
INPEX
Ichthys LNG.
Our journey.

Ichthys LNG.

Our journey.

INPEX acknowledges and thanks the traditional custodians of the land and waters on which we operate. We pay our respects to Elders past, present and emerging.

Photographs used in this book courtesy of INPEX archives and Anthony Hills, INPEX Operations Technician.

The Ichthys LNG Project is led by INPEX (the Operator), alongside major partner TOTAL and the Australian subsidiaries of CPC Corporation Taiwan, Tokyo Gas, Osaka Gas, Kansai Electric Power, JERA and Toho Gas.

This book is dedicated to all those who have played a part in bringing the Ichthys LNG Project to life, and their families who have supported them.

Ichthys Explorer CPF site team members, November 2016.

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Seiya Ito, President Director Australia, INPEX

Message from the President Director Australia

"We had the drive and determination to make it happen."

Seiya Ito, President Director Australia, INPEX

The Ichthys LNG Project has been an amazing journey of success.

Twenty years ago, INPEX arrived in Perth, Western Australia, in a move that would prove to be the start of our greatest challenge yet – to build and operate one of the world's biggest resources projects.

Today, as the operator of Ichthys LNG, we can look back with immense pride at what we have achieved. Together, we have created something special, something that many people thought could not be done.

We discovered the giant Ichthys gas and condensate field in 2000, two short years after establishing an office in Perth. It was our first large commercial discovery after regaining exploration operator activities in the mid-1980s, and the fourth operator exploration block that we challenged.

Few people understood how we could unlock the potential of this extraordinary hydrocarbon discovery. Our critics said the field was too technically challenging. INPEX had never been a major project operator before. We had limited experience and lacked the resources to make the project work.

What we did have, however, was willpower – the drive and determination to make it happen.

Further, the challenge we'd experienced through our exploration operator activities was crucial in helping us transform into an LNG development and production operator.

With the vision and support of INPEX CORPORATION in Tokyo, we brought together an extraordinary and diverse group of professionals from all over the globe, who successfully built one of the most technically challenging LNG projects ever undertaken.

The Ichthys LNG Project has been delivered with an unwavering commitment to safety, allied with world-class engineering. Anzen Dai Ichi, or Safety Number One, continues to be our core value that has underpinned our journey.

On behalf of INPEX, I would like to thank the tens of thousands of people from across the globe who have worked on the Ichthys Project. From day one, I have seen highly motivated and hardworking people who have lived and breathed INPEX's values of safety, integrity, diversity, ingenuity and collaboration. Their determination has been critical in bringing our amazing project to life.

I would also like to thank our Joint Venture participants, including major partner Total, and the Australian subsidiaries of CPC Taiwan, Tokyo Gas, Osaka Gas, Kansai Electric Power, JERA and Toho Gas.

Ichthys has been described as the key to INPEX becoming a world-class energy business. I firmly believe INPEX can be proud of its position as an LNG operator, however I know our journey is far from over. Our challenge now is to demonstrate that we are a safe, reliable and efficient operator – only then can we say we are a truly world-class integrated energy company. I know we have the people and the will to get there.

As we embark on 40-plus years of sustainable operations, providing future generations around the world with energy and opportunity, we can look forward with great optimism.

Seiya Ito,
President Director Australia, INPEX
October 2018

Investigating onshore site options in Western Australia in 2007.

Chapter one

New frontiers

"We were the new kids on the block, we believed there was a commercial discovery to be made in the Brewster Member formation, and we were given the green light by INPEX CORPORATION to *'go for it'*."

Shinsuke Ban, former General Manager Exploration, INPEX Australia

Offshore

The Ichthys Project's offshore operations are comprised of a central processing facility (CPF) and a floating production, storage and offloading facility (FPSO).

The Ichthys Explorer CPF is the world's largest semi-submersible platform. Over a 40-year lifetime, it will support hydrocarbon processing systems, utilities and workers' living quarters. After initial processing at the CPF, most condensate is transferred to the Ichthys Venturer FPSO for further offshore processing.

