TWISTS AND TURNS OF ICHTHYS PROJECT—THE ROAD TO FID AND BEYOND

---INPEX as the First Japanese Operator of a World-Class LNG Project
getting over TECOP Challenges---

**Jiro Okada**
Vice President of Ichthys Project Division
INPEX Corporation

**KEYWORDS**
Australia, Darwin, Ichthys, TECOP Challenges, Circle of Mutual Trust

**ABSTRACT**

On 13 January 2012, INPEX made the Final Investment Decision to develop the Ichthys Gas and Condensate Field, which targets the first production by the end of 2016, having overcome a number of Technical, Economical, Commercial, Organizational and Political challenges.

Upon the award of the exploration permit for the WA-285-P acreage off Western Australia in 1998, INPEX faced the first challenge to find exploration partners. Having failed that, INPEX had to complete the exploration works at its own risk, but it was rewarded by the excellent discovery of the condensate-rich gas field in 2000, and that was followed by successful drilling of a series of appraisal wells to delineate the vast accumulation of hydrocarbons. After the extensive studies, INPEX had matured the development concept to locate the LNG facilities on the Maret Islands off the Kimberley Coast, and commenced environmental approval processes in 2006.

Facing a lack of political supports over the environmentally untouched Maret Islands which was also regarded as one of holy places by the indigenous people, however, INPEX started to investigate alternative concepts and locations for the development, and in September 2008, INPEX chose Darwin as the plant site. This brought us another boost of technical challenges including an 900km subsea pipeline from the Ichthys Field to Darwin, one of the largest scale of the floating production facilities and so on, as well as a number of social and political issues. Furthermore INPEX has managed all these challenges with ever-rising costs and a closing LNG marketing window firmly in mind. With the mission to share Japanese values with the world, INPEX was fortunate to attract many talented people all across Australia and worldwide to establish Perth as the centre of gravity for the Ichthys Project.

Based upon mutual trust and benefits among all stakeholders, INPEX is now fully geared to deliver a safe and reliable project within budget and on time thereby ensuring stable supply of LNG to buyers in a carbon constrained future for decades to come.

This paper outlines the paths of progress of the Ichthys Project.

*What is presented here is based on the statuses of the project as of December 2012.*
1. **DAWN OF ICHTHYS PROJECT**

Indonesia Petroleum Ltd., a forerunner of INPEX CORPORATION, was established in the 1966 in Tokyo to explore and develop oil reserves in Indonesia. The company expanded its operations into neighbouring Australia in the latter half of the 1980s and worked together with both international and local E&P companies on a number of oil and gas exploration and development projects. By late 1990s, INPEX had already acquired a decade of experience working in Australia through participation in a number of offshore projects as a joint venture partner, building up knowledge, experience and results. After studying the data obtained over these years of operation in the region, INPEX geologists determined that there existed great potential
for reserves of oil and gas in the offshore Browse Basin in Australia, which had been, at the time, one of the largest most scarcely explored petroleum provinces in the world.

This block was offered in an open tender in March 1997 by the Australian Government, and INPEX began further studies after acquiring geophysical survey data in addition to the study results already in hand. After the geologists accumulated more data and determined which blocks were considered to have high potential, the decision was made to take up the challenge as an operator in Australia in hope of achieving future growth.

With the aforesaid confidence, we participated in the open tender conducted by the Australian Government in March 1998 for petroleum acreage located in the Browse Basin off the coast of Western Australia (WA), about 200km offshore from the remote Kimberley region in Australia’s northwest. This led to a successful bid for an exploration permit for WA-285-P in August 1998 as an operator.

After the exploration permit was granted, the next challenge was to find a “partner”. To reduce the risk of carrying out the exploration drilling campaign, we approached international and local oil companies asking for their interest to farm-in. However no positive responses were received. To make the matter more challenging, despite our application with Japan National Oil Corporation (JNOC) to fund our exploration expenditure, JNOC tuned down our application as JNOC was focusing upon oil exploration (but not natural gas exploration) at the time. Although the risk was not hedged by farm-out, nor reduced by the JNOC scheme, we decided to solely advance the exploration drilling believing in the potential for a great amount of gas in the area. It was, indeed, very rare for INPEX, half owned by the Japanese Government at the time, to carry out exploration without JNOC funding.

2. DISCOVERY & APPRAISALS

2-1 Geological Success

In the first drilling campaign, which took about one year from March 2000, three exploratory wells were drilled. The presence of gas and condensate was confirmed in each attempt. In May 2001, we commenced obtaining 3D seismic data for further interpretation as each discovery was initially believed to be separate pools. Encouraged by this exercise to dream that three discoveries might be connected, the second drilling campaign began in June 2003, and three further exploratory wells were drilled to confirm that the dream had come true! We did discover a huge gas and condensate field, which was named “Ichthys Field”. The name “Ichthys”, meaning “fish” in ancient Greek, was given after the great amount of fossilized fish that had been discovered in the vicinity of the block.

In April 2007, two more wells were drilled to confirm the extent of the gas and condensate field. Through the intensive evaluation works thereafter, including the results from these eight wells, recoverable reserves from the field have been significantly upgraded. Thus, over a 40-year period, having started from a joint venture partner in Indonesian projects, INPEX had obtained the basis for operating a major project that will play a key role in the world’s LNG industry.

Intensive work led us along the path of further progress where INPEX was granted Petroleum Retention Lease (WA-37-R) over the Ichthys Field in September 2009, followed by the grant of two Production Licenses for the development and production of the Ichthys Field on 1 March 2012. These are WA-50-L (for the area that the Retention Lease WA-37-R previously covered) and WA-51-L (for an extension to the Ichthys Field, called Ichthys West), with areas of 913.4 km² and 166.0km² respectively.

