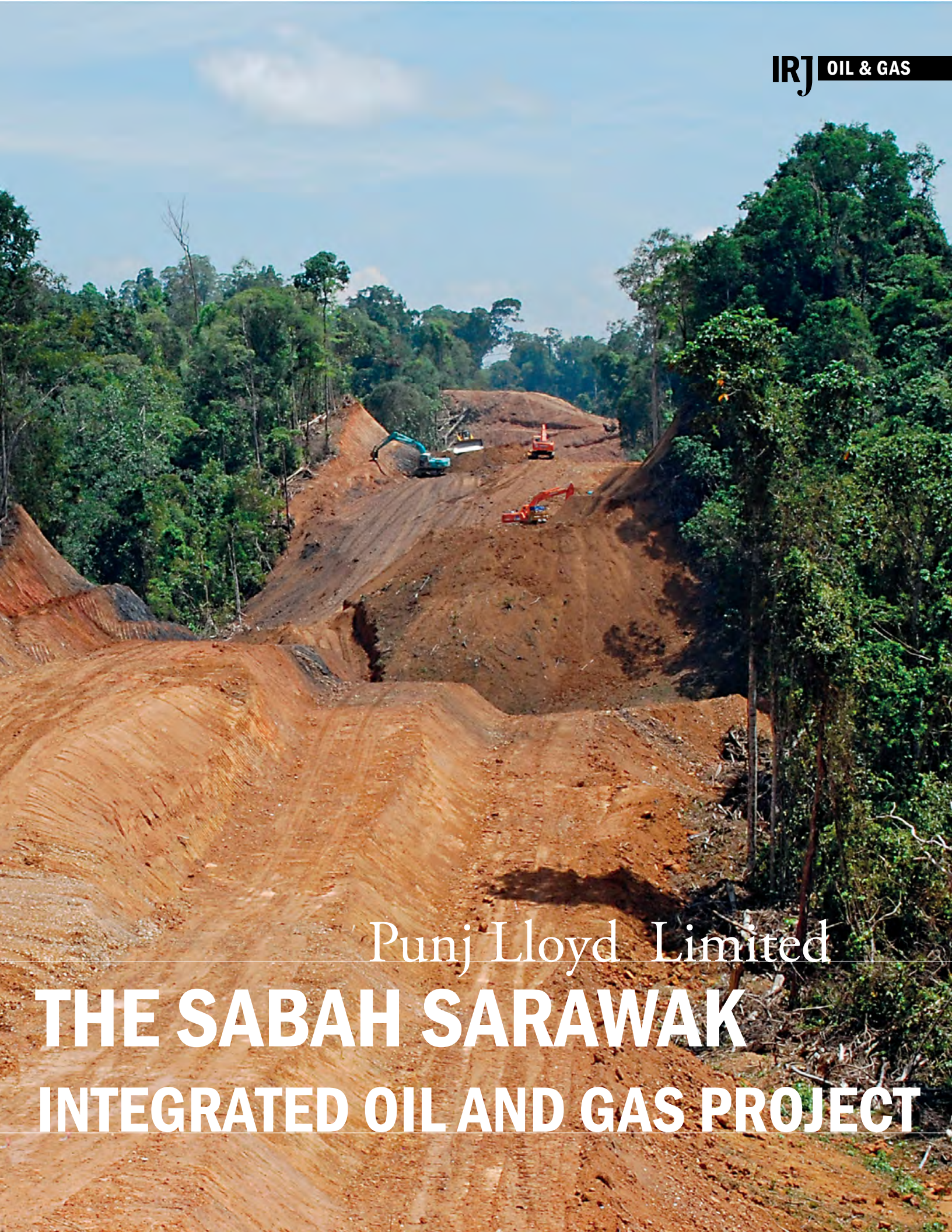

Punj Lloyd Limited

THE SABAH SARAWAK INTEGRATED OIL AND GAS PROJECT


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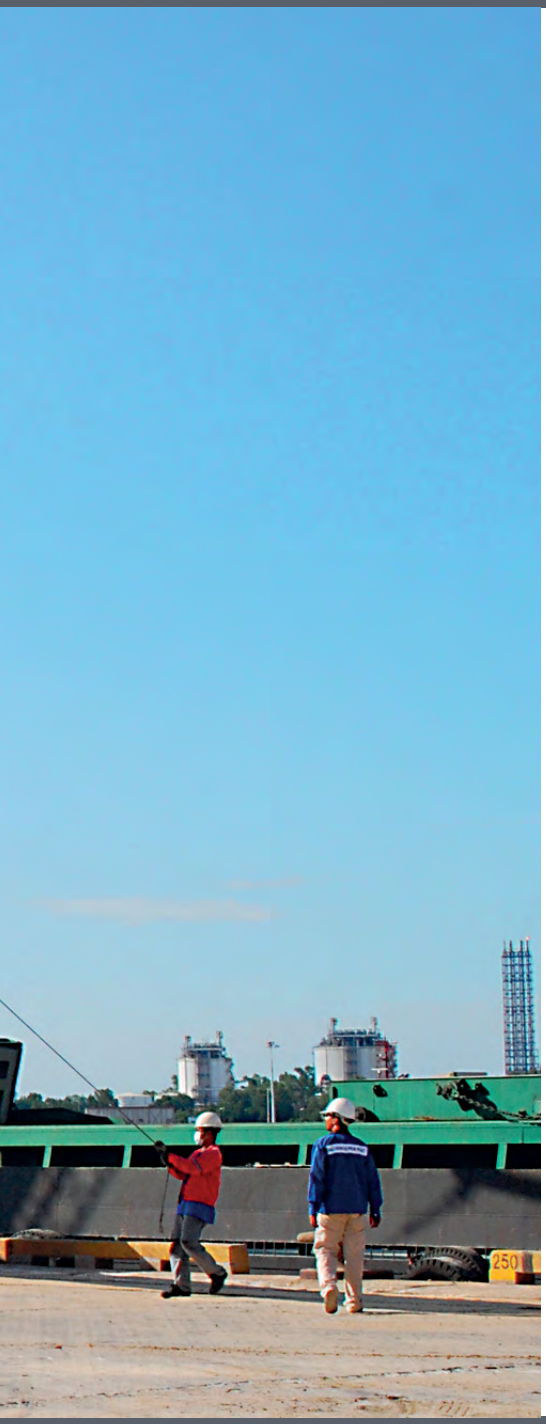

Back in March 2008, a consortium led by Punj Lloyd Limited, headquartered from Gurgaon, India, was awarded the Sabah Sarawak Gas Pipeline Project by Petronas Carigali Sdn Bhd, a subsidiary company of Petronas, the state oil and gas major in Malaysia. Sabah Sarawak, the largest pipeline project in Malaysia then valued at US$500 million, was both a coup for Punj Lloyd and an indication of the grand scale-projects this company is capable of carrying out.


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OF COURSE, NO one said that Sabah Sarawak was going to be easy, and today *IRJ* catches up with Punj Lloyd, the globally diversified conglomerate company providing integrated design, engineering, procurement, construction and project management services, to look at the different challenges, considerations and most of all, great successes, which the company has already mastered as it works towards project completion slated for March 2011.

The Sabah Sarawak integrated oil and gas project by Petronas aims to tap natural gas from the rich reserves of the Malaysian fields in the South China Sea. The project comprises two onshore projects; the Sabah Oil and Gas terminal (SOGT) at Kimanis and the Sabah Sarawak Gas Pipeline Project (SSGP) on Borneo Island. Awash with great promise to improve the economy of Malaysia, the gas from SOGT will be transported to Bintulu and will be processed into LNG at the PLNG complex.

Scope of work

The scope of work for Punj Lloyd in the Sabah Sarawak gas pipeline encompasses many different aspects of the oil and gas production line. This includes Engineering, Procurement, Construction and Commissioning of the 512 km 36" diameter Gas Pipeline from Kimanis, Sabah to Bintulu, Sarawak, complete with cathodic protection, a compressor station at Bintulu, metering stations at Kimanis & Bintulu, intermediate scrapper Stations at Lawas, Long Lama and a compressor station and launcher station at Kimanis, receiver station at Bintulu, 22 block valve stations and six future tap off points along the pipeline. And this spread of involvements is not all, as activities also include SCADA, telecommunication, leak detection, fire and gas systems, and a gas management system.

