JIP
Shell Brasil participated in the first part of the Petrobras' Underbalance Drilling JIP where simulators (software) as well an instrumented separator were developed. A field test was performed using a semi-submersible Petrobras XVII and a real well.
The second part of the JIP will focus on the use of the light drilling fluid for ultra-deep water to avoid loss of circulation due to a low fracture gradient. The idea is to use a casing inside the riser and Nitrogen-gas-lift to lower the fluid density. Shell Brasil is waiting for this new proposal to decide if will participate in this part or not.

Metocean JIP
The only useful information that Shell presently has concerning ocean currents offshore Brasil is based on a study carried out for Albacora Leste. The design criteria were developed from a one year program in 2000 meter water depth and a second one year program in 650 meter water just south of Albacora Leste. The study has extrapolated the data from these studies to generate extreme design conditions up to a 100 year return period. Shell does not have access to any of this data, only the statistics included in the report. It is therefore not possible to perform any further analysis.

Shell Brasil will require reliable metocean data to support and optimize the design the future development options of our deepwater portfolio. The absence of metocean data may result in increased development costs and/or lost opportunities for Shell Brasil. In addition to dedicated metocean projects, SBEP will consider JIP opportunities as raised by the University of Sao Paulo, or possible purchase of data from Petrobras.

TECHNOLOGY PLANNING PROCESS

2.6. *Technology Gaps and Focus Areas*

The business to technology mapping has provided an overview of the technology needs for Shell Brasil EP. The BAA, JIP, Universities, etc. have been reviewed as a potential resources to satisfy our Technology needs.

Technology Focus Areas

Key technology themes and focus areas were derived from the BTM and further work and an overview is provided below:

SBEP Technology 2001 - 2002

	Technology Themes	*Technology Focus*
Exploration	Hydrocarbon prediction from seismic	Regional Play developments. Advanced seismic imaging, Direct Hydrocarbon Indicators (DHI), Qualitative analyses including Avo inversion, 4D baseline survey before development.
Development	Deliver promises on development projects	Applying technology to the limit: C2V, DtL, V2V
	Intermediate API oil	Production testing, EOR, completion integrity, sand control, processing and product enhancing
	Cluster development	Novel deepwater systems, Subsea multiphase boosting, Metocean data, SBOP drilling, Multilateral and horizontal wells, short radius wells, minimum intervention completions
	Push the deepwater envelope	Production testing, ultra deep drilling and subsea systems

3. Technology Application

This section deals with the 2002 - 2003 technical services and technology development items. A mapping of the Technology activities to each of our blocks and opportunities is presented in attachment 5.6. A detailed Technology Issues Register is inserted in attachment 5.7. It captures the issues, the identified action and the required completion date and status. SBEP-UT will be responsible for the Technology Issues Register.

3.1. 2001+ Program

The technical solutions for an early investment decision will require optimization of present technologies rather than breakthrough technology initiatives. Due to the challenging environment, such as (ultra)deepwater and low oil gravity, a number of performance improvements are required to provide a robust development scenario.

Key short term technology issues are briefly discussed below.

Hydrocarbon Prediction from Seismic
Results from the exploration campaign to date have shown that amplitudes are useful in predicting hydrocarbon occurrences. More so than anticipated when the Venture began. However, the amplitudes are subtle and, further development of the analyses techniques is required to enable the identification of deeper objectives.

Intermediate Gravity Oil
The Campos basin is expected to yield 16 to 24 API oil finds, and there is a huge already discovered resource base of currently non-commercial < 15 API oil. Increasing recovery efficiency and ultimate recovery per well will have a large commercial impact.

An integrated Brazil intermediate viscous crude strategy is currently being developed, which will outline the path forward on how to successfully leverage this huge resource base. Evaluation of evolving EOR techniques have shown considerable potential and will be actively studied in 2002.

Clusters – Viable Cluster-Type Developments
SBEP is actively engaging with the Novel Development Systems projects aimed at defining deepwater cluster development concepts at 30% less cost. Most promising near term NDS1.1 technologies appear to be:

- Application of single electrically heated Pipe in Pipe (PiP) flowlines to overcome possible flow assurance items and avoid the requirement for operational pigging.
- Use of subsea multiphase boosting downstream production manifolds to enhance system availability relative to application of ESP's in individual well bores.
- Integration of FPSO hull / Topsides design (e.g. accommodation to be part of Topsides).
- New simplified and lighter Topsides system design based on existing building blocks and as a next phase the application of novel processing technologies.

In addition, we have initiated a feasibility study on the application of surface BOP in our blocks, with the potential of a 30% reduction in drilling costs.

Ultra Deepwater
Our blocks range in water depths from 900 to 3200 m, and realising maximum value from the ultra-deepwater areas (e.g. BMC-10) will require extending current limits on drilling and sub-sea developments. SBEP therefore supports SDS efforts in these areas.

Key surface facilities technology barriers are the installation capability of flowlines and risers (especially Pipe in Pipe) in ultradeep water. Other issues are:

- The requirement for synthetic mooring or dynamic positioning of FPSO's and floating platforms.
- Mitigate costs escalation due to increased water depths.
- Match ultradeep water technologies maturation plans with anticipated project timelines.
- Gather Metocean and seabed data to understand deepwater environment and currents offshore Brazil.

Deepwater Drilling
SBEP will need to ensure the following technology is state of the art for maturation of the SBEP portfolio:

- (Identified) upgrades to the Stena Tay drilling rig such as increased riser / (tension) capacity.
- Sufficient planning time (ca 12 months) to address world record ultradeep issues, rig upgrade, potential for shallow hazards .
- Surface BOP Analysis
  - Riser technology, wear analysis, metocean data
  - Anchoring / station keeping, suction anchors, VLA's, polyester lines
  - SBOP quick disconnect device.

- Well Bore
  - UBD with a surface BOP (gas lift riser)
  - Expandables tubulars (due to smaller riser, wellhead, etc)
  - ESS-sand control
  - 13 5/8" wellhead + drillthrough X-mas tree
  - Mud technology if high angle wells required
  - Drill in casing
  - Log whilst casing thru the bit
- Testing
  - Unconsolidated sand GP's, DP considerations, artificial lift, ESP's
- Production
  - Corrosion, flow asurance (15 deg API crude possible)
  - Smart wells zonal isolation
  - No interventions, high integrity wells (NASA QA/QC & technology), Control lineless telemetry data transmission, control DH tools
  - On line continuous measurement of DH flow parameters

3.2. Global Implementation of Strategic Technologies

- Expandable Tubulars
- Smart Wells
- Underbalanced Drilling
- Time Lapse Reservoir Monitoring

We review at regular intervals the potential of strategic technologies (Expandables, Underbalanced drilling, 4 D seismic, Smart wells) in our business.