Figure 4: Location of the Ichthys Field: the blue line showing the proposed Gas Export Pipeline (GEP) route.
2-2 In pursuit of an Onshore LNG Plant Site

Coinciding with the exploration work, initial studies were conducted in 2002 to define the development concept, including the process system studies and the market research. A variety of approaches such as LNG, LPG, raw gas (domestic supply), methanol, GTL, etc. were examined. Bearing in mind a simple principle to adopt "Field Proven" technology to the development, and taking the upside potentials of the reserves and the process systems into account, we came to conclude that the most appropriate product slate was LNG, LPG (propane and butane) and condensate for the Project.

Given this discussion, the site selection studies for the Ichthys Onshore LNG plant also commenced.

INPEX started to carry out site screening studies focusing upon the sparsely populated Kimberley region. However we quickly bumped into a “sacred song line” of some 2,000 km cherished by various groups of the Aboriginal People covering most of the Kimberley coast. Then with criteria including land access, flat tops supported by hard rocks, and deep sea access, we extended our surveys to hundreds of offshore islands in the Kimberley, and identified a number of islands with potential for locating LNG plant and its related facilities.

Ultimately the Maret Islands were chosen as our most preferred candidate as the plant site requiring the construction of a causeway between North and South Islands with North Island for airport and accommodation, and South Island for the LNG plant and the related facilities. A key advantage of the Maret Islands was that there was deep water in close proximity and, therefore, minimal dredging would be required for it to be a suitable export location. Having confirmed, through our preliminary survey carried out by environmental scientists and archaeologists, that no tourists visit the islands, no significant scarce flora and fauna was present and there were no sacred sites for the Aboriginal People, we decided to carry out the concept development with the Maret Islands as the primary site. An Environmental Referral Document naming the Maret Islands as the primary plant site was submitted to the relevant authorities in May 2006.

Though the Native Title was, as yet, undetermined (had not been considered by the Courts), we felt that it was consistent with INPEX’s corporate social responsibility to assume that the Native Title existed over the Islands. Having duly identified the relevant Traditional Owners of the Maret Islands as the Uunguu People, we seriously engaged ourselves in negotiation with them and their representative body the Kimberley Land Council (KLC). In mid-2007 INPEX was officially welcomed by the Uunguu People/KLC management onto the Maret Islands with traditional welcoming smoking ceremony. We were almost in a state of euphoric trance.

During the course of the investigations of the Maret Islands and the ongoing negotiations over the Native Title and heritages, there were a number of impasses that were resolved through the development of a better mutual understanding between the parties. This led to a belief that, we were edging closer to finalisation of the agreement covering our usage of the islands including a benefit package for the Uunguu People and the wider Kimberley Aboriginal Community. Despite the positive progress, however, we were unable to confirm alignment in support for Ichthys Project among various community groups including the Aboriginal People in the Kimberley region within a suitable timeframe.

In parallel with the Native Title negotiations, we carried out further investigation of the Maret Islands deploying an army of scientists, archaeologists and geologists. Having obtained a permit to carry out geotechnical surveys over near shore as well as on the islands, we were in the middle of the operation when an anti-development group mounted a protest at the islands. While it was a minor protest, this was the first active engagement by opponents to the establishment of oil and gas development in the Kimberley.

In order to firmly establish a land tenure bankable, we sought the WA Government support for the deal to cement the agreement and firmly secure our land tenure over the Maret Islands. Despite their initial supports and our tenacious efforts to convince the WA Government to firmly stand behind us, it had unfortunately become increasingly clear that the Government no longer officially supported our development on the Maret Islands. Anti-development movements appear to have caused the Government to pursue an idea of concentrating the regions’ LNG developments into a single hub rather than allowing each project to construct facilities in locations that best suited the needs of the specific project. The WA Government formed the Northern Development Taskforce to select one single site for LNG development in the Kimberley citing the Maret Islands as one of many candidate sites including James Price Point which was later selected as the LNG Hub Site.

As these circumstances unfolded, we started to have serious concerns that it might be difficult to obtain full political and governmental supports, and secure the land tenure covering the Maret Islands, environmental approvals and other essential permits within our timeframe. Amid these events, we seriously started to look into other alternatives. While a Darwin option had been part of the initial site selection process, it was as a
result of these circumstances in mid-2007 that we started to seriously study Darwin as an alternative location to the Maret Islands which were much nearer to the Ichthys Field.

3. Road to FID - overcoming Technical, Economical, Commercial, Organisational and Political challenges.

3.1 Technical
Concept Selection & Pre-FEED
The series of Concept Development Planning (CDP) works conducted up to December 2005 identified and recommended the candidate locations including the Maret Islands consisting of South and North Islands as the preferred location and Darwin as one of alternatives.

Maret Islands, located off the Kimberley Coast in Western Australia and about 200km away from the Ichthys Field, had been considered as the primary candidate mainly because of its geographic/technical advantages which would enable INPEX to transport the gas and liquids from the field with relatively small scale of offshore facilities. Extensive studies of the region had shown that the proposed development would impose a minimum foot print on the pristine Kimberley region.

While, as previously discussed, we were facing many difficulties to maintain the Maret Islands case, Darwin, the capital of the Northern Territory, emerged as the alternative location. The Northern Territory (NT) Government had been showing us its eagerness to host Ichthys LNG plants as early as from 2005. In our view, the development timeframe for the proposed James Price Point Gas Hub did not match the needs of the Ichthys Project.