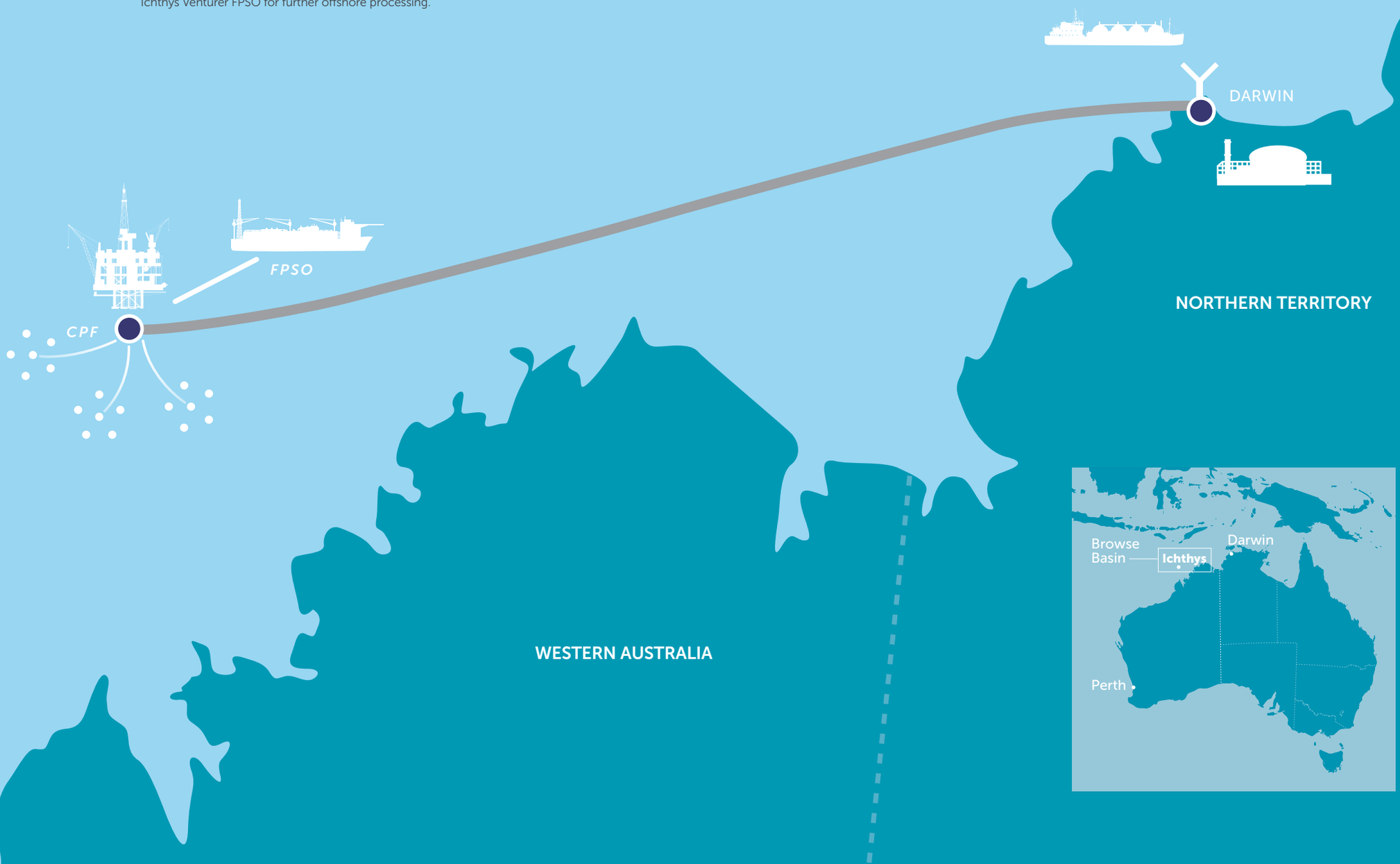
Pipeline

One of the world's longest subsea gas export pipelines, the 890-kilometre Ichthys pipeline unites the Ichthys Project's offshore and onshore operations. The pipeline delivers natural gas and some condensate to the Ichthys onshore processing facilities, near Darwin in the Northern Territory, to be prepared for export.

In total, the pipeline length is equivalent to the distance between the major Australian cities of Sydney and Melbourne.