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ATTACHMENTS

5. Attachments

5.1. Technology Achievements

5.2. Group Technology Process

5.3. List of BAA Leaders and Brazil Focal Points

5.4. List Implementation OU Table

5.5. Local Content Work Flow

5.6. Technologies Activities Mapping

5.7. Technology Issues Register

Attachment 5.1. Technology Achievements

ATTACHMENTS

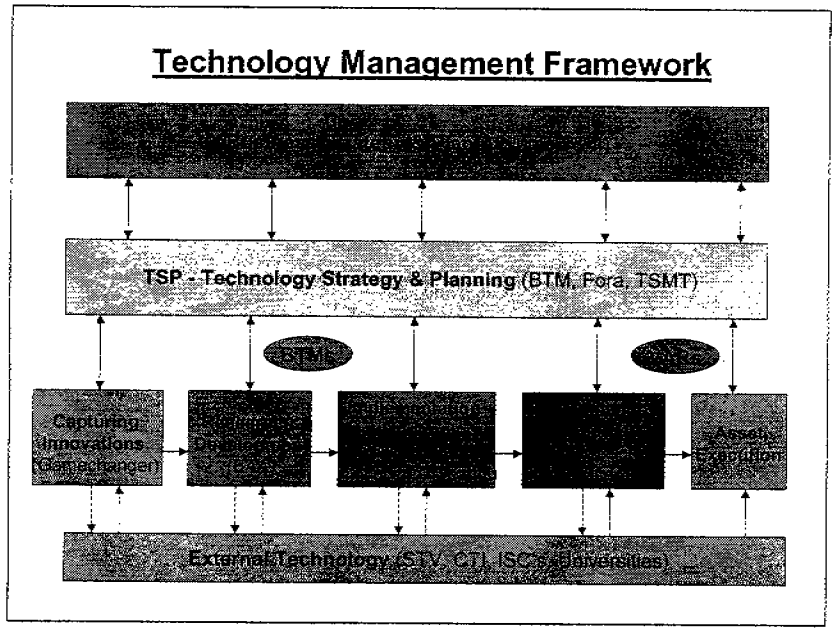
Technology

TECHNOLOGY	Cost Reduction ($mln.)		Turn Around Time Reduction (Months)		Production Increase (mln. BOE/year)		Reserves Increase (mln. BOE)	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Creation of fluid and lithology cubes for seismic interpretation(Block BC-10)			4	3				
Creation of fluid and lithology cubes for seismic interpretation(Block BS-4)			4	3				
Use of Cauldron-Strategem on Campos and Santos Basins (BC10, BS-4,)			12	9				
Full 3-D inversion and seismic modelling (BC-10)			4	3				
Full 3-D inversion and seismic modelling (BS-4)			4	3				
Optical stacking of seismic (BC-10)			1	1				
Optical stacking of seismic (BS-4)			1	1				
DtL 1-Shel-1-ESS and 2	3,70	2,50						
Drilling PIPs	0,4	0,4						
Swedged casing on 1-Shel-1-ESS	0,8	0,8						
Shallow water flow evaluation for ES-1	-0,8	0						
Reservoir modelling (DepSim - Seismic model)			4	3				
Use of LWD Sonic Caliper to determine borehole stability	0	0						
Brasil Deepwater MDT success with less than 17 API oil	-5	0						
Play to Prospect for regional Campos and Santos Exploration scoping			4	3				

ATTACHMENTS

Attachment 5.2. Group Technology Process

The general technology framework for E&P and basic technology planning and management process can be summarized in the following illustration:



A number of the global technology sub-processes have been newly developed or updated during 2000 – including many of those noted above.

The Tech Strategy Process (TSP) determines the technologies that should be researched and how individual projects or a portfolio of projects can be managed for value over time. The process allows gauging, from very early on, the real value to the business innovative ideas as they move through the research and development cycle to implementation. It provides a clear value-link between technology and the global EP business through:

- Enabling integrated EP business and technology planning.
- Focusing resources on the highest value technology solutions for the global EP business.
- Using the generation and valuation of alternative project futures as a project management tool.
- Forcing clear in-house development, strategic partnership, commercialize, and buy decisions, and
- Knowing the value of the R&D for all stakeholders.

The two main outcomes from this process are:

- An ability to identify the technology research areas that will bring maximum value to each OU and the global EP business some 3 to 5 (or more) years from now.
- A best-practice means of value-managing a balanced and dynamic portfolio of revolutionary and evolutionary research projects over their R&D life cycle from idea generation to technology implementation.

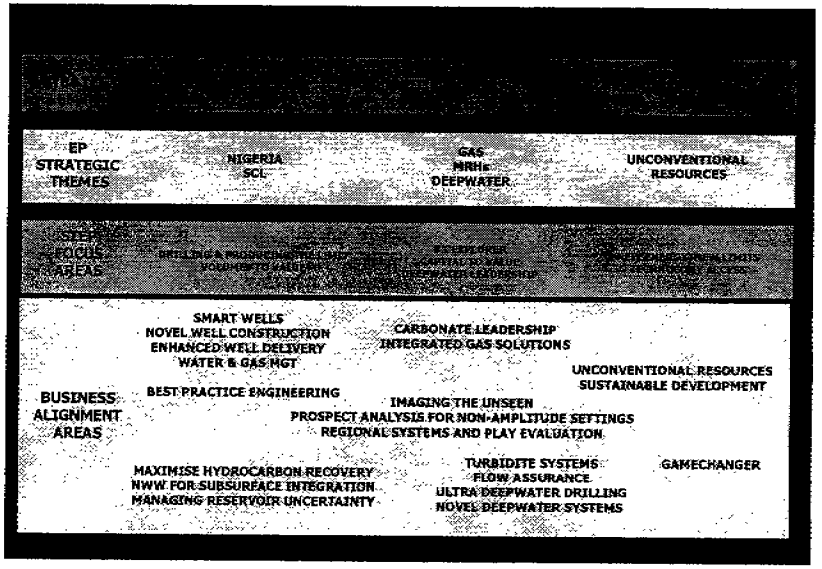
Both outcomes contribute markedly to one of the key EP enabling strategies of differentiating Shell 's global EP business through the development and effective deployment of unique value-adding technology.

ATTACHMENTS

A collaborative process is used with OUs to formulate and execute the technology development plan according to 'Third Generation R&D ' Principles including customer-defined business value propositions and clear business & customer focus. Following the establishment of the Business Strategy, the first phase of the TSP is a collaborative process for called Business Technology Mapping (BTM). BTM is conducted with each OU and forms the base for the Technology Development Plan.

The Technology Development Plan (TDP) improves focus and delivers more value at the same level of investment. It also completes the value creation loop between technology-needs analysis, management of technology development projects, and the implementation of solutions. The Technology Development Plan (TDP) maximizes the potential value that R&D can bring to the global EP business by concentrating both STEP and agreed OU resources on achieving a limited number of potentially high impact objectives in the coming 3 to 5 (or more) years.

These objectives are fully aligned with operating unit needs and current EP strategic themes and strategy elements. (See Chart Below – BAA is Business Alignment Area). Commitment to them requires disciplined human and financial resource allocation both in STEP and the OUs.



Achievement of the TDP and the project objectives will differentiate us from the competition and enhance the value of the EP business. STEP and OU representatives together bring focus to the TDP through:

- Technology focus areas aligned with EP strategic themes and strategy elements.
- Value-ranking of OU technical needs from Business-to-Technology (BTM) mapping.
- Setting of 'Moonshot' or 'Tomorrow's Limit' targets.
- Planning for the technology life cycle from idea generation to implementation.
- Making Lead/Partner/Follow choices based on rigorous competitive intelligence.

ATTACHMENTS

- Making Business Alignment Area (BAA) leaders and core teams accountable for delivery, utilizing a flexible project management approach.
- Having 'Lead Implementer 'and 'Fast Follower' Operating Units commit to an implementation plan and funding. No technology plan will be initiated unless there is a clear agreement with customers on the lead implementation OU, the site, and the resulting implementation plan. Lead Implementer OU's have a clear resource and planning commitment to support first implementations of developed technologies.

Key enablers for the TDP include:

- STEP and OUs working together towards common goals' is a basic tenet of the process from planning through execution to implementation.
- Total funding and split across focus areas is pre-defined.
- Keyed-share funding of the total plan (allowing technology practitioners to focus their attention on program content).

The TSP collaborative process includes actively managing the projects and the TDP. Although having a well-structured plan in place is the starting point for a value-adding R&D program. During execution of the TDP, it will be exposed to and must respond to unexpected opportunities. Thus projects within the R&D program must be managed to add maximum value over their full life cycle from idea generation to technology implementation. The same applies to the total R&D portfolio. It can be managed for maximum value both within and across focus areas and, if necessary, re-focusing on opportunities arising from any strategic re-direction.

The various BAAs must have targets that are specific, measurable, attainable, relevant and time-bound. This is very important for life cycle planning and funding. The technology management process must be able to determine when a project has been completed so that resources can be moved to the next project. Continuity of funding for projects that are on track is highly desirable - fuzziness in targets that encourages project longevity is not. Having clear objectives that require technology breakthroughs leads directly to life cycle planning of R&D. Life cycle planning is an important enabler to fast value extraction and closely binds R&D activities with OU business planning. This means developing a plan to achieve project objectives from idea generation through to implementation in the OUs - a staircase of activities over time leading to achieving the objective.

Pursuing a project staircase requires multi-year funding, resourcing and implementation planning. However, base case plans are subject to challenge and change. Also, we do not have to wait for the final deliverable for the R&D program to generate value. Intermediate deliverables can be effectively deployed and supported by a technical service delivery program. Often, technology spin-offs can open up unexpected major opportunities.

The effective management of R&D projects through their life cycle requires a degree of flexibility with regard to project content and funding allocation. This demands a structured approach to decision-making on both of these aspects. Effective milestone reviews and periodic status reporting ensure that all aspects of the project and its possible futures are discussed and challenged regularly from its earliest days through to its termination or implementation. An efficient and effective milestone review procedure provides an opportunity for BAA core teams to act on real options throughout the BAA R&D life-cycle with respect to important aspects:

ATTACHMENTS

- Competitive positioning and in-house development versus external acquisition of technology.
- Investment level e.g. spend-up, spend-down, maintain or terminate.
- Intellectual property (IP) management.
- Implementation plans.
- Commercialization potential.

A BAA program is made more valuable during its execution by the development and valuation of various alternatives for that BAA's future. This is a form of option analysis that allows the evaluation of investments at successive stages of a BAA's life cycle. By requiring BAA Core Teams (consisting of the SEPTAR BAA Leader and key technical leaders from lead implementation or fast follower OU's) think through the options at each milestone under different funding levels, innovative processes and procedures such as GameChanger are promoted throughout the BAA's life cycle. Valuation of the various options provides a ranking and resource allocation tool. BAA core teams bring together representatives of the various stakeholders in the technology management chain to take part in these milestone reviews. Depending on the level of review, they can draw on STEP Business Unit Vice Presidents, BAA leaders and key research staff, Lead Implementer and Fast Follower OU staff, TSMT members, the Global Fora members, the iP Committee, the GameChanger panel, Shell Technology Ventures and Shell Global Solutions. Independent challenge from appropriate third parties will be used as appropriate to further add value to this process. The value-driven management process at the BAA level will be expanded to manage focus area content and funding and the total R&D portfolio.

Technology Strategy Management Team

A major enabler in collaborative technology management is the Technology Strategy Management Team (TSMT). This is an advisory body of senior OU technology users and managers that provides strategic steer to Shell Technology EP (STEP). The roles and objectives of the TSMT are to:

- Promote a shared vision and whole system alignment.
- Recommend technology strategy including budget levels and technical content/balance. Advise on technology business framework to promote rapid implementation and to deliver solutions.
- Ensure that there is a demonstrable process to measure the estimated value of technology investment
- Contribute to continuous improvement of the Technology Strategy &Planning (TSP) process.
- Make recommendations to optimally deploy technology and competencies required to achieve this.
- Ensure the views of non-represented OUs are considered in forming the TSMT view

Business Interface Manager

Business Interface Manager (BIM): SEPTAR has number of Business Interface Managers who are generally each assigned to a specific large OU or region. They coordinate & execute technology related activities focused on addressing the technical needs of their OU. In particular they are responsible of executing the TSP (including the BTM and technology implementation) in their OU as well as high level tech transfer and coordination with STEP. They meet as a group to support and help develop high level strategy & planning on a global basis.

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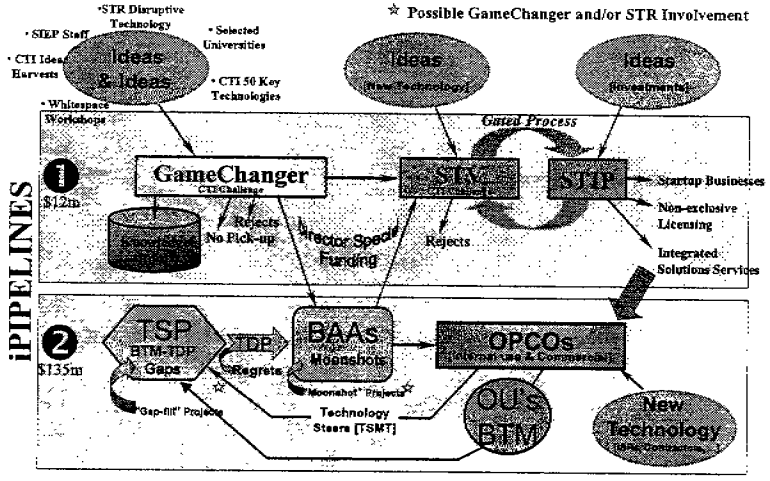
GameChanger

The GameChanger Process is the process whereby game-changing ideas are captured, nurtured and matured, until they are ready to be picked up in the mainstream of EPT's technology development activities. Ideas may come in at any time, from anywhere and from anyone. The process is based on speed; it typically takes less than a month to obtain funding for an innovative proposal. In practice, GameChanger is funding revolutionary projects until either a proof of concept has been reached or it is clear that the idea is not (yet) feasible. The proof of concept lowers the risk for further investment and hence facilitates take-up of these projects by OUs into their evolutionary R&D portfolio. This GameChanger Process is supported by the SIEP-RTS GameChanger Panel. The GameChanger process and the TSP are depicted on the figures below referred to as "iPipelines".

2001 E&P Technology iPipeline



GameChangers are ideas whose implementation in the business have the potential to effect a quantum improvement in the profitability of the business, or which open up opportunities for growth. They contain a novel perspective on a problem, a new source of information, a new product or a new vision.

Two types of GameChanger are recognized:

1. *new technology* that may open up paths to new high-impact opportunities ("solutions begging for implementation")
2. *new visions*, that will significantly impact the EP business but which require innovative solutions ("opportunities begging for solutions")

In one year, many concepts should mature to a stage that OUs should be interested in taking-up these projects as part of the TDP or their own implementation.

Business to Technology Mapping

The BTM process has the following key characteristics:

- A clear link between business drivers / aspirations to technical problems and potential solutions
- Realistic valuations of technology needs, which helps to drive technology implementation, hence asset value.
- Consistent and transparent valuation across the Group.
- Improves communication and raises awareness of possible solutions for OU asset staff.

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It provides the following benefits for SBEP and STEP.

- Seamless business and technology planning - raising technology profile, Asset NPV and R&D accountability.
- Focus technology implementation and provides a forum to identify and implement external R&D.
- BAA workshops may dissipate to once every two years and R&D is given stability.
- Focus time and money on the highest value technologies / technical challenges for SBEP and the global business.
- Transparency, consistency and improved communication.
- Helps to identify skills requirements.
- Provides a forum to challenge and benchmark.

ATTACHMENTS

Attachment 5.3. List of BAA Leaders and Brazil Focal Points

BAA	BAA Leader	Brazil Focal Point
Drilling and Producing the Limit (DPtL)		
Smart Well Solutions	Mark Anderson	Thor Lovoll
Novel Well Construction	Bruce Stewart	Thor Lovoll
Well Systems Productivity	Arthur Hale	Thor Lovoll
Water to Value	Zara Khatib	
Volume to Value (VtV)		
Carbonate Leadership	Manuel Willemse	TBA
Maximize Hydrocarbon Recovery	Mark Shannon	Sam Whitney
NWW for Subsurface Integration	Adam Lomas	Mike Costello
Managing Reservoir Uncertainty	Herb Yuan	Chris Wojcik
	Hans Potters	
Number One Explorer (#1Ex)		
Imaging the Unseen	Chris Corcoran	TBA
Prospect Analysis for NAS	Melvyn Giles	TBA
Play to Prospect	John Bickley	TBA
Capital to Value (C2V)		
Smart Facilities Solutions	Michiel Jansen	John Minnee
Integrated Gas Solutions	John Hurst	John Minnee
Deepwater Leadership (DWL)		
Turbidite Systems	Melvyn Giles	
Flow Assurance	Alan Leitko	Jeff Sieler
		Susan Lorimer
Novel Deepwater Systems	John Pelletier	John Haney
Ultra Deepwater Drilling	Chris Hakulin	Chris Hakulin
New Energy/New Limits (NENL)		
Unconventional Resources	Claudia Hackbarth	
Sustainable Development	Wolf Heidug	Ben Hillier
Global Implementation of Strategic Technologies (GIM)		
Expandable Tubulars	John Dewar	TBA
Smart Wells	Pieter Kapteijn	TBA
		Piet van Maastrigt
Underbalanced Drilling	Brian Truelove	
Time Lapse Reservoir Monitoring	Hans de Waal	
Integrated Services		
Technology Development Support		
Gamechanger	Ben van den Brule	
Competitive Technical Intelligence	Christiaan Luca	
Technology Stategy and Planning	Keith Eastwood	
Contractor Relationships	Jerry Vertal	

ATTACHMENTS

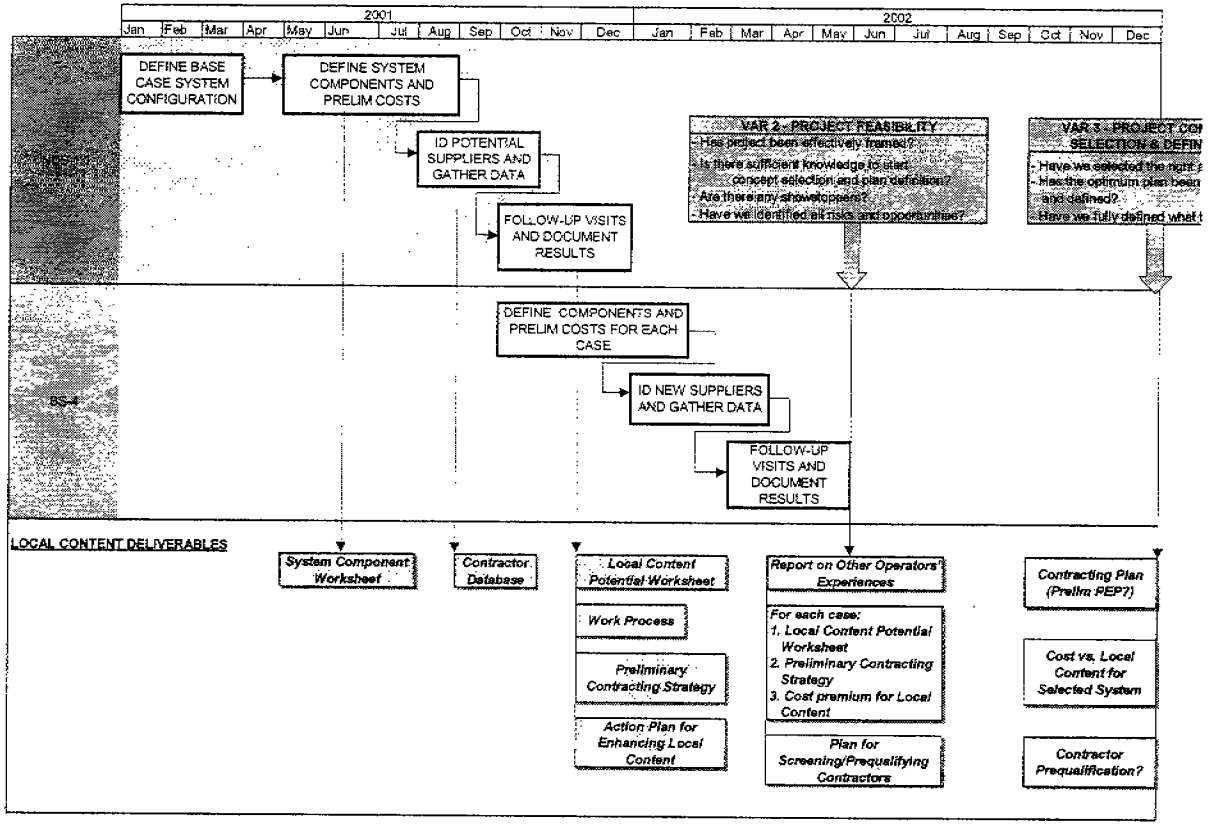
Attachment 5.4. Lead Implementation OU Table

FA	Business Alignment Area	SCAN	BEB	SENV	SPDC	SNEPCO	NSEP	PDO	SSPD	Expro	SEPCO	SBEP	SVSA	BSP
DPTL	Smart Wells		FF		LI	FF		LI			M			LI
	Novel Well Construction							LI	FF	LI / FF	LI / FF			
	Enhanced Well Delivery						LI / FF	S	FF	LI / FF	LI / FF		FF	
	Water and Gas Management						LI / FF	S	LI / S	LI / FF	M			
V2V	Carbonate Leadership	FF						LI	FF		M			
	Maximise Hydrocarbon Recovery				LI			LI	LI	LI / FF	LI / FF			
	NWW for Subsurface Integration				FF		LI / FF	LI		LI / FF	LI / FF			
	Managing Reservoir Uncertainty				FF		LI / FF	S		LI / FF	LI			
#1 EX	Imaging the Unseen	FF		FF				LI		LI / FF	LI			
	Prospect Analysis for NAS						LI / FF	S			LI	LI		
	Regional Systems and Play Evaluation				LI		LI / FF	S		LI / FF	M			
										LI / FF				
C2V	Best Practice Engineering					FF	LI / FF	S		LI / FF	M			
	Integrated Gas Solutions							S						
DWL	Turbidite Systems						LI / FF				LI	LI		
	Flow Assurance				FF					LI / FF	LI		LI	
	Ultra Deepwater Drilling					FF					LI			
	Novel Deepwater Systems					FF	LI / FF				LI	LI		
NENL	Unconventional Resources	LI									LI			
	Sustainable development				FF		LI / FF	S		LI / FF	M			

LI Lead Implementer
FF Fast Follower
M Monitor
S Secondary

ATTACHMENTS

Attachment 5.5. Local Content Work Flow



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Attachment 5.6. Technology Activities Mapping

SBEP 2001 - 2002 Technology Activities "DRAFT"

	Technology Application																																			
	Strategic Technology										Drilling & Producing the Limit				Volume to Value				#1 Explorer			Capital to Value		Deepwater Leadership				New Energy		Technology Devt Support			
	Low Cost Wells and Development					Hydrocarbon Prediction		Make Heavy Oil Work																												
	SDDP, Punch n Go	NDS	Underbalanced Drilling, Expanded Tubulars, etc	High Rate and Ultimate (multilateral, Horz, etc) completion and well optimisation	Smart Wells	Quantitative Amplitude evaluation and the Grey Zone	Imaging the Unseen	Aumor Team and Improved Recovery	Improved completion, lift and systems performance	4D Seismic	Smart Well Solutions	Novel Well Construction	Well Systems Productivity	Water to Value	Carbonate Leadership	Maximize Hydrocarbon Recovery	NWW for Subsurface Integration	Managing Reservoir Uncertainty	Imaging the Unseen	Prospect Analysis for NAS	Play to Prospect	Smart Facilities Solutions	Integrated Gas Solutions	Turbidite Systems	Flow Assurance	Novel Deepwater Systems	Ultra Deepwater Drilling	Unconventional Resources	Sustainable Development	Gamechanger	Competitive Technical Intelligence	Technology Strategy and Planning	Contractor Relationships
Brazil general																												x		x	x	x		
BC-10			x		x						x	x	x			x	x	x				x			x	x		x		x	x	x		
BS-4			x		x						x	x	x			x	x	x				x			x	x		x		x	x	x		
BMC-10			x		x					x	x	x	x			x	x	x	x	x	x	x			x	x	x		x		x	x	x		
BC-2			x		x						x	x	x			x	x	x				x			x	x		x		x	x	x		
BMS-8			x		x						x	x	x			x	x	x	x	x	x	x			x	x		x		x	x	x		
FZA-1			x		x					x	x	x	x			x	x	x	x	x	x	x			x	x		x		x	x	x		
Peroa Cangoa																x	x	x					x					x		x	x	x		
Merluzo																							x					x		x	x	x		

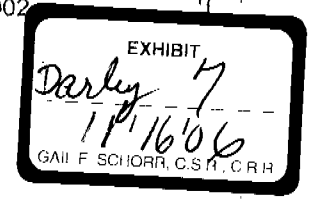
Reponsible : UT Date: 12-21-01
Version : V011225 Technology Issues register

Technology Area	Discipline	Component / Need to know	Action/Reference	Focal point	Need by date	Status
Intermediate gravity Oil	Reservoir Engineering / Flow Assurance	Need to improve crude quality downhole or subsea (Gamechanger).				
		Need to improve flow properties of 17 - 24 API gravity crudes to create High rate / High ultimate wells (10 - 15 K bbl/day and 35-50 MM ultimate recoverable / well)				
		Need to carry out low API production test (planned for BS-4) to gather key development data.				
	Completions / stimulations	Need to develop a completion / stimulation strategy for intermediate gravity oils in unconsolidated turbidite sandstones to make High rates / High Ultimate wells for Brazil.				
	Offshore Processing	Need cost effective processing options				
	Product Enhancing	Needs way to reduce price penalty for intermediate gravity oil				
Cluster Development	Novel deepwater solutions	Need for reliable and cost effective solutions to enable economic developments in deep water.				
	Subsea Boosting	Need for catalogue ready multiphase subsea boosting to firm-up feasibility of current development concepts.				
	SBOP	Enable Shell Brasil to significantly reduce well delivery costs by using surface BOP and a casing riser with a modified 3 rd generation semi-submersible rather than a dedicated deep water vessel.				
	Subsea	Need cost effective subsea completions with few interventions over the life of the well.				
	Metocean	Need beter understanding of metocean characteristics of Brazilian offshore (during the drilling of the BC-10 #3, 2 drilling days were lost due to max metocean conditions without 100 year wave conditions).				
		Need Polyester Anchoring capabilities.				
	Major Project Realisation	Need to cost-effectively develop several 200-300 MM bbl accumulations in close proximity.				
Push the Deepwater envelope	Novel deepwater solutions	Need for reliable and cost effective solutions to enable economic developments in ultradeep water				
	Ultra DW drilling	Need significant cost reductions ($100K/day down from the current $ 250 K/day).				
		Need to reduce the weight of the riser mud column height as the the frac gradient of the rock will not not support (Possible solutions: Subsea pumping or gas lifting of riser through subsea injection).				
Hydrocarbon prediction from seismic	Geology	Need to correlate 2000 - 2001 well findings with Worldwide turbidite analogs				
		Need better structural calibration and consultation with the experts in SEPTAR				
		Need improved understanding of the basin Model for hydrocarbon charge, maturation and migration (Cauldron, etc).				
		Need a Monarch / Geocap study (similar to Norway)				
	Geophysics	Need improved 3D imaging for prospects				
		Need advanced geophysical techniques including AVO (on Roncador)				
		Need help for predicting cementation / porosity preservetron (Exermeier?)				
		Need an increased understanding of applicable geophysical technologies for prospecting, appraisal and development.				
	Petrophysics	Need validation by SEPTAR experts of lith and fluid calls for new wells in Brazil.				
Strategic technologies for wells	Ghost	Need to understand the well failure on the second wel in BC-10				
	Underbalanced drilling	Need to understand applicability for Brazil.				
	Expanded Tubulars	Need to understand applicability for Brazil (SDS would like to drill monobore wells here.				
	Sand control	Need expandable Sand screens				
	Well Engr	Need extended reach wells.				
Enablers	Local research	Brazil research projects, required to spend upto 1% of revenue on local research				
		Potential for Tax credits on research prior to revenue stream				
	Local content	Local industry technical capabilities				
	Petrobras tech. exchange	Clarify role and expectation of Petrobras Global focal point on technology issues				
		Update/review Petrobras Technology Exchange Agreement				
		Decision on UB drilling JIP				
	Business Interface Manager	Establish formal contract for BIM Q1 2002				
	BAA	Establish representation on BAA core teams where SBEP has a Lead Implementer Role.				

Sakhalin Team Members

EPT Note to EXCOM

February 4, 2002



Note for Discussion to EP EXCOM – February 4, 2002

GLOBAL EP PROJECTS – A Centre of Excellence for Project Management & Execution

The note summarises the current status and plans for implementation of the new Centre of Excellence for GLOBAL EP PROJECTS.

Realisation of the EP oil and gas production growth targets over the coming five to ten years will critically depend on the secure delivery of a number of major projects, on time, on budget and with performance in line with prediction.

The business case for this initiative stems from the general pattern of unpredictable performance on EP project delivery, with a consistent cost in deferred oil and gas production (captured in the OU Volume 1 returns). Failure to turn this around in the immediate term will jeopardise future EP growth targets.

In October last year, a dedicated (mini-FRD) team was commissioned to address this issue. Following consultation with project management experts across EP, the team recommended the early creation of a Centre of Excellence for EP Projects as the preferred route to ensure consistent, high quality project delivery.

The rationale for the recommendation was based on the following considerations:

- The CoE creates the functional home to ensure the appropriate number of Shell EP staff with engineering, project services and project management skills.
- The CoE provides a framework to capture learning and build capabilities through the project delivery learning cycles.
- The model has been successfully deployed for US deepwater projects and most recently in Nigeria, where Shell Deepwater Services "Development/Execution" (SDS/DE) organisation has demonstrated a consistent and impressive cost/performance improvement profile over a number of years of project delivery. It is recognised however that further work will be required to assess the degree to which this model can be laterally applied/extrapolated to design the Global EP Projects Unit covering the full spectrum of onshore and offshore projects across the globe in their respective environments, particularly new venture locations.
- The same model is successfully used in OG, where all major GP, OP and Chemicals projects are delivered from a central organisation across the globe.

The goal is to design and create a professional Global EP Projects (CoE) organisation that will provide a competitive advantage for the Group by building on and utilising the existing capabilities, processes, design and project management tools operating within SDS/DE and complementing these with existing capabilities from within SGSi (OGU) and other best practices emerging from ongoing global initiatives and recently completed successful projects. Global EP Projects will thus comprise a global organisation (based in Rijswijk, New Orleans and Houston) with immediate responsibility for the existing deepwater project portfolio and with future responsibility for projects such as Sakhalin, Kudu and Pohukura.

The design of the new organisation will be worked out in detail by a small team, incorporating staff from SDS/DE, SGSi, experienced project staff (e.g. from the recently completed Malampaya project) as well as future customer representatives over the coming three months. The timing and manner of the transfer of responsibility for ongoing projects to GEPP will be the subject of detailed work by the design team and the current project teams/OU's for the respective projects. Measures to ensure that the project value chain is preserved at all times will require particular attention.

The precise interface between Global EP Projects and SGSi (OGU) remains to be defined and will require detailed study. Under current practice, OGU (together with other SGSi units) provide a range of engineering input to both SDS/DE and to various EP project teams. Clearly, the OGU engineering capability will be required by Global EP Projects and the delivery model (either re-location of the respective capabilities to GEPP, or contracted delivery from OGU under an agreed framework) will be optimised by the design team. The preferred model is likely to see some transfer of SGSi staff to the Global EP Projects organisation. This will require positive advice from the Staff Council.

Impact on SDS

The Global EP Projects organisation will entail the re-deployment of SDS/DE as an integral element of the new organisation. Current interfaces between DE and the remaining SDS organisation (subsurface evaluation teams, well engineering etc) will need to be carefully addressed to ensure that the capabilities developed in the Deepwater value chain over the past three years are captured in the new structure.

Additionally, the team will develop the transition model for integrating SDS/DE into the new CoE. The Team will need to design the earliest integration to allow adoption of existing and proven systems and processes but ensure the least disruption to assured delivery of the currently operating projects (Bonga, Nakika and several other subsea projects).

Impact on SGSi

The SepTAR Surface Cluster was integrated into Shell Global Solutions in January 2001 to provide a significant EP engineering service capability, designated OGU. The prime rationale for the move was to create the opportunity to offer commercial services to third parties, while at the same time providing support to both EP projects and EP OU operations. The integrated engineering portfolio was seen to offer high value to customers.

OGU has provided significant and valued services to Shell OU's (eg the seamless team approach with SPDC in Nigeria) and to EP projects (Sakhalin, Kudu, Bonga) during 2001.

The SGSi commercial model is based upon OGU charging a uniform commercial rate for services to both internal (i.e. Shell project teams and OU's) as well as third parties. The net profit earned on internal services is remitted to EP (STEP) under the terms of an agreement between SGSi and EP. Application of the commercial rate has, however, caused aggravation between SGSi and the various Shell internal customers (e.g. SDS projects for Nigeria, Saudi CV3 venture, PDO plus others). This is being actively addressed between SGSi and EP.

Given the recent transfer of the EP SepTAR Surface Cluster staff to OG (and in particular the positive response of staff to the "commercial model environment"), communications with staff with respect to any proposed changes in this sphere will require to be managed carefully.

Way Forward

A "Whole System Design" team is being formed to undertake the detailed planning of the new EP Global Projects organisation. The approach to be followed will be based on that used to create the Project Execution organisation (at the time SDDSI) in 1997. This became the Project Execution arm of SDS when it was created in July 1999.

Team members will include:

- Team Leader (M.Hasan (?) until the arrival of D.J. Greer in Rijswijk)
- Two representatives from SDS/DE (G.Edwards +A.N.Other)
- Two representatives from the Malampaya project (M.Thomas & C. Macara)
- OGU representative (S. Officer)
- Customer representative (Sakhalin Team Member:TBA)
- C2V representative (H.Wabeke)
- Shell Organisational Design Consultant (Tba)

- Professional Facilitator (R. Thayer)
- Co-opted members from Engineering, IT, Procurement, Commercial Services, Finance and HR as required

The Terms of Reference for the team were reviewed and agreed by Greer, Hasan, Frith and Darley and are enclosed as Attachment 1.

The team will be expected to deliver the design and modus operandi for the new organisation by 30th June 2002, together with a transition plan to show how current projects (eg the SDS/DE portfolio, Sakhalin, Kudu) will be delivered by the new EP Global Projects organisation. An integral part of the transition process will be the process of consultation with all involved staff and with the NL staff councils.

The design team will also take account of the formation of the new "Technical and Operational Excellence" organisation, reporting to Brian Ward, which will include responsibilities for the Field Engineering skill pool staff in EP.

Jcd
30.01.2002

Most Confidential

EP Leadership Forum

The Woodlands, 23 & 24 May 2002

Pre-reading Documents

Walter v.d. Vijver

Dear Walter,

Cost Structures FRD – Interim report
EPLF – May 2002.

Please find enclosed as pre-reading for tomorrow's presentation and discussion the interim report of the cost structures team. We have been working for only six weeks and the results are of course subject to further rigorous checks; we felt however that you would want to be kept advised of some of the interesting preliminary conclusions that we have been able to draw, particularly on our current position with respect to (future) Unit Operating Cost and our recommendations on how to handle internal and external reporting of Operating Costs.

These preliminary conclusions have already been shared with members of ExCom and the final recommendations after we have finished in June will need to be the subject of further careful consideration.

Our objective at this stage is to ask you to consider with an open mind whether the current situation is acceptable for a multinational Global business, and to consider whether there are alternatives which we can adopt together to improve the efficiency of our company,

John Bell
Head of Cost Structures
Technical & Operational Excellence

- *Operating model for core operations* - Core operations also have few external benchmarks at a global level. However, experience with regionalisation in NESS indicates opportunities for both Opex and production benefit. Extending this regionalisation concept across the globe could capture an additional $100M in cost improvement. There will be an additional benefit from application of T&OE initiatives through transfer of best practices, imposition of minimum standards and increased staff competency
- *Centre costs* - Centre costs have risen by more than $200m over the last three years *(Exhibit 19)*. Benchmarks suggest many centre tariff rates are 30% higher than market rates
- *Expat costs* - Expat premium is $300-400 million (over having equivalently competent regional staff) driven by a headcount double that of our competitors *(Exhibit 20)*, and sub-optimal deployment. Coming down to competitor levels offers the potential to reduce costs by ca. $150 – 200 mln Shell EP uses more expats than any other major blue chip and roughly twice as many as BP or ExxonMobil
- *Procurement leverage* - Global procurement opportunities are under-utilised, in part due to a lack of central mandate. The Procurement function have identified initiatives that could deliver $50-100mln if enabled by changing the business model
- *IT as an enabler* – The CIO has identified opportunities to use IT to reduce core operations costs, these are yet to be fully quantified.
- *Portfolio management*[2] – there may be an opportunity to asset swap in order to extract synergy benefits. If partners could be found, this could be $50-100mln

2.4 The Way Forward

- The potential prize is in excess of $0.5 bln
- Implementation would require a significant change in the operating model
  - An improvement in how central services are managed and delivered
  - A shift from OU autonomy to a more EP-wide model that captures economies of scale and cross-OU optimisation
- There will be many implementation challenges
  - Decision rights will be changed throughout the organization
  - There will be headcount implications in low value adding activities
- Embarking on such a change programme is a key decision
- The balance of the FRD period will be spent finalising our understanding of the cost structure and firming up the opportunity catalogue of potential cost structure initiatives

V00300501

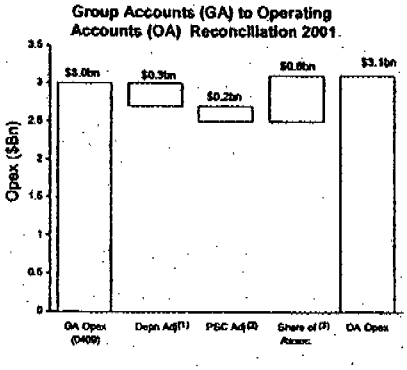
[2] *Portfolio management analysis recognises the need to manage to unit margin, not simply unit opex (high UOC is not per se a bad thing) – See Exhibit 21*

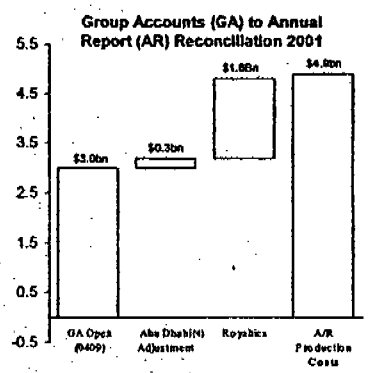
Attachments

- Reporting Exhibits
- Opex Improvement Exhibits
- Terms of Reference

PRELIMINARY

Exhibit 1 : Shell uses multiple metrics for internal and external Opex reporting





(1) Exclude Oman Depreciation
(2) Exclude cost relating to Government share of volumes in PSCs. (PSC = Production Sharing Contract)
(3) Include Group share of Associate costs
(4) Add back Abu Dhabi costs as reserves classified as Group reserves

15.05.02 EPLF Revised Exhibits v1

Slide 1

V00300502

FOIA Confidential Treatment Requested

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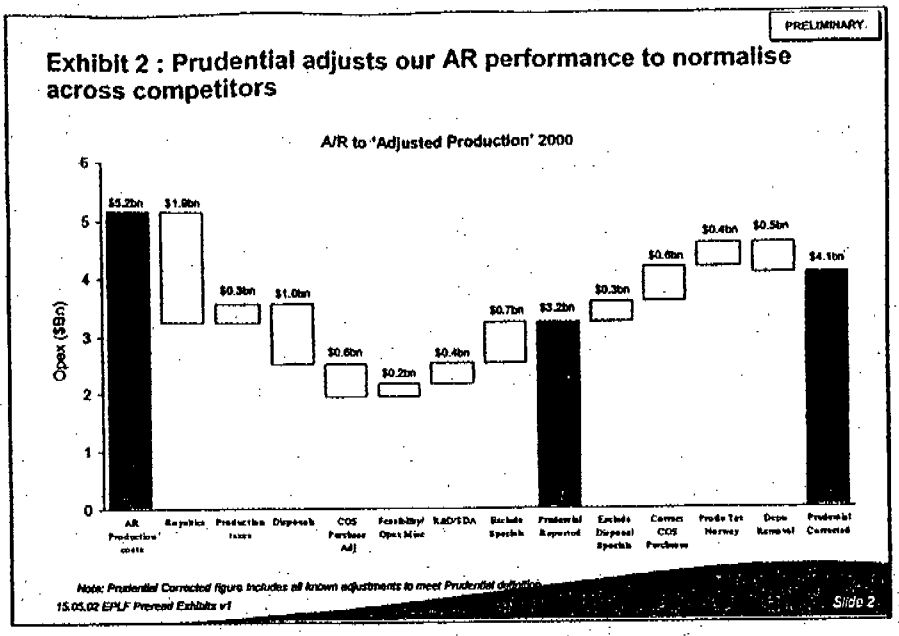

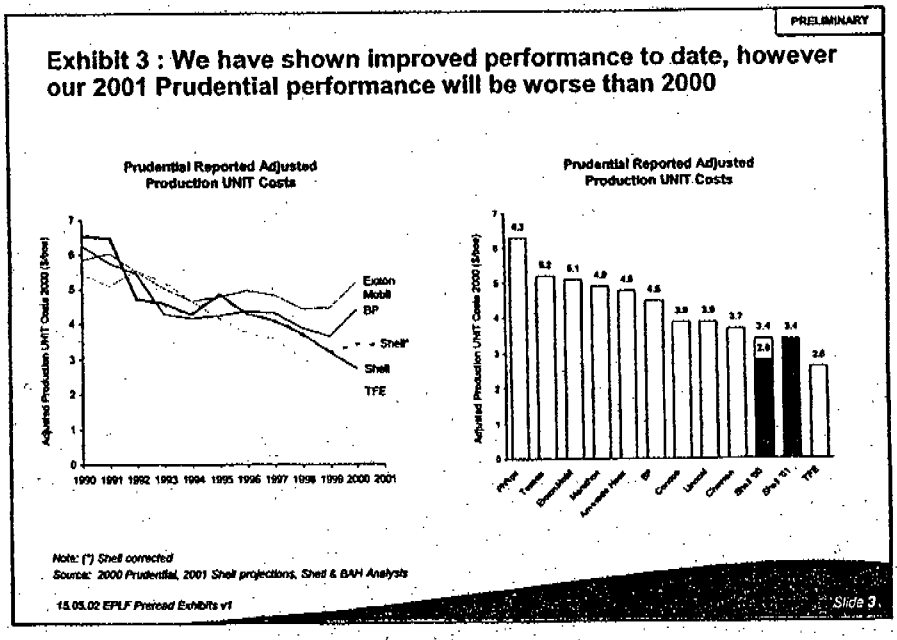

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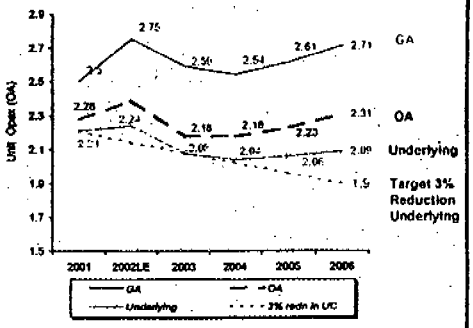
Exhibit 4 : We introduced an additional metric to the market – "Underlying UOC"

DEFINITION

- 6 adjustments to OA Opex:
  - Exclude abnormal start-up costs and feasibility studies
  - Exclude the cost of significant extraordinary maintenance or "once-off " special items
  - Exclude amounts related to FAS 87 Pension Fund Credits / Debit charges
  - Exclude changes in currency exchange rates from 2001 levels
  - Exclude costs incurred to increase the product value after the product is in a "ready for sale" state. E.g. Norske Shell/ SIPI; AOSP
  - Include tariff amounts recorded as revenue from third parties
- Adjustments to OA Production:
  - Adjust for abnormal, major disruptions that are expected to be of a short-term nature e.g. OPEC constraints; facility availability events & PSC production volumes normalised to $14/bbl

Underling UOC compared with OA & GA



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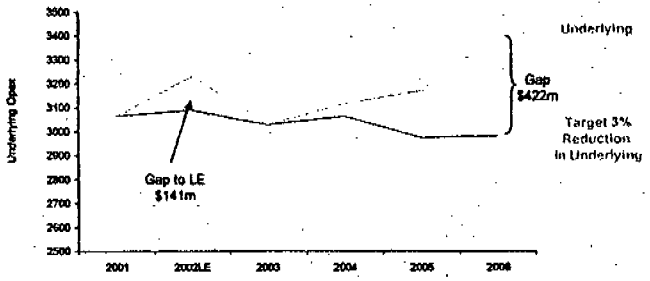
Slide 4

PRELIMINARY

Exhibit 5 : Using this definition, assuming Vol II production growth we would hit our 2003 target

Underlying Opex Forecasts ($M)



... although the 2002 LE suggests it might be harder than imagined

Note: All analysis at $14
Source: CERES, EPMIS for 2002 LE data

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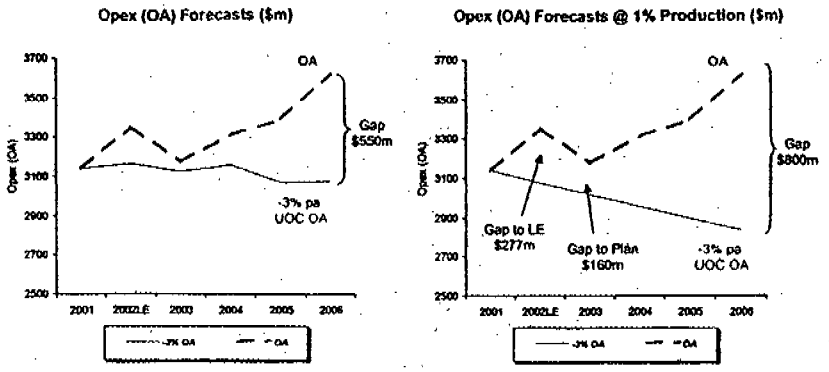
Exhibit 6 : If we need to deliver against a 3% UOC target (OA) or fail to meet production targets, there will be a substantial gap in 2003 and the longer term



Note: All analysis at $14
Source: CERES, EPMS for 2002 LE data
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Exhibit 7 : Emerging Recommendations

INTERNAL MANAGEMENT INFORMATION	EXTERNAL COMMUNICATION
Robust framework for analysis of EP cost structure	Consistent external messages, clearly aligned with internal MI
▸ Formal documentation of processes & calculations relating to OA ▸ Roll out a single common set of definitions of costs: – Extend the BBBs to required detail level – Template discussion ongoing in BBB forum prior to Q2 submission by top 15 OUs – BBB team to develop a best practice cost allocation methodology to enable meaningful internal benchmarking – Incorporate in SAP BP & Sun design ▸ Focus & manage all components of EP cost structure (not just 0409) using existing Qtrly information flows	▸ Document reconciliation process for all externally reported EP-related information including Annual Report, Prudential benchmarking ▸ Ensure Senior EP sign-off for all external communications, for example, Prudential adjustment ▸ Ensure that additional metrics (eg. Underlying UOC) are clearly defined and transparent; understand relationship with other published data (AR, benchmarking) ▸ Further recommendations on underlying cost definitions and usage

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Exhibit 8 : Recommended Internal Reporting Template

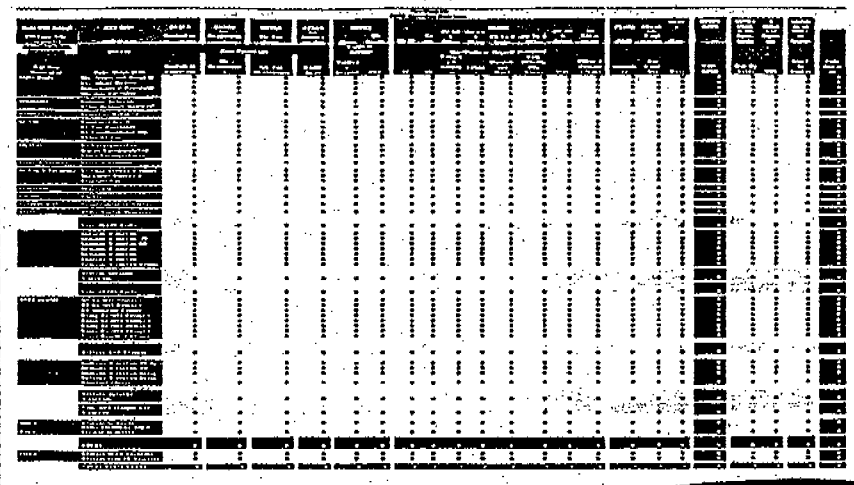

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Exhibit 8a : Recommended Internal Reporting Template - activities

ACTIVITY		COST ELEMENT	
Operations (GA)	Production Operations Well Maintenance Facilities Maintenance Gas Plant Operations Direct management	Local to OU	Staff costs Contract costs Materials Utilities Logistics Travel & Personal Building & Equipment Insurance Tariffs Telco & IS charges Other
Technical Support (GA)	Technical Management New Business Development (?) HSE		
Non Technical Support (GA)	IT HR Planning & Economics Finance Procurement Management Corporate Affairs etc Legal Property / Office Management Insurance Other	Internal Allocations	From/to Technical Support From/to IT From/to HR From/to Finance From/to Procurement Mgmt. From/to Office Property Mgmt From/to Others
		Charges from Centre	EP Call offs EP Overhead (GSF) Group Call offs Group Overhead
Other	Activities in Misc Op Costs Activities in SDA Feasibility Studies	Allocations	To Capital Projects To/From partners To/From external Shell entities
		Benchmark adjustments	e.g. own gas consumed Tariffs paid in production

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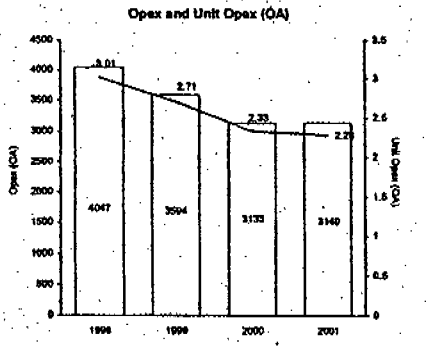
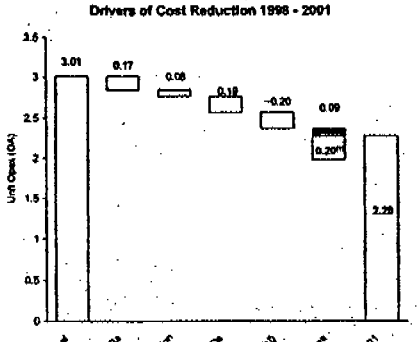
Attachments

- Reporting Exhibits
- Opex Improvement Exhibits
- Terms of Reference

PRELIMINARY

Exhibit 9 : The improvement in UOC to date has largely been driven by factors other than underlying cost efficiencies





Note (1): Inflation effect based on 2% – some costs (eg. Wages) may have seen higher rates
Source : Shell Val L SCL analysis
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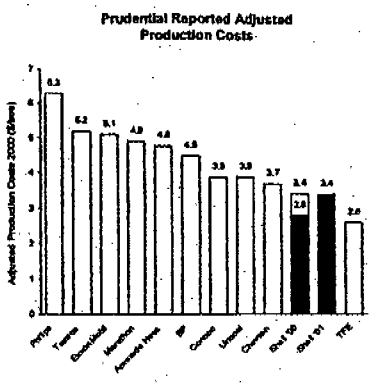
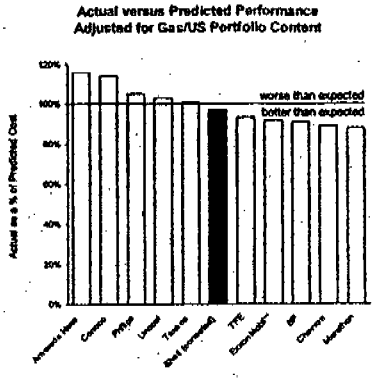
Exhibit 10 : Viewed critically (adjusting for portfolio), our cost position is average and our claim to be a cost leader can be challenged





Note : Predicted versus Actual based on a multiple regression analysis of US and Gas Content versus Adjusted Production Costs
Source: 2000 Prudential, 2001 Shell projections, Shell & Analysis

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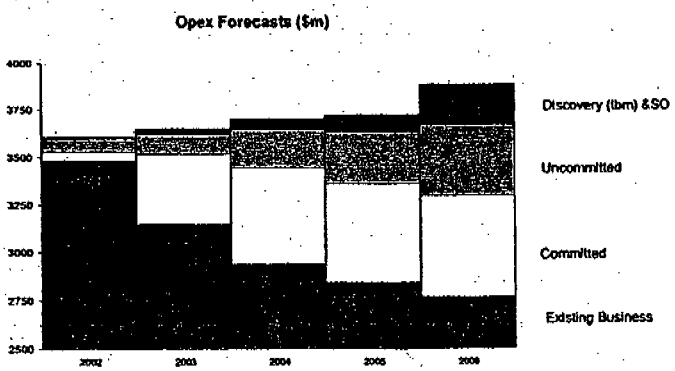
PRELIMINARY

Exhibit 11 : Our costs are forecast to rise significantly – driven in part by our planned growth



Note: All analysis at $16; excludes pension fund credits
Source: CERES, EPMIS for 2002 LE data

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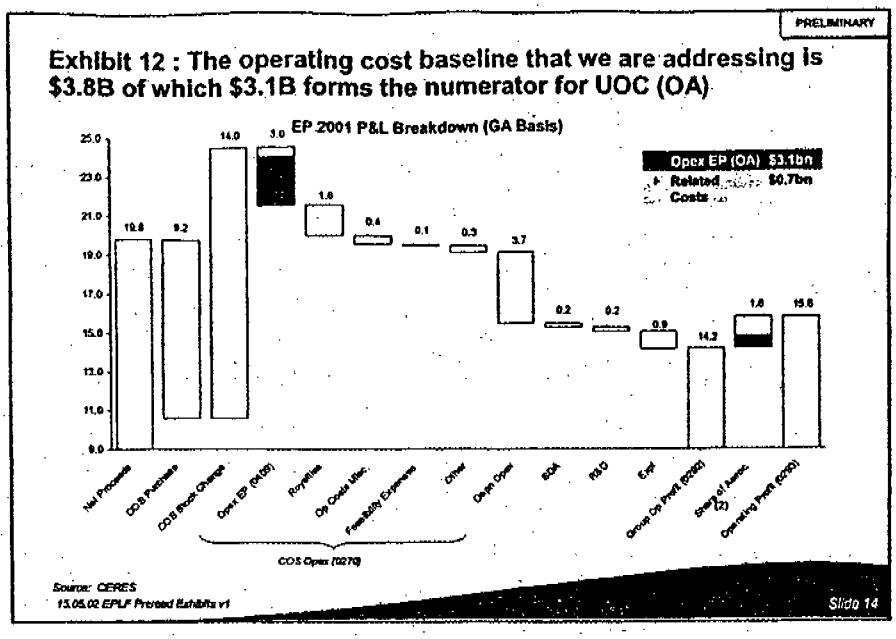

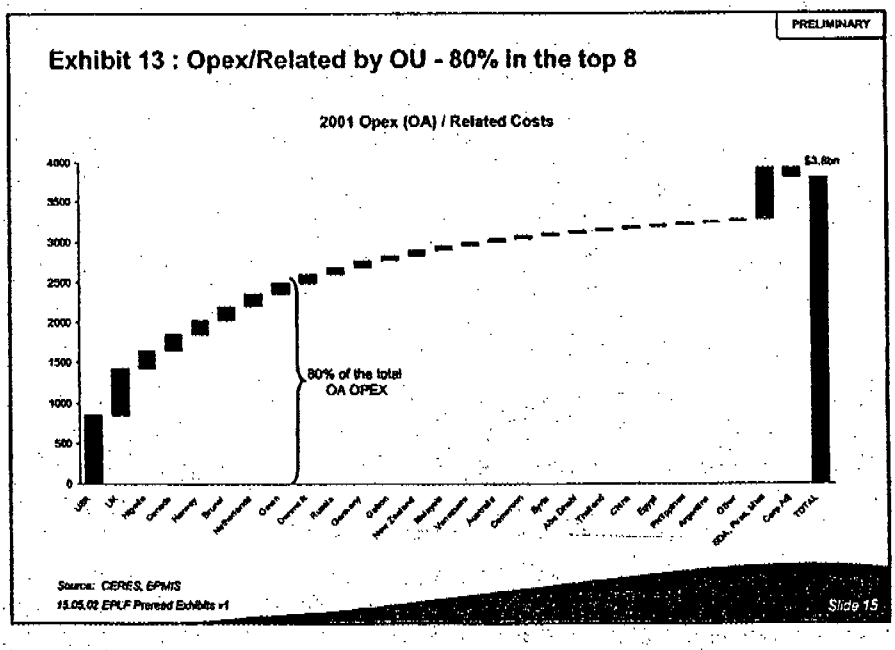

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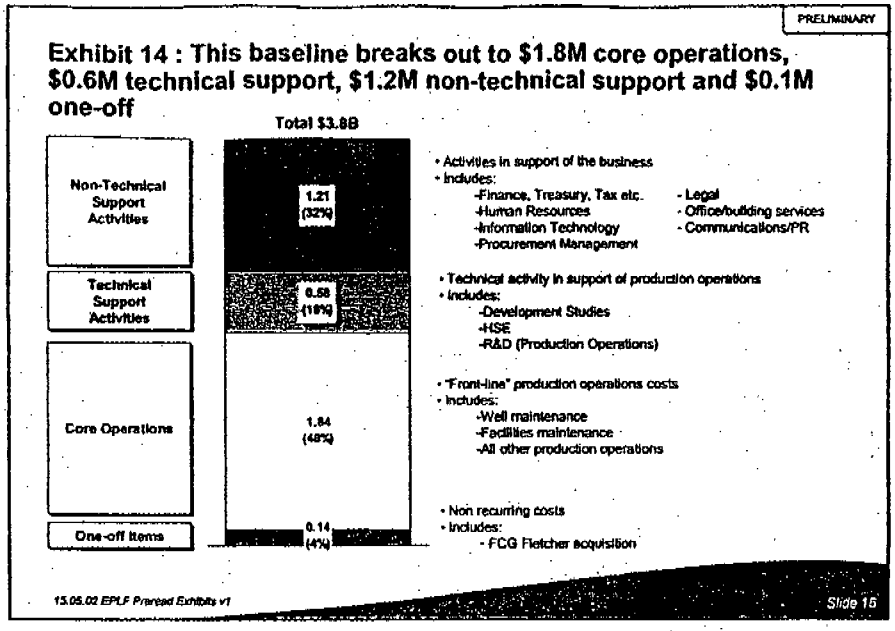

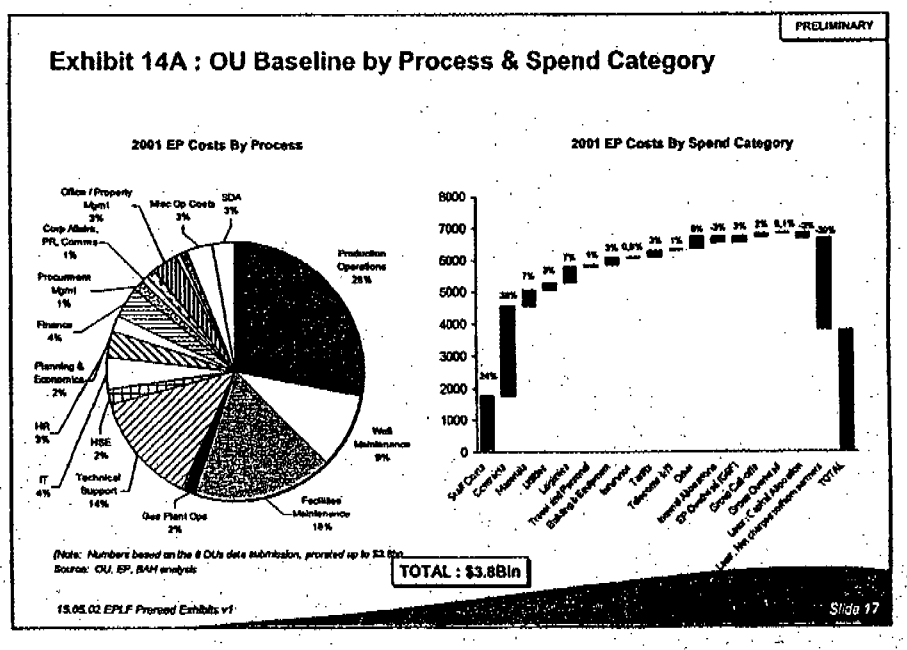

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