There had been technical challenges to overcome the tyranny of distance from the Ichthys Field to Darwin requiring nearly 1,000km of subsea pipeline and significant increases in the size and complexity of offshore process facilities to sustain the pipeline. With people’s dedicated works, however, having identified a lot of advantage such as easy access to well established infrastructure and various services as well as constructability and operability, we confidently concluded that the Darwin development concept would be technically, economically and environmentally feasible. In September 2008, INPEX finally selected Darwin as the LNG plant site since this option did provide the certainty required to progress into FEED. (For the twists and turns in this process of site decision, please refer to 3.6.)

For the offshore process facilities, a number of options had been considered and eventually a semisubmersible facility was selected after conducting a comprehensive analysis taking into consideration factors such as safety, relatively soft soil, technical advantages, operational stability, schedule and cost.

Figure 5: Announcement of LNG Plant Site Location on 26 September 2008
(From left) Martin Ferguson, Minister for Resources and Energy, Minister for Tourism, Commonwealth of Australia / Naoki Kuroda, INPEX Chairman / Paul Henderson, Chief Minister, Northern Territory
FEED

Offshore

The Front End Engineering and Design works (FEED) for the Offshore Facilities were performed from April 2009 to July 2011 by AMEC as a contractor, with support from subcontractors Aker Solutions and JP Kenny. The main objective of the FEED was to deliver a sufficient level of design documentation to enable the Operator to make attainable costs estimate and technical specifications for the various construction packages leading to the preparation of Invitations to Tender (ITT) for the Engineering Procurement and Construction (EPC) phase. The ITTs were issued to the potential contractors for each facility package starting from October 2010. INPEX completed the evaluation works of the bids for the majority of the packages by Q4 2011, selecting the successful contractors for the main offshore packages ready for execution upon making the Final Investment Decision (FID).

Onshore

The FEED works for the Onshore LNG Facilities were conducted from January 2009 to March 2011 by an international consortium comprising some of the most well-known engineering companies, namely JGC Corporation, KBR Inc., Chiyoda Corporation formed the “JKC Joint Venture”. Together with the FEED works, the JKC Joint Venture was contracted to participate in an Open Book Tendering (OBT) process with the Operator to define an optimized concept for the EPC phase. The OBT process was structured to maximize competitions between subcontractors and equipment and material suppliers while providing transparency of the costs to the Operator. This approach was designed to provide the Operator with reasonable certainty of the cost estimates and the execution schedule while providing positive incentives for JKC to stay within budget and the agreed schedule at the EPC phase. Having completed all these works, we were ready for execution of the EPC contract with JKC upon making FID.

Development Concept (Anzen Daiichi: Safety first!)

Development of the Ichthys Field will require the drilling of approximately 50 production wells over the Project’s approximately 40-year lifetime. The first 20 wells will be drilled in the initial construction period within the execution phase, and the remaining 30 wells will be drilled later to maintain the gas production as the two reservoirs making up the field are depleted over time.
A subsea tree is installed at the top of each well and will be connected to the Drilling Centres equipped with the manifolds which are to commingle the produced raw gas into the flow lines and flexible risers to the Central Processing Facility (CPF).

After thorough studies, a semisubmersible CPF was adopted as it was considered to be the best adapted to the deep sea gas and condensate field where the sea bed is uneven, soft and far from the land. The raw gas will be received on board the CPF, and the separated liquids will be transferred by pipe to the Floating Production, Storage and Offloading facility (FPSO). The remaining gas will be dried and pressurized to be delivered into the 42-inch pipeline connecting to the Darwin LNG Facilities.

The greater amount of the condensate separated offshore will be transferred through a transmission line to the nearby FPSO where the condensate will be treated, stored and shipped to the off-take tankers for export. The dried natural gas from the CPF will be directed through the approximately 900km-long GEP to the Onshore Facilities at Blaydin Point on Middle Arm Peninsula in Darwin Harbour for processing into LNG and liquefied petroleum gases (LPGs). The lighter condensate comingle into gas will be separated and treated onshore for shipment from Darwin Harbor.

While you can consider the Ichthys LNG plant as a "green field" project, it is being constructed in an area where the other gas based developments are already in operation. The plant and its related facilities will comprise two LNG processing trains, each producing 4.2 million tons per annum, LPG fractionation plant, condensate stabilization unit, LNG tanks, LPG tanks, and Condensate tank. The plant and the product export terminal will be located on Blaydin Point about 11km to the southeast of the Darwin's central business district.

The two LNG processing trains will produce 8.4 million tons per annum of LNG for about 20 years and 1.6 million tons per annum of LPGs at production plateau. It will also produce an estimated 100,000 barrels of condensate per day both offshore and onshore combined at peak. The production period will continue over 40 years. The near shore infrastructure will consist of an approximately 35km-length of the subsea pipeline from the entrance of Darwin Harbour to the shore crossing on the western side of Middle Arm Peninsula; a module offloading facility on Blaydin Point for receiving prefabricated gas-processing modules; a two-berth product loading jetty on the northwestern end of Blaydin Point; and a navigation channel, turning basin and berthing pocket for the product tankers.

---

Figure 7: Schematic of the Development Concept
Developing The Contracting Strategy
As we proceeded with the FEED activities, we developed the following EPC contract strategy to allow us to be ready for execution right after the FID date.

Offshore
1. Modify the FEED contract with AMEC to include preparations for issuance of the ITTs and evaluations of those tender results together with INPEX;
2. Maximisation of lump-sum contracts;
3. Competitive tenders;
4. Scope of each EPC Package to include maximum possible at shore commissioning on top of transportation, installation and hook-up;
5. Selection of an independent commissioning contractor to cover the Offshore System as a whole;
6. Selection of a project management service contractor to cover CPF and FPSO; and
7. Complete EPC contract negotiations and ready for execution right after FID.