Onshore

The Ichthys Project's onshore processing facilities, at Bladin Point near Darwin, cool gas delivered via the Ichthys pipeline and transform it into a liquid, reducing its volume for transport. The purpose built, state-of-the-art onshore facilities include two liquefied natural gas (LNG) trains, liquefied petroleum gas (LPG) and condensate plants, product storage tanks, administration facilities, utilities and a materials offloading facility and jetty.



The Ichthys LNG Project

The Ichthys Project is a marvel of modern engineering. As a liquefied natural gas (LNG) and condensate project off the north-west coast of Australia, Ichthys may seem like 'just another resources project', but it is so much more.

The Ichthys Project is one of the most technically demanding resources projects on the planet. Its scale, remote location and even the characteristics of the Ichthys Field itself, presented challenges that many people in the industry thought could not be overcome. Yet through vision, ingenuity and sheer willpower, INPEX and the hundreds of contractors that helped design and build the facilities have made it happen.

The Ichthys offshore facilities and subsea structures are among the largest and most advanced in the world, operating in often hostile marine conditions. More than 130,000 tonnes of subsea equipment, along with the 50 or so wells that will be drilled over the life of the project, will unlock the estimated 12 trillion cubic feet of gas and 500 million barrels of condensate in the Ichthys Field.

The Ichthys Explorer central processing facility (CPF) is the world's largest semi-submersible platform, while the Ichthys Venturer floating production, storage and offloading (FPSO) facility tips the scales as one of the largest and most complex ever constructed.

For the next 40 years these colossal facilities will push natural gas and residual condensate through the longest subsea gas pipeline in the southern hemisphere. At an astonishing 890 kilometres long, the Ichthys gas export pipeline unites the offshore operations with a state-of-the-art onshore processing plant at Bladin Point near Darwin in Australia's Northern Territory.

The onshore facilities are no less impressive. With the capacity to produce up to 8.9 million tonnes of LNG and 1.65 million tonnes of liquefied petroleum gas (LPG) per year, the Bladin Point facilities will deliver energy and create jobs for generations to come – in Australia and across Asia.

But these are just the numbers. What makes the Ichthys Project unique is the human endeavour behind it – the drive and determination to achieve something many thought could not be done.

What began with the foresight of a handful of people in 1998 to explore a field many had dismissed, became a journey that has brought together tens of thousands of people in Australia and around the world.

This book tells the Ichthys story. A story of vision, innovation and the will to make it work.

Ichthys Project journey

1998

Exploration permit WA-285-P awarded

2000

2000–2001
Exploration campaign

2006

Total farm-in (24 per cent)

2007

2007–2008
Appraisal drilling campaign

2008

Bladin Point Darwin selected for the onshore facilities location

Q4 2008 – Q2 2011
Front–end engineering and design

2011

Q3 2011
Environmental impact statement government approval

Binding LNG sales and purchase agreements

2012

Final investment decision

2013

Onshore module first steel cut

Ichthys Explorer CPF hull first steel cut

Q2 2013
Module offloading facility and jetty pocket dredging complete

Ichthys Venturer FPSO hull first steel cut

Q3 2013
Manigurr-ma accommodation village opened

Gas export pipeline (GEP) manufacture completed

2014

FPSO keel laying

Umbilicals, risers and flowlines (URF) riser support structure tower installation

2015

Ensco 5006 semi-submersible drilling rig arrived in the field and commenced drilling production wells

GEP deep water pipe lay completed

Offshore production commences

First field condensate cargo

First liquefied natural gas cargo

Last onshore module installed

First liquefied petroleum gas cargo

2016

2018

2017

Installation of 133,000 tonne subsea network complete

Ichthys Explorer CPF sail away

Ichthys Venturer FPSO sail away

Ichthys Explorer CPF safely moored in Ichthys Field

Ichthys Venturer FPSO safely moored in Ichthys Field

Our values

Safety

Anzen Dai Ichi – 'Safety Number One' – is the way we think, act and promote safety at INPEX that forms the core of a strong HSE culture.

Integrity

We embrace initiative and innovative problem-solving at all levels of INPEX and celebrate our successes at every opportunity.

Diversity

We proactively embrace our individual differences which are central to who we are at INPEX and what makes a unique and welcoming workplace environment.