Topography

The region has a challenging and dramatic terrain throughout, consisting of mountainous ranges with rocks and swampy stretches along the pipeline route.

Most of the vegetation is made up of dense rainforests and oil palms.

Crossings

There are a great many river crossings, of which three are major rivers stretching over 100 metres wide. Six of the rivers are 50-100 metres wide and 305 rivers are less than 50 metres wide. The total number of river and stream crossings is more than 1,800. In addition, there are two railway crossings, 27 major road crossings, 88 minor road crossings and 14 HDD crossings. Add to this the possibility of sink holes occurring along the route near Ba-

tang Baram because of the caustic limestone in that area, and the potential sedimentary fill that causes settlement under loading, and it becomes clear that this is not terrain for the faint-hearted.

Weather is a constant phenomenon in Sabah and Sarawak regions throughout the year. There are high altitude mountainous areas where it rains almost every day. In Sabah, the highest rainfall recorded is 717 mm (June to mid of January) and in Sarawak 1280 mm (September to March).

Health, safety & environment

Punj Lloyd has always focused on Health, Safety & Environment which is reflected in 5 million man-hours achieved without lost time injuries on the project so far.

Execution

Laying pipelines on hilly and mountainous terrain involves deployment of heavy earth-moving and pipeline equipment. Punj Lloyd has mobile specialised equipment, trailers and sledges for pipe transportation, stringing and welding in the ROW. Heavy duty winches, walking spider excavators and a ropeway crane system were mobilised for the installation of the pipeline on the steep slopes.

As most of the ROW was in hilly, rocky, swampy, dense forest areas where approach roads were nonexistent, Punj Lloyd had to construct and/or maintain more than 200 kilometres of inaccessible ROW, build approach roads and bridges and develop and maintain the logging roads. For the transportation of the pipes and bends, hauling and stringing in a 35 kilometres long stretch in Limbang, air crane helicopters were used.

The undulating terrain calls for a huge number of field bends, estimated at 22,000, which are almost 50 per cent of the total number of pipes. Communication was another challenge due to the remoteness of the area where use of satellite phones and radio signals were impossible. Initially, when the Punj Lloyd team set foot in the region, no mode of communication existed. There are many areas where satellite phones are still not available, and a complicated system of messaging had to be devised for communication.

In order to meet the installation requirements, a unique execution plan was formulated to take into account the varied terrain and inclement weather. The salient features of the execution strategy include:

- A configuration of work in four independent spreads
- Establishment of two camps per spread i.e. a total of eight camps
- Increase in the number of mini crew in

tough and undulating terrain to ensure the required productivity is achieved

- Air crane helicopters for airlifting and transporting pipes in inaccessible areas, pipe shifting by dozers and excavators with sledges. Heavy duty winches and a cable crane system for installation of the pipeline on steep slopes
- Construction and maintenance of approach roads, bridges, culverts and logging roads
- Push pull method in swampy areas. Of the initial 25 kilometres of the pipeline route, 18 kilometres is in swamp, with a single push pull of 4 kilometres
- Other conventional crossing methods such as open cut crossings, thrust boring and HDD methods

The most challenging feat was to lay the pipeline with extreme sensitivity, without disturbing the tribal people who inhabit 120 kilometres of ROW, live a semi-nomadic life and hunt with blow pipes. To communicate with the tribal people, the project team employed locals from tribal areas nearby who could interact and sustain regular dialogue with the tribal leaders. Cultural programmes were held with the tribal members for better integration and understanding. Under the Corporate Social Responsibility programmes of Punj Lloyd and in keeping with the guidelines of Petronas, the tribes benefited from the development of local infrastructure, schooling and daily health clinics established at various site camps along the entire pipeline route.

The construction of the Sabah Sarawak gas pipeline is a real challenge taken up by Punj Lloyd and the team is committed to complete it on time, to the client's satisfaction. IRJ

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