Onshore
1. Maximisation of lump-sum contracts;
2. Introduction of a re-measurable portion with intention to minimise the reimbursable elements;
3. Memorandum of Understanding (MOU) to be negotiated with JKC covering profit margin, risk premium, and overhead items of the EPC contract prior to the commencement of the OBT exercises;
4. OBT exercises are to cover main sub-contractors so as to enable JKC to execute those main sub-contracts right after FID;
5. EPC scope to cover interface management, pre-commissioning, commissioning and performance tests including production test for design capacity prior to its official handover to INPEX;
6. Maximum possible modularisation; and
7. Dredging contract to be outside the scope of EPC with JKC so as to ensure the accountability for this critical scope to be coordinated at the highest levels directly managing a dredging contractor.

Having established the above contracting strategies for both Offshore and Onshore, we seriously reviewed our practical schedule to complete the negotiations to our satisfaction covering all the main EPC contracts before FID. Taking well into consideration marketing and financing progress, we postponed our FID target by approximately one year in order to finalise all the major EPC contracts with appropriate due diligence and risk management. This ensured a completely prudent approach to manage costs and schedule.

3.2 Economics
We successfully completed the primary EPC contract negotiations, securing lump-sum contracts for 75% of the overall EPC scope of work. This eliminated uncertainties associated with the project costs.

Although the Ichthys Project requires significant initial investment, the Project produces a relatively large volume of condensate in comparison to the other LNG projects, making return on the investment quicker,
strengthening the business case for the project. In addition, INPEX operates the project to deliver a stable and large free cash flow over a long term after the start of production by producing LNG. The strength of the Ichthys Project is its production slate – three products from one investment. LNG, LPG and condensate produced at internationally significant volumes for a very long period of time make this project a remarkable and economically sound one.

Financing has also been an important factor in the development of this project since it demands massive investment. Commercial banks from Japan, Australia, Europe, the USA, etc. as well as Export Credit Agencies (ECAs) from a range of countries are involved in financing the Ichthys Project. The agreement for project financing was successfully completed December 2012 as the largest project financing ever undertaken. INPEX had to overcome many difficulties to make project financing feasible as we moved ahead with the FEED, the governmental approvals, and marketing activities in parallel. While the tender processes of the EPC contracts and acquiring various governmental approvals as well as sensitive negotiations over LNG marketing were advancing, the due diligence by lenders including their technical, commercial and legal, consultants was undertaken. While providing the extensive information and data, we took the opportunity to hold face-to-face meetings between the project and the due diligence teams from the commercial banks and ECAs to deepen the mutual understanding thereby resolving any concerns.

3.3 Commerce-Marketing

LNG Buyers

Ichthys Project is a world-class undertaking by INPEX as the Operator, covering both upstream and downstream as an integrated LNG project, which has never been undertaken by any other Japanese company in the history of LNG industry. The contribution to a safe and stable LNG supply to Japan, which is so poorly endowed with energy resources, is one of the most important missions for INPEX and one of the key reasons that INPEX was established.

LNG projects with long lead time require a huge capital commitment, much more so than standard oil development projects. Thus it was essential for the success of the Project to identify potential LNG buyers and to conclude sales agreements prior to making FID, thereby ensuring the Ichthys Project was financially viable.

We consistently exchanged views with potential LNG buyers, with the intention of deepening our understanding on their needs. Finally we came to share with them the view that it was to the mutual benefit that INPEX successfully deliver the Ichthys Project as an Operator, and ensure safe and stable LNG operations. In line with this basic philosophy of mutual trust, INPEX strenuously negotiated with the potential LNG buyers to secure the terms comparable with the other competing LNG projects. At the end, INPEX finalised the sale of the full volume of LNG from the Ichthys Project with signing of legally binding Sales and Purchases Agreements with Tokyo Electric Power Company, Inc. Tokyo Gas Co., Ltd, the Kansai Electric Power Company, Osaka Gas Co., Ltd., Kyushu Electric Power Company Inc., CPC Corporation, Chubu Electric Power Company, Inc. and Toho Gas co., Ltd. as well as with Total Gas & Power and INPEX with a contract duration of 15 years from 2017.

It should be noted that Taiwan’s CPC Corporation secured a large volume of LNG. This is notable as the first LNG sales agreement secured with a Taiwanese energy company for Australian LNG.

Some Ichthys LNG volumes will also be delivered to INPEX’s own Naoetsu LNG Receiving Terminal on Honshu Island in Japan, which is currently under construction and expected to begin operations in 2014, in line with INPEX’s growth strategy to strengthen its gas supply chain.

INPEX expects that the majority of condensate and LPG volumes will be sold into Far East and Southeast Asian markets.
Joint Venture Partners
In November 2006, INPEX selected TOTAL as its joint venture partner as we had cultivated a long-standing partnership with them elsewhere in the world. TOTAL has substantial experience constructing and operating several major LNG development projects around the world. TOTAL offered a number of excellent people with significant expertise and good truck records to have delivered big projects comparable to Ichthys and they had been well integrated into INPEX’s operator organisation. The full alignment between INPEX and TOTAL did form the platform for a circle of mutual trust to successfully deliver the Ichthys Project.

INPEX also transferred small parcels of its interest to some LNG buyers who were interested in partnering with the project in parallel with marketing arrangements.

3.4 Community and Environment

Community
INPEX is committed to support the sustainable development of the communities in which INPEX operates throughout its project life, thereby improving social and economic well-being of the communities affected and of course minimising impact on the environment.