Ingenuity

We embrace initiative and innovative problem solving at every level of INPEX and celebrate our successes at every opportunity.

Collaboration

We rely on unity and team spirit to build strong professional working relationships both within INPEX and the communities in which we operate.

The origins of Ichthys

The Ichthys Project story began in 1998 with a A$ 3000 cheque, issued by INPEX CORPORATION in Tokyo to purchase an offshore exploration permit. The WA-285-P permit signalled the beginning of an ambitious attempt to explore a remote area of the Browse Basin, 220 kilometres off the north-west coast of Australia in the Indian Ocean.

At the time, the Browse Basin was believed in the resources industry to be a rich source of hydrocarbons. Now known as the Ichthys Field, the area was initially drilled by Woodside in 1980, however, it was believed at the time that the structure could not be developed and commercialised without any testing or sampling.

Shinsuke Ban, then General Manager Exploration at INPEX Australia, was the visionary geologist who convinced INPEX top management, including INPEX CEO Kunihiko Matsuo, that INPEX could succeed where others had failed.

“We were the new kids on the block, we believed further potential for the commercial discovery in the area was totally underestimated, and we were given the green light by INPEX CORPORATION to ‘go for it’,” Mr Ban said.

INPEX CORPORATION was eager to grow its global portfolio and take the giant leap to becoming the operator of a world-class project, with the aim of becoming a global integrated oil and gas exploration and production company. The Ichthys Project had the potential to catapult INPEX into this position.

A producible hydrocarbon discovery would also provide a significant opportunity to strenghten Japan’s energy security. Determined to succeed, INPEX CORPORATION pressed ahead with geological and geophysical studies in the Browse Basin.

INPEX had been working in Australia predominantly as a non-operator since 1986 and opened an office in Melbourne in 1993. INPEX Australia opened a Perth office in 1998, shortly after securing the WA-285-P exploration permit. The office was home to just three people, supported by a handful of others in Tokyo. The early days were long and hard, and the team persevered through challenges, the largest of which was attracting the right people to INPEX – a relatively unknown name in Australia at the time.

One of the original Perth trio, Director Corporate Coordination Hitoshi Okawa recalled the sense of adventure during those early days.

“Very few people in Australia knew INPEX and none of us had any experience working in Australia, so it was a very steep learning curve,” Mr Okawa said.

“It was an exciting time – getting the right people on board, learning the Australian culture and way of doing business, finding out what would and would not work. Every day we learnt something new.”

It wasn’t until three exploration wells were drilled in 2000/2001 that INPEX knew it had found something with real potential.

1. INPEX Australia’s original Perth office team, January 1999.

(L-R standing) Chief Geophysicist Wataro Kato, General Manager/Exploration Manager Shinsuke Ban, Chief Geologist Graham Pitt, Geologist Takahiro Zushi, Receptionist Liz Anderson, Senior Geophysicist Rob Nunn and Senior Draftsman Graeme Cockram.

(L-R seated) Exploration Advisor Peter Watson and Deputy General Manager Administration and Finance Hitoshi Okawa.

