

- Brazil expects to decrease oil imports from 50 per cent to 30–40 per cent.
- Production will soon reach 30 million cubic metres of gas and 100,000 barrels of oil per day.
- New management models are required to handle the scale of the project.

Tapping the riches of the Santos Basin

Brazil is expecting to ease its dependency on foreign gas imports by developing the full potential of the Santos Basin. Jim Banks reports on the investment and development process.

THE SANTOS BASIN, DISCOVERED DURING BRAZIL'S FIRST offshore exploration activities in the 1980s, went into operation in 1993 and today the Merluza Field produces 1 million cubic metres of gas and 1,600 barrels of oil a day. In 2003, the Mexilhão reserve was found and it is now the crown jewel in Brazil's drive to reduce its dependence on imported natural gas and ensure its energy diversification goals.

The Santos Basin Natural Gas and Oil Production Development Master Plan, developed by the Santos Basin Business Unit (UN-BS), expects to invest \$18bn over the next decade, increasing production to 30 million cubic metres of gas a day between 2010 and 2011.

José Luiz Marcusso, UN-BS general manager, Petrobras, explains: 'In the short term, the Santos Basin will consolidate the national gas market and reduce imports from 50 per cent to 30–40 per cent. Eventually, it will help maintain oil production self-sufficiency by increasing production from 10,000 to 100,000 barrels a day within four or five years.'

Huge potential

The Santos Basin, in the south east Brazilian continental margin, is a sedimentary basin limited by high geological points in front of the Arraial do Cabo and Florianópolis. It occupies 352,000–151,000km² at 400m and 201,000km² at 400–3,000m. The growth potential is common to the five production poles. Pole BS-500 alone should produce 22 million cubic metres of gas and 150,000–200,000 barrels of oil a day.

Initial evaluations indicate that the southern pole may produce a further 140,000 barrels of oil and three million cubic metres of gas a day. Platform SS-11 is already operating in Paraná, producing 9,000 barrels of oil a day. The Cavalo Marinho field is expected to start operating in 2008 with production estimated at 18,000 barrels of oil a day.

The Merluza Field will increase production from 1.2 million cubic metres of gas and 1,600 barrels of oil a day at the Merluza-1 platform to 2.5 million cubic metres of gas a day in 2008 when it starts collecting gas from the Lagosta Field and the SPS-25 well area. A second platform will increase production to ten million cubic metres of gas a day from 2010.

Mexilhão and the Cedro area will initially produce 8–9 million cubic metres of gas, rising to 15 million cubic metres of gas and 20,000 barrels of condensate per day. The total capacity should be reached in the next decade as more areas go into production. In 2008–09, production demand will require a platform capable of producing 15 million cubic metres of gas a day. The unit will be located 140km off the São Paulo coast, producing at a depth of 170m.

Marcusso says: 'Mexilhão is a structuring project, working as an outflow centre for the entire Santos Basin gas production process. The basin could have ten to 14 platforms, including Merluza and Coral.' Integrated with the Merluza pole enhancement projects and development of the Mexilhão pole, Petrobras will install a gas treatment plant in Caraguatatuba. There will be two modules, each capable of processing 7.5 million cubic metres of gas a day, to collect gas from Mexilhão, Cedro and the other UN-BS fields through a 145m network of pipelines.

The Merluza pole's objective of reaching ten million cubic metres of production may require another unit to be built, increasing the plant's processing capacity to 22.5 million cubic metres, and the construction of another 210km pipeline. The gas will flow to the Petrobras transportation gas pipeline network via a connection with the Campinas-Rio gas pipeline in the São Paulo municipality of Taubaté.

A HISTORY OF BRAZIL'S OIL ADVENTURE

1960s

Brazil realises that its onshore oil reserves will not meet future demand.

1968–69

The first offshore seismic surveys produce promising results.

1970

The first offshore well is drilled.

1970–80

The Campos Basin becomes the biggest national oil reserve and exploration commences.

1998

By March, 100 wells are being drilled: 65 by Petrobras and 35 by companies under risk contracts. Petrobras discovers five oil and gas fields, Tubarão, Coral, Estrela do Mar, Caravela and Caravela Sul, and Pecten finds Merluza.

In August, the National Petroleum Agency (NPA) grants Petrobras six exploratory blocks in the Santos Basin, bringing to 115 the total number of blocks granted by the NPA to this company. A further 26 blocks are granted in seven other bids.

2003

The enormous gas reserve of Mexilhão is discovered 140km off the São Paulo coast.

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Implementing the technology

The Santos Basin's complex geological structure is technically challenging. The gas area burying depth (the distance between the bottom of the sea and the reservoir) varies considerably, ranging from 1,500m to 4,500m. There is also a high incidence of faults cutting the reservoirs. These features will require multi-fractured, horizontal wells to increase productivity.

Several new management structures have been created. A gas engineering management team has been established by the Workgroup Petrobras to develop the UN-BS's Master Plan. In addition, two fundamental units, SMS and operation practices, have been integrated. The environmental licensing coordination has also been connected to the general management.

Furthermore, partnership support and control management has been set up. This means that Petrobras now has 11 exploration partners and 14 partners in total, including the production concessions. The Santos Basin represents 25 per cent of

Petrobras's total concessions and 12 per cent of Brazil's total concession area. Since 1970, it has received investments of \$780m and over the next ten years it will see 20 times as much.

Although 30 million cubic metres a day surpasses the 28 million cubic metres currently imported from Bolivia, this does not imply self-sufficiency. By 2010–11, gas, which currently represents 7 per cent of national energy use, will have reached 12 per cent, and domestic consumption will be around 99 billion cubic metres a day. Reducing dependence may only be the first step for Petrobras to repeat the victory it achieved with oil self-sufficiency. ●

CURRENT PETROBRAS DRILLING INTERESTS

- 25 EXPLORATORY BLOCKS IN THE SANTOS BASIN, TOTALLING 36,269KM²
- FIVE DISCOVERY EVALUATION PLAN AREAS, MEASURING 3,806KM²
- BETWEEN 1998 AND 2005, 64 EXPLORATORY WELLS WERE DRILLED IN THE SANTOS BASIN, RESULTING IN THE CAVALO-MARINHO, LAGOSTA, URUGUÁ AND TAMBAÚ FIELDS

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