The Ichthys Project is the biggest investment ever made in the Australia’s Northern Territory, and probably the second biggest in Australia’s history. Its significant social and economic benefits will be delivered to the community, both in Darwin and elsewhere in the Northern Territory. These benefits will include regional and social infrastructure enhancement, employment and training opportunities, and the local business growth through the supply of goods and services, as well as royalties paid to the Federal Government and the other public revenue streams to the Northern Territory. Obviously, contribution and benefits from the project will also be spread throughout Australia, including Western Australia where the Project’s head office is located.

The Ichthys Project committed to carry out procurement in a full, fair and reasonable manner to produce positive opportunities for the NT and Australian local companies. Aboriginal businesses and people are a key focus of this local content strategy throughout construction and subsequent operations. Acknowledging this, we developed an Industry Participation Plan with the NT Government, which was the basic platform for the involvement of the Northern Territory businesses and other commercial stakeholders.

INPEX highly values its relationships with the community and especially with the Aboriginal and Torres Strait Islanders who are the traditional and historic owners in Australia. An MOU was reached with the local Aboriginal group in Darwin - the Larrakia People - through the Larrakia Development Corporation as early as in 2009. This MOU seeks to contribute to the sustainable economic future for the Aboriginal communities in the Darwin area by creating training, employment and business participation opportunities, sharing with them the mission to successfully deliver a safe, reliable and sustainable Ichthys Project.
As an example, in 2010, we contributed A$3 million to fund construction of the Larrakia Trade Training Centre, the biggest cross-training facility under one roof in the Northern Territory in line with the aforesaid agreement with the Larrakia People who held such a concept for a long time for their young generations. It is delivering accredited qualifications, traineeships and apprenticeships to Aboriginal and non-Aboriginal students from across Northern Australia including basic English and mathematics. We also wanted to ensure lasting benefits to the Northern Territory. INPEX was proud to invest in the Centre which will be pivotal in up-skilling and growing the sustainable local workforce. As the operator of the project, we fully recognize that the Australian Government’s desire that natural resource projects become more closely involved with educational institutions.

Environment

In addition to our Environmental Impact Statement (EIS) commitments, we committed to the Northern Territory in the area of environmental and social benefits so as to provide long-term benefits for the local community and the environment over the life of the Project and beyond.

The package includes supports and implementation of the following:

Darwin Harbour integrated monitoring and research programme: Improving the understanding of the health of the Harbour through funding and implementing important research and development programmes over a 40-year commitment.

Conservation status of coastal dolphins in the Northern Territory: A long-term survey of coastal dolphins to improve the understanding of dolphin numbers, distribution and critical resource needs. Identifies locations and habitats of importance, providing valuable information to protect and maintain dolphin populations.

Habitat mapping for the Darwin region: Producing habitat maps of the Darwin region will provide baseline information, inform monitoring and allow for coastal planning. The project will involve scientists from various organisations and the Aboriginal ranger groups.

Conservation management of marine mega fauna in the Western Top End: INPEX recognises the significance of dolphins, dugongs and marine turtles to Darwin’s Traditional Owners, and the other Aboriginal groups in the NT. This initiative allows for the Aboriginal groups to actively manage marine mammals and turtles along the Territory coast, securing conservation status and increasing employment in disadvantaged areas.

Publication of the Kimberley region research: INPEX has undertaken extensive studies and surveys gathering information on marine turtles and whales along the remote Western Australian Kimberley coastline closer to the Ichthys Field. This unprecedented research, which costs A$25 million, will be published by INPEX and made accessible to the general scientific, regulatory and wider community.

Australian Research Council (ARC) Linkage Projects: ARC Linkage projects support collaborative research and development programmes between higher education researchers and industry partners. INPEX is proposing to support two projects over three years, both with a focus on Darwin Harbour.

Savannah fire management: Working with the NT Government to pursue savannah fire management opportunities that will offset some greenhouse gas emissions. Fire management initiatives offer significant opportunities for the Aboriginal employment in the Territory.

North Australian Centre for Oil and Gas: we donated A$3 million to Charles Darwin University for constructing the Centre which opened on 20 November 2012. A range of industry specific courses will be introduced to help the Northern Territory become a leader in training and researches for the oil and gas industry.

Although we decided to locate the LNG facilities in Darwin, we continue to review the needs of the Kimberley community in order to assist Traditional Owners in the region. For example, INPEX made a contribution of A$500,000 through the Kimberley Foundation Australia towards the establishment of two new Professorial Chairs in Rock Art in the University of Western Australia’s Centre for Rock Art Research and Management. This donation enabled the establishment of a perpetual chair to advance the acquisition and dissemination of knowledge about the Kimberley rock art. This chair has been created specifically to provide a greater understanding of the Kimberley rock art and to ensure its appropriate heritage management through long term, integrated research programs that will be conducted in collaboration with the Aboriginal People. The research studies will bring together technical aspects of rock art studies and heritage management which will fit alongside traditional interpretations.
Together with the above environmental and social commitments, we consider it imperative to reduce greenhouse gas (GHG) emissions from the Ichthys Project. We continue to explore all practical GHG management strategies taking into consideration the Australian legislative outcomes of recent years.

The development of a portfolio approach to GHG mitigation may afford the lowest risk and cost approach for the Project, avoiding a reliance on any single solution and providing flexibility to adapt over time. Opportunities such as engineering abatement, biosequestration, which includes carrying out a reforestation assessment project (645ha) in Western Australia to accumulate know-how and to conduct risk analysis, geosequestration (Carbon Capture and Storage (CCS)) and the purchase of emission permits from the market are all being considered and evaluated at this time. And we will make endeavours to reduce GHG emissions by optimising the energy efficiency of Offshore and Onshore Facilities.