2. INPEX Australia team meeting in Perth, 2002.

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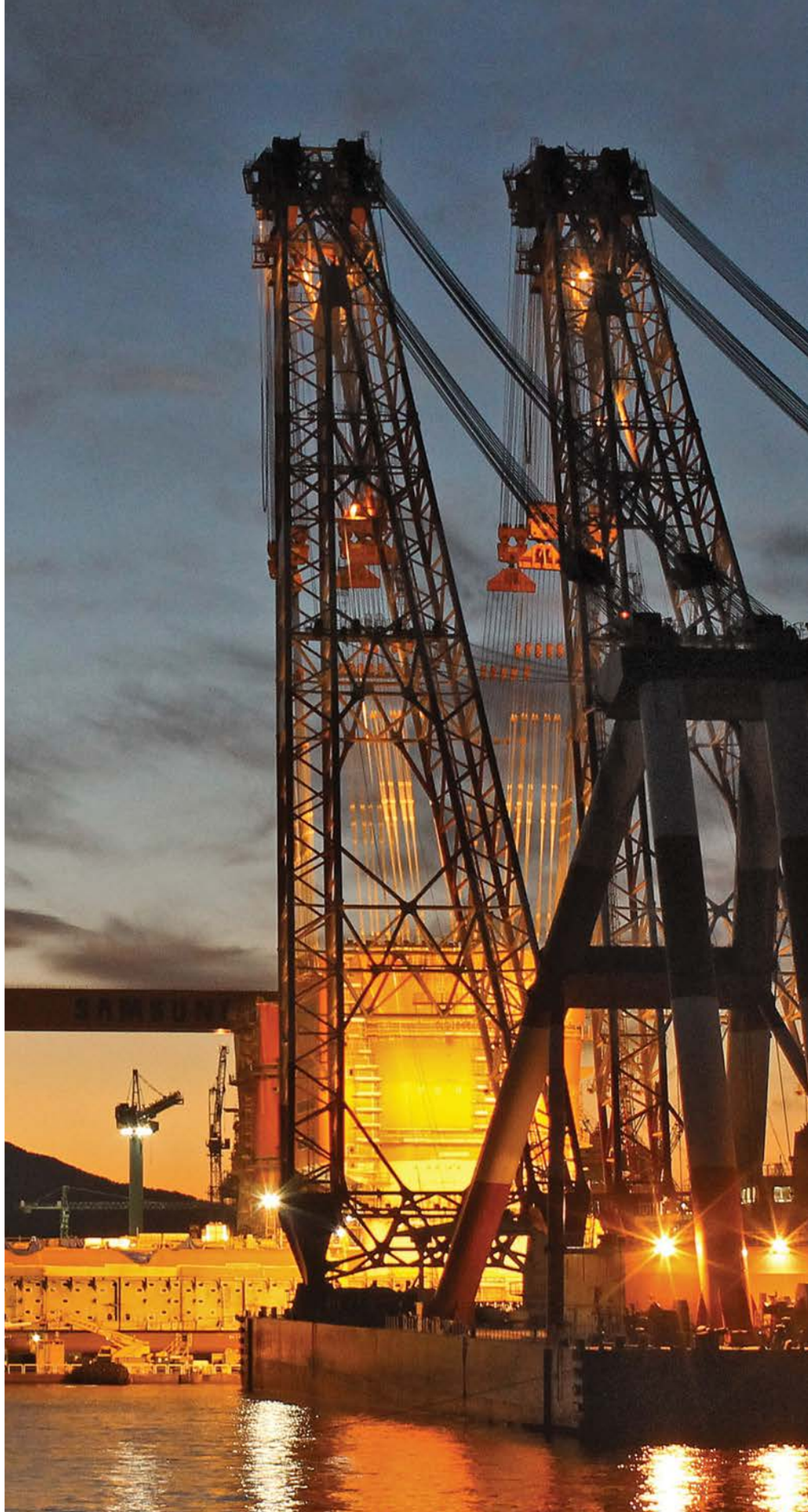

"When we found the gas we were excited, but remained cautious."

Wataru Kato, Chief Geophysicist during the Ichthys exploration and seismic analysis campaign

The Ichthys Field *– unlocking the potential*

INPEX's drilling program from March 2000 to February 2001 resulted in the largest discovery of hydrocarbon liquids in Australia in more than 30 years.

Three exploratory wells were drilled in what is now known as the Ichthys Field. The Brewster Member and Plover Formation, deep in rock 4000-plus metres beneath the sea surface, were found to be rich in gas and condensate liquids, with the potential to yield millions of tonnes of LNG.

Wataru Kato was the Chief Geophysicist to lead seismic analysis of the field, and one of the first Japanese expatriates based in Perth.

"When we found the gas we were excited, but remained cautious," Mr Kato said.

"We weren't yet sure how big the reservoir was, or whether we could commercialise such a remote field."

Further appraisal verified that INPEX was sitting on something special: much to the industry's amazement, Ichthys was found to be a vast, producible gas condensate field.

This exciting discovery officially kicked off the INPEX-operated Ichthys Gas Field Development Project in 2002. The Perth team quickly grew from three people and work started on conceptual project assessment to determine the type, size and cost of the development to be built.

The next leg of the Ichthys journey had begun.

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1. On board the SEDCO 703 rig, May 2000.

2. Inspection of core samples from the Dinichthys 1 well, 2000.

OPPOSITE
The Songa Venus drilling rig in the Ichthys Field, 2008.

