



Shell Global Solutions



# GAS MASTERPLANNING

Generating maximum value from your gas reserves



# GAS MASTERPLANNING



## Opportunities and challenges

The world's reserves of gas are forecast ultimately to outlast those of oil. Given also the growing demand for cleaner fuels and increased pressure to reduce flaring, it is not surprising that developing effective strategies for dealing with gas is high on people's agendas.

The difficulty with gas has always been balancing the costs of production, transport, processing and market development with the ultimate commercial value of the gas.

The goal, though, is clear: to maximise the long-term value of your gas reserves (possibly a mix of associated and non-associated gas) and at the same time to integrate your oil, gas, power, chemicals and other hydrocarbon interests to deliver the greatest value to your stakeholders.

This is what gas masterplanning is all about:

- Taking an integrated approach to your entire gas value chain
- Sharpening the focus on a single, consistent resource-development plan
- Maximising the return on your gas reserves
- Making best use of existing and planned assets
- Sequencing oil, condensate and gas field development in the most efficient manner
- Responding effectively to existing and new market opportunities.

“An excellent, well-led piece of work. The study did the trick of bringing the best option to the attention of management just at the right time”

*Leading oil and gas operator, Egypt*

*Unlike oil, the intermediate storage of gas is not commonly feasible. This makes an integrated approach to the entire gas value chain even more vital to business success*

# OPTIONS

## Overall value creation

There is usually no shortage of options for gas. But deciding between them is not always straightforward. At the exploration and production stage, the main question is how to gather the gas and where to send it – smaller, more remote reserves clearly present a special challenge in this regard. Alternatively, should the gas be reinjected to boost liquids production?

Further downstream, a decision has to be made on how the mix of products should be treated and what specification to aim for – which depends on the end use. Is the gas intended for pipeline export, local domestic use, power generation or liquefied natural gas production?

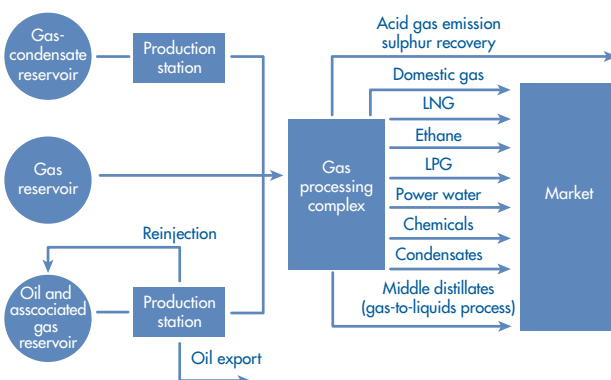
Could it become a petrochemical feedstock, or is its use in a gas-to-liquids plant a possibility?

These are issues that can only be resolved by someone with a sound understanding of the character of the different markets and their potential. Moreover, at this end of the chain, local politics become important, with environmental, employment and other industrial development needs often influencing the way forward.

People tend to base decisions such as these, quite reasonably, on immediate commercial considerations rather than their impact on the overall gas value chain. This is an inevitable

consequence of the business boundaries that often exist along the chain owing to the presence of different shareholders, joint venture agreements and so on. As a result, the full potential contained in the gas value chain is not always realised.

Gas masterplanning is a process developed by Shell Global Solutions to overcome these hurdles, creating winning opportunities for all the parties involved. It coordinates input from one end of the gas value chain to the other. The result is a maximum-value solution, not only in economic terms, but also in the context of the surrounding political, environmental and social concerns.



*Our experience shows that optimising the individual parts of the gas value chain will not generate the maximum return on your reserves*

A photograph of three business professionals in a meeting. A man in a light blue shirt and tie is pointing at a document on a table. Two other people, one older man with glasses and one woman, are looking at the document. The scene is lit with a cool blue light.

# PROCESS

## Customer-driven

Gas masterplanning is not a standard product. It is driven by the customer, whose interests, objectives and commercial environment are generally unique. Understanding these at the outset is vital. Thereafter, the process breaks down into two clear phases.

The first phase of the process involves analysis of the existing assets and infrastructure, and covers a four-year timescale. Proven technico-economic models are used to construct a detailed picture of the gas value chain, the aim being to improve the current system without the need for

major investment. Operational process improvements, debottlenecking initiatives and changes to the way production is routed often emerge at this stage.

The second phase examines long-term opportunities – over a 5 to 20 year time frame. It defines possible development strategies for the business, and highlights opportunities and threats related to possible changes in the nature of the gas market. Decision criteria are defined and a recommended course of action and gas marketing strategy is set out.

## Typical framework

### **Preliminaries (three to five days) – scene setting and team building:**

- Discuss aims and objectives
- Set out terms of reference
- Assemble study team with representatives from each stage in value chain.

### **First stage (three to four months) – optimising existing assets:**

- Gather data to build a technical and commercial model of the gas value chain
- Identify overcapacity and constraints in the system
- Generate ideas for improving the overall system economics
- Quantify the expected value of the suggestions
- Set priorities.

### **Second stage (two to three months) – creating long-term value:**

- Review the commercial environment – market demand, existing supplies and competitor activities
- Assess potential markets for the available product streams
- Develop possible new strategies for assets, facilities and infrastructure
- Determine evaluation criteria – normally including international benchmarking
- Estimate the ultimate return on each strategy (net present value) for various oil price assumptions and levels of recovery.

*The increasing power demands of expanding economies present opportunities for energy producers. But the risks are considerable. An initial Shell Global Solutions' energy review can provide a firm foundation on which to develop a gas masterplan*



# FOUNDATION

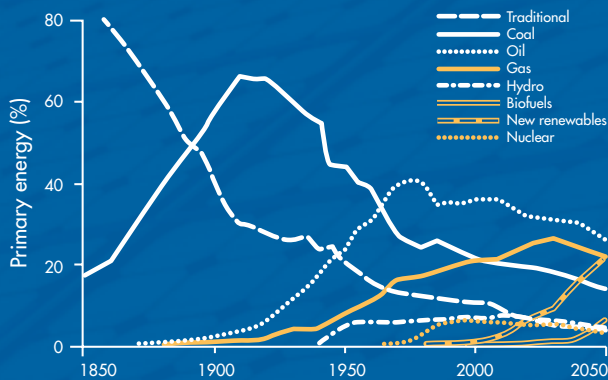


## Energy review

Gas is set to play an increasingly influential role in the energy economies of most countries. Just how influential gas could become will have a major impact on your plans. For this reason we can undertake an energy review for the country or the region in which you are operating.

Typically lasting one to two months, this review looks at current domestic and industrial energy demands and forecasts how these will change in the future. The fuel mix is analysed and a view taken on how it is likely to change with time. Ongoing energy projects, and the state and extent of

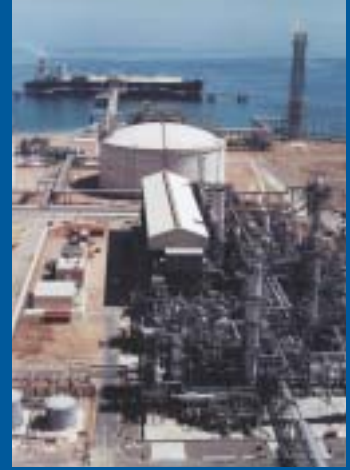
current infrastructure are examined in the light of local demand and load profiles. Additionally, the possible options available to countries to meet increasing power demands are outlined.



Shell Long-Term Energy Scenario (from 2002)

*Gas has a major role to play. It not only offers a practical and clean alternative to coal and oil but provides the bridge between fossil fuels and a new energy future*

*The discrete skills and knowledge necessary to develop an effective gas strategy exist in many organisations. Less common is the overall ability to see how the various parts of the value chain can be linked together to create maximum value*

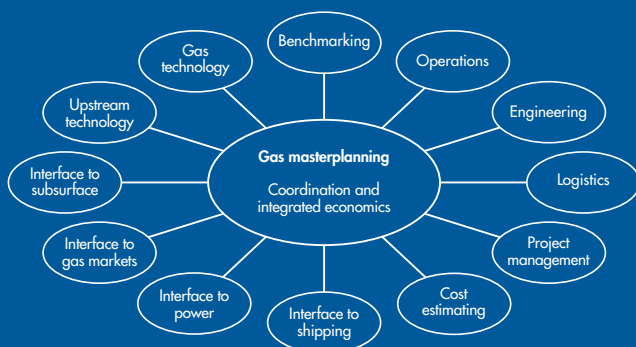


# INTERACTION



## The ability to see the whole picture

Gas masterplans are largely developed by multidisciplinary teams of Shell Global Solutions' experts working with the customer in a series of intensive and interactive workshops. Most of the data and information come from your side. So what does Shell Global Solutions bring to the table?



There are several elements to the answer – foremost is the ability to pull the process together and provide leadership and direction:

- Leadership from individuals with in-depth knowledge and experience that stretches right across the gas value chain
- The ability to evaluate ideas in an integrated fashion and to associate gas technology options with the needs of the gas business
- Support from a world-class organisation that is heavily involved in all aspects of gas production, processing, marketing and power generation
- Benchmarking for gas plants – advice on best practice – access to data and information related to numerous gas ventures all around the world
- State-of-the-art planning, simulation and optimisation tools
- Engineering and project management skills covering all stages in the process of taking gas from the reservoir to the marketplace
- Leading position in gas treating, liquefied natural gas and gas-to-liquids technology
- Access to sound, global market intelligence.



## Gas masterplanning in practice

### Nigeria

Shell Global Solutions' gas masterplanning team was faced with several key requirements when developing a gas masterplan for a major oil and gas operator in Nigeria: to secure gas supplies to existing and planned liquefied natural gas facilities; to eliminate all continuous flaring within eight years; and to position the company for sustainable growth in oil production with a profitable outlet for its gas.

The study concentrated on integrating offshore fields under development with existing onshore fields and infrastructure. Changes to a planned gas gathering network were put forward, and a prior proposal to build a new gas-to-liquids plant was abandoned in favour of extending the gas pipeline system and the existing liquefied natural gas facilities. A scheme was developed for sequencing the connection of new fields to the network in order to meet the target of no continuous gas flaring by 2008. Finally, the non-associated gas capacity necessary to ensure liquefied natural gas supplies was also identified.

It is estimated that the new plan will reduce investment costs by more than \$500 million over the planning period.

### Australia

A study carried out for an Australian operator producing from a series of oil and gas, lean-gas and condensate reservoirs identified various system constraints to the delivery of condensate, a recognised high-value product. Proposed modifications to the offshore production system will enable the level of gas reinjection to be raised, which will drive up condensate production appreciably in the near- and mid-term. The plan increases the net present value of the operator's assets by more than \$200 million.

“*The gas masterplan is an enormous contribution and will certainly add value to our integrated oil and gas operations in Nigeria from the next business plan period*”

*General manager (gas), major Nigerian oil and gas operator*





## Shell Global Solutions

Please contact Shell Global Solutions International BV  
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Shell Global Solutions is a network of technology companies of the Royal Dutch/Shell Group