3.5 Organisation

The primary mission of INPEX in Australia is as the Operator of this world class undertaking to deliver a safe and reliable project on time and within budget by commercialising the Ichthys Gas and Condensate Field in time to capture the anticipated market window. This mission was established in 2007 with positive participation from employees at the time through a process of many interviews and proactive suggestions.

In October 2010, INPEX implemented a revised project management organisation that formalised a compact project structure with all the key functions to deliver the Project. The Ichthys Project Division is headed by a dedicated Managing Director with the necessary delegated authority to manage the key package deliverables. The primary driver for a dedicated management team was to realise the Ichthys Project key milestone of FID on schedule and to go into the execution phase, smoothly to attain the first production at the end of 2016.

The project structure encapsulates all the necessary technical and project support functions, capability and resources. The Project Managing Director now has the following powers:
• all the functions and resources within his management control to deliver the Ichthys Project according to the agreed schedule
• the necessary delegations via the Manual of Authority (MOA)
• management control and decision capability over the technical and non-technical resources to deliver the Ichthys Project to the agreed schedule.

Divisional directors are provided with sufficient management scope of control to deliver the various packages of works in the Onshore and Offshore divisions.

During the period of the initial phase from 2000 through 2006 in particular, we found it challenging to recruit talent as the company “INPEX” was not widely known in Australia. Also, there were some sceptical views that INPEX had never played a role of LNG operator in the past because most of the LNG projects INPEX was involved were generally operated by experienced international oil companies. In addition, with so many LNG projects in development around the world, there is a shortage of professionals and skilled labour in general, so the market for people is highly competitive.

However, gradually we have succeeded in gathering competent people as INPEX’s employees by adopting the following methods.

• Improvement in visibility of the company “INPEX” and the project “Ichthys” through initiatives such as running booths at the exhibitions in and outside of Australia, placing advertisements in the airports in Australia and so on. These have contributed to the improvement in company’s visibility.
• Differentiation from other companies: In established operators, manuals, policies, systems etc. are already prepared. On the contrary, INPEX provides the opportunities to become involved in the development of the culture and processes from the very start. As a consequence, the ability to
participate in creating the Ichthys Project concept has caught people’s attention and attracted challenge minded individuals.

- Adoption of a family concept and the “rice paddy” spirit: This means that INPEX thinks of the company, the employees and their family as one big family. Not just the employees but their family also participate in various activities providing the opportunity to share and exchange the ideas and the values of INPEX. The rice paddy spirit comes from a traditional value of Japanese culture where people inherit a rice paddy from their ancestors to cultivate and hand over in an improved state to the next generations, sharing resources with the other villagers along the way. A person of high respect is the one who leaves a better rice paddy to their sons and daughters. As a result of this philosophy, the families of INPEX employees better understand INPEX and the Project leading to strong support for the Ichthys Project, and resulting in increased motivation to accelerate and to successfully deliver the Project. Creating a circle of mutual trust ensures mutual benefit throughout the project life which has succeeded in helping to attract talents and reducing turnover of personnel to sustain the organisation.

3.6 Politics – Government Relations, Bipartisan and Community Support

In pursuit of the LNG Plant site, there were many twists and turns prior to our official decision and announcement. A Darwin option had been part of the initial site selection process although it was not until around mid-2007 that we started to study Darwin as a potential alternative location to the Maret Islands which, while nearer to the Ichthys Field, was become increasingly uncertain.

**Plant Site Selection**

We are fortunate to enjoy support from widespread communities and the government supports for the Project in Darwin. As a result, we were able to conclude the Project Development Agreement with the NT Government which was fully ratified through a unanimous vote of the NT Parliament to firmly secure the land tenure and reconfirm by-partisan support. This did not come so easily.

At the project front in Perth headed by the undersigned, despite progress in our negotiations with the KLC and the Uunguu People covering the use of the Maret Islands, we started to have serious concerns in regard to the Maret Islands as a viable option.

It was around this time of 2007 when the NT Government representatives visited us in Perth to present Darwin as an option for the LNG plant site for the Ichthys Project. Impressed by their enthusiasm, we commenced very close communications with NT to strike a deal to secure the land tenure in parallel with studies to determine the viability of the Darwin option.

Because we had made significant pre-investments for the Maret Option and officially our primary location was still the Maret Islands, we could not make any commitment to the NT Government. However we were badly in need of legally binding commitments from the NT Government to gain much needed project certainty and help to persuade Tokyo and Paris to move away from the Maret Islands to Darwin. Difficult negotiations ensued but finally we secured commitments from the NT Government in November 2007. While we were keenly waiting for a commitment letter reflecting our negotiation outcomes, we were shocked to be notified that the Chief Minister had decided to resign. This was quite alarming to us as negotiation outcomes were very touchy and delicate so the undersigned immediately flew to Darwin to meet the new Chief Minister. We were very fortunate to find, to our great relief, the new Chief Minster unequivocally honoured the verbal undertaking and negotiation outcomes.

It was a very difficult task to convince Tokyo and Paris to go along with the Darwin option because of their attachment to the Maret Islands option. It took us almost 5 months to make an internal decision to officially submit the Operator’s recommendation to go with the Darwin Option and inform the WA Government. The decision was further complicated by the state elections in both the NT and the WA jurisdictions. As we did not wish to have the Ichthys Project as an election issue, we withheld any decision in order to remain politically neutral believing in the importance of maintaining bi-partisan political supports.

We finally made an official decision to locate our LNG Plant site to Darwin on 26 September 2008. The key drivers of this were the increased certainty of access to land for the LNG plant and the ability to, therefore, to develop a definitive timeframe and schedule for the Project on top of advantages described in 3.1 above.

**Government Approvals and Licences**

To commence this world scale development, it was essential to have strong supports and alignment from the Australian Government as well as from the NT Government, Darwin being the LNG Plant Site, and from the WA Government, the Ichthys Field being located offshore WA. In August 2006, INPEX was granted the
Major Project Facilitation status for Ichthys. This action recognised that the development of the Ichthys Field would contribute to the long-term economic development of Australia.

The Australian Federal, WA and NT Governments granted Pipeline Licenses from all the relevant authorities covering 900km. In this complicated process covering five jurisdictions, INPEX was pleased with the strong coordination across the governments in supports of the Ichthys Project.

Extensive long-term environmental surveys were conducted, including the Offshore Facilities, the GEP and the Onshore LNG plant. The survey results were submitted in a form of EIS Draft for public review for three months from July through to September 2009, and after taking into consideration the opinions and comments of a variety of stakeholders, we applied for and received the EIS approvals in May 2011 from the NT Government and in June 2011 from the Federal Government. The Field Development Plan was approved in November 2011, and the offer for the Production License followed shortly thereafter.

By now it should be clear in the reader’s mind as to the scale and complexity of this Project. No company, on its own can achieve such an undertaking with the buy-in and committed, willing support of its key stakeholders.

Furthermore, any project having such a critical influence over the local economy in which it operates, must engage with the government. This is no different for the Ichthys Project and its long-term relationships with the government at the State and the Federal levels in Australia.

As an Operator, INPEX must give credit where credit is due, and acknowledge the significant role the Northern Territory and the Australian governments have played for the success of the Ichthys Project.

With the supports of the Australian Minister for Resources and the NT’s Chief Minister, the progress toward FID was rapid and without significant obstacles.

The working relationship between the project and the government could be regarded as a benchmark in how to work with the elected representatives of the communities within which we operate. One can see that the objectives of the Ichthys JV, its customers, stakeholders and the governments involved are all solidly aligned. With this mutual trust, respect and support, our success is assured.

3.7 FID

After all of these endeavours, on 13 January 2012, we made the Final Investment Decision to develop the Ichthys Gas and Condensate Field. Overcoming the Technical, Economical, Commercial, Organisational and Political (TECOP) hurdles had been a tough challenge but we made it.

The Ichthys Project’s FID signals the commencement of the execution phase of one of the world’s largest LNG facilities based on an estimated 40 years of gas and condensate production from reserves in the Browse Basin, offshore Western Australia. In delivering this important Project into production, INPEX will be securing vital long-term energy supply to Japan and other customers while delivering sustainable economic and social benefits across Australia. Ichthys production volumes represent approximately 10% of Japan’s LNG imports at current levels and Ichthys will provide a long-term stable supply of cleaner energy to Japan, and help Japan diversify its energy sources.
4. EXECUTION – DEVELOPMENT PHASE

Upon FID, all contractors for construction of the Onshore and Offshore Facilities had been selected based on their performance records and reliability. INPEX now is well into the execution phase carrying out detailed design and procurement works concerning each facility as well as site preparations, dredging in Darwin Harbour, and construction of Accommodation Village through to 2013. From 2014 through to 2015 INPEX will drill production wells and construct the facilities. We are targeting commencement of production by the end of 2016.

Ichthys Project is truly an international collaboration. Approximately 4,000 people will be required in Darwin at the peak of Onshore construction ahead of the first gas. A full-time workforce of 300 people would operate and maintain the gas plant over the 40-year life of the Project, with a further 400 supporting the operations of the Offshore Facilities.

(As of December/2012)

<table>
<thead>
<tr>
<th>Facility’s name</th>
<th>Contractor’s name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore LNG Facility</td>
<td>JKC Joint Venture (JGC Corporation, KBR, Chiyoda Corporation)</td>
</tr>
<tr>
<td>Dredging</td>
<td>Van Oord</td>
</tr>
<tr>
<td>Central Processing Facility (CPF)</td>
<td>Samsung Heavy Industry</td>
</tr>
<tr>
<td>Floating Production Storage and Offloading vessel (FPSO)</td>
<td>Daewoo Shipbuilding &amp; Marine Engineering</td>
</tr>
<tr>
<td>Subsea Production System (SPS)</td>
<td>GE Oil &amp; Gas</td>
</tr>
<tr>
<td>Subsea flow line construction and installation</td>
<td>McDermott in cooperation with Heerema</td>
</tr>
<tr>
<td>Gas Export Pipeline (manufacture)</td>
<td>Mitsui-Europipe, Sumitomo, Metal One-Nippon Steel</td>
</tr>
<tr>
<td>Gas Export Pipeline (concrete coating)</td>
<td>Mitsui-Bredero Shaw</td>
</tr>
<tr>
<td>Gas Export Pipeline (pipe lay)</td>
<td>Saipem</td>
</tr>
</tbody>
</table>

Figure 14: Key EPC Contractors
Project Locations

Ichthys Project activities are geographically spread across the world. Permanent offices have been established in Perth and Darwin, with supporting offices providing specific expertise from Yokohama, Houston, Aberdeen, Kuala Lumpur, Singapore and South Korea. Fabrication site offices include Thailand, China and a number of other locations in Southeast Asia.

![Figure 15: The Ichthys Project Locations in the Execution Phase](image)

Project Progress

- **10 January 2012** Sales and Purchase Agreements completed
- **13 January 2012** FID
- **February 2012** Major Contract Packages were awarded. GEP line pipe was started to be manufactured
- **March 2012** First HSE CEO Forum gathering all the CEOs of Ichthys Contractors both Offshore/Onshore
- **April 2012** Site preparation work at the Blaydin Point (Onshore LNG Plant site) commenced
- **May 2012** The formal ground-breaking ceremony held at the Blaydin Point site in Darwin. The site preparation work commenced on both the Blaydin Point and Howard Springs sites
- **August 2012** Started dredging in Darwin Harbour to create a safe shipping channel to Blaydin Point as well as for Module Offloading for the Ichthys Project. Dredging project has commenced one of the strictest environmental monitoring programmes yet undertaken for a major project in Australia.
- **November 2012** Second HSE CEO Forum
- **December 2012** Project Financing with ECAs and major commercial banks successfully completed
- **End January 2013** First steel cutting ceremony for the CPF and FPSO Turret
Figure 16: Ground-breaking Ceremony of the LNG Plant - May 2012
(From left) Naoki Kuroda, INPEX Chairman / Julia Gillard, the Prime Minister, Commonwealth / Paul Henderson, former Chief Minister, NT / Mike Sangster, TOTAL E&P Australia Managing Director

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Selection Land Tenure Secured</td>
<td>Pipeline Approvals</td>
<td>FID</td>
<td>Production Licences</td>
<td>Production start-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Approvals</td>
<td>Received pipeline licences (May 2011)</td>
<td>Offshore FEED Work</td>
<td>Offshore EPC Preparation Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Received environmental approvals (May and June 2011)</td>
<td>Onshore FEED Work</td>
<td>Onshore EPC Preparation Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production licences offered (November 2011) followed by P&amp;Ls March 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Offshore EPC
Commencement of Offshore facilities fabrication works
Start drilling of development wells

Onshore EPC
Commencement of Onshore facilities fabrication works

Project Finance
Confirm lenders' intentions
To sign loan agreements; first drawdown
 LNG purchase commitment from buyers

Gas Marketing

Figure 17: Key Milestones
5. OPERATION-ANZEN DAIICHI: SAFETY FIRST

INPEX Operations Pty. Ltd. will manage all the facilities and assets of the Ichthys Project. The operations centre will be based in Perth, Western Australia, consisting of senior management, technical specialists and administrative support personnel.

The Onshore LNG Facility will be supported by the local management and technical resources including a combination of resident and fly-in-fly-out staff and contractors. Each of the offshore facilities will be managed with stand-alone capability but will be under the overall control of a single field manager resident on the CPF. The facilities will operate under a single management system covering safety, integrity management and business support, to provide consistency in standards and to maximise compliance, efficiency and continuous improvement of operations across the assets. Comprehensive business support systems will also be put in place to ensure visibility and integrity of information across the support bases, including specialists and vendors, and to optimise oversight and responsiveness to manage each facility.

Personnel will be mobilised from both the local and the international sources. The majority of the component of the operations personnel will be sourced by INPEX staff, supplemented by a number of contractors, vendors and specialist consultants where appropriate and necessary. A comprehensive training and competence management framework will be put in place.

The supply-chain functions, including materials management, procurement, repairs, and air and marine logistics will be integrated within the operation. All facilities will be subject to regular inspections and maintenance, including periodic planned shutdowns and campaigns. Experienced personnel will be assigned to ensure that each event is properly planned to make the most effective use of such opportunities in order to achieve optimum level of production.

Comprehensive emergency response capabilities will be available at all times, and trained personnel will be allocated throughout all levels of the organisation at worksites, in support locations, and with specialist contractors to minimise escalation of any adverse events. This will reduce risks to personnel and the environment and allow prompt return to normal operations.

During the Project’s execution phase the Operations team is led by Director of Operations, supported by capable and experienced staff already exceeding 100 in number reporting to Managing Director Ichthys Project and will be responsible for the following:

- actively engaging with the Project team in the Project design, construction and commissioning phases to contribute to and assure the final quality, maintainability and operability of the Ichthys Facilities and to prepare for start-up
- managing the start-up process from the point of introduction of hydrocarbons to the Facilities following the Project team’s achievement of the “Ready For Start-Up” milestone
- ensuring recruitment and training are undertaken to secure sufficient competent personnel for start-up and ongoing operations
- Managing the planning and delivery of core operations systems, contracts and support assets

We are planning to have recruited and duly trained operation people of over 700 by the middle of 2016 at the latest to ensure smooth and seamless transition from the execution phase to the operation phase upon completion of the successful hook-up and commissioning.
6. CONCLUSION-FOR THE SUCCESS OF THE PROJECT

As described above, the Ichthys Project has been progressing and is now well into the execution phase. The Project is gaining the world’s attention as the first major LNG project undertaken by a Japanese company as an Operator. INPEX is steadily moving forward with safe, efficient development toward our goal of commencing production by the end of 2016 and thereafter over 40 years and beyond.

Like any other major LNG projects, the Ichthys Project can only become successful based upon the ever-evolving good relationship with LNG buyers through the integrated system from the identified gas source, LNG plant and shipping arrangements as the case may be. For the project to be successful, it is essential for all the stakeholders, governments & communities in Australia, LNG buyers, lenders, contractors to be combined and integrated in the circle of mutual trust, sharing the mission to row the same boat called “Ichthys” together to the mutual benefit of all.

The Project is strongly supported by the circle of mutual trust which is an icon of strengthening interdependency among Australian, Japanese and other stakeholders. It is INPEX’s pride to be the Operator of the global and dynamic project that is Ichthys!

![Circle of Mutual Trust to Mutual Benefits Ensuring Security of LNG Supply throughout the Project Life and Beyond](image)

Figure 18: Circle of Mutual Trust to Mutual Benefits Ensuring Security of LNG Supply throughout the Project Life and Beyond