Choosing the onshore site

> **"It soon became clear Darwin was the best option."**
>
> Bill Townsend, General Manager External Affairs and Joint Venture, INPEX Australia

> **"From that moment, in mid-2008, all of the pieces really started to come together."**
>
> Sean Kildare, General Manager Darwin, INPEX Australia

Having established the immense potential of the Ichthys Field, the next decision was what type of project Ichthys should be. What would be the best option to maximise the value and success of this huge discovery?

INPEX weighed up numerous options for potential onshore locations and product slates – including a gas-to-liquids development – before deciding that an LNG project was the best solution. At the time, Japan was the world's biggest LNG importer while the US, as an emerging LNG importer, was believed to be capable of taking surplus capacity. INPEX also investigated a possible tie into existing LNG operations before confirming the Icthys hydrocarbon resource was sufficient for a standalone onshore development.

After a comprehensive survey of Western Australia's Kimberley region for an area suitable to house onshore processing facilities, the Maret Islands became the focus of attention. As the closest potentially suitable landfall, only 190 kilometres from the Ichthys Field, the Marets seemed the best choice for a site from technical, environmental and commercial perspectives.

Talks with the Commonwealth and Western Australian governments began in earnest, as INPEX looked at how best to develop a Maret Islands site. The Company wrestled with the twin challenges of securing land access and environmental approvals, plus a tight timeframe to meet the forecast market window for the LNG development.

In 2007, the Northern Territory's then Chief Minister Clare Martin and Chief Executive of the Department of the Chief Minister Paul Tyrrell travelled to Tokyo, to propose Darwin as the location for the Ichthys onshore facilities.

The timing of this Tokyo visit proved auspicious, as the Western Australian Government announced shortly thereafter an intention for all LNG projects in the state to be co-located in a single 'hub.'

Under the direction of the General Manager Jiro Okada, INPEX began investigating the Darwin option (known as 'Plan C' internally) seriously through the remainder of 2007 and into 2008.

"The 'hub' concept eliminated the Marets as an option," INPEX Australia General Manager Darwin Sean Kildare said.

"We focused on bringing the Project to Darwin, which we already knew was achievable from an engineering perspective. The Northern Territory Government was willing to engage deeply and look at how we could develop this as a real opportunity."

Despite the vast distance from the Ichthys Field to Darwin (almost 900 kilometres), the 361 hectare Bladin Point site in Darwin's inner harbour proved the ideal location.

Bill Townsend, General Manager External Affairs and Joint Venture, was the first to visit Darwin and a member of the team who evaluated the Darwin site.

"It soon became clear Darwin was the best option. The land was zoned for industrial use, there were roads, rail and we had the support of government and the community," Mr Townsend said.

The opportunity presented by the Darwin site was relayed back to INPEX CORPORATION in Tokyo and to Total headquarters in Paris. Bladin Point was the answer they had been looking for.

In July 2008, INPEX Australia finalised a Project Development Agreement with the Northern Territory Government for the Ichthys LNG Project, which was unanimously ratified in the Territory's parliament in September that year.

"Very quickly, we had land, a project concept to design and build, it was operable, commercially viable and we had committed government support," Mr Kildare said.

"From that moment in mid-2008 all of the pieces really started to come together."

The Ichthys Project had a clear direction, an onshore location and was gathering momentum.

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1. INPEX Australia team members investigating onshore site options in Western Australia, 2007.

2. On September 26, 2008, the Ichthys Joint Venture (INPEX 76 per cent and Total 24 per cent) officially announced that Bladin Point had been selected as the location of the proposed Ichthys LNG processing facility.

3. Bladin Point in 2009 – the chosen site for the Ichthys Project's onshore facility.

4. Nearshore geotechnical studies in Darwin Harbour, 2009.

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1. The signing of financial documents in Tokyo, December 2012.

2. Signing of the Ichthys Project Final Investment Decision in Darwin on 13 January, 2012.

The road to FID

"

FID was when the project became real. Suddenly people looked at INPEX differently and began to recognise what our people had achieved and could achieve."

Hideki Iwashita, Director Commercial Coordination, INPEX Australia

Final investment decision (FID) represents perhaps the biggest milestone for any project, and the Ichthys Project was no exception. The Ichthys FID, announced by INPEX CORPORATION Chairman Naoki Kuroda in January 2012, proved a watershed moment for INPEX and the Joint Venture.

FID was the culmination of tens of thousands of hours of dedication and painstaking attention to detail. Perhaps more importantly, it marked a coming-of-age for INPEX as a player in the global LNG market.

At the time of the Ichthys Field discovery and appraisal, INPEX was not well known in Australia and although financially capable, it was not an operator - its workforce, project management and technical capability had to grow accordingly.

INPEX had the foresight to secure a first class partner to help develop the Ichthys Field. In 2006, long-standing business partner and oil and gas super major Total acquired a 24 per cent[1] participating interest in the project, bringing with it decades of operating experience and expert resources.

Building strong professional relationships between Total and INPEX was important to successfully delivering the Ichthys Project. The positive working partnership between President Director, INPEX Australia Seiya Ito and General Manager Total E&P Australia Adrian Hodgson was vital in moving the project through its early stages.

The Ichthys Project gathered pace, with INPEX growing its technical capability and workforce throughout the pre-front end engineering and design (FEED) and FEED phases of the project. The onshore FEED contract was awarded to JKC Australia LNG – a joint venture between JGC Corporation, KBR and Chiyoda Corporation in January 2009, followed by award of the offshore FEED contract to AMEC Engineering in April 2009. The critical pre-FEED and FEED phases saw development of the Ichthys concept, detailed design, feasibility studies and commercial evaluation of how INPEX could make the project a reality.

By 2011, the number of people working for INPEX on the Ichthys Project had grown from fewer than 25 in 2002, to more than 1000. In June 2011, after three years of extensive environmental surveys and socio-economic studies, the Ichthys Project's Environmental Impact Statement (EIS) was approved, paving the way for FID. Securing the EIS was a huge milestone, as it required the approval of government, regulators and the broader community to ensure INPEX could deliver and operate the project safely and conscientiously, while minimising environmental impacts.

One of the biggest challenges on the road to FID was securing financing to fund the project. INPEX's commercial team, led by Director Commercial Hideki Iwashita, worked tirelessly to secure world record project finance of USD$ 20 billion.

"INPEX was not an experienced operator, so we had to do a lot of work to convince all our stakeholders we could make this work," Mr Iwashita said.

"It was a real chicken-and-egg situation. We had to convince investors we had capable contractors to deliver the project and that we had solid buyers in place to purchase the LNG - but to convince the contractors and buyers, we had to secure financial backing from the investors.

"It took a huge effort but we managed to put all the pieces together so we could reach the final investment decision."

In 2011, sales and purchase agreements were signed with JERA[2], Toho Gas, CPC Corporation Taiwan, Tokyo Gas, Kansai Electric Power Osaka Gas, and Kyushu Electric Power for LNG from the Ichthys Project. The same parties (with the exception of Tokyo Electric Power and Kyushu Electric Power) purchased equity shares and were welcomed as Ichthys Project Joint Venture participants over the course of 2011 to 2015.

With approvals in place, LNG contracts locked in and FID made, the world sat up and took notice as the Ichthys Project began to take shape.

[1] Increased to 30 per cent in 2012.

[2] Formerly Tokyo Electric Power and Chubu Electric Power.

"

The [Ichthys] well names weren't initially popular in Tokyo because they were difficult to pronounce. But Mr Shoya, the INPEX CORPORATION Chairman at the time, told me 'never mind, once the gas field is discovered everyone will have to remember them'."

Shinsuke Ban, former General Manager Exploration, INPEX Australia

What's in a name?

The Ichthys Project derives its name from several put forward by Shinsuke Ban, the INPEX geologist and exploration manager who was the driving force behind the decision to explore the field. Also a keen naturalist, Mr Ban suggested prehistoric fish names for the three wells that were drilled in May 2000: Dinichthys-1, Gorgonichthys-1 and Titanichthys-1.

That drilling campaign confirmed INPEX had discovered a viable hydrocarbon field, so Ichthys was the logical name for the entire project.

Ichthys is the ancient Greek word for fish.

The first Ichthys Project logo, designed by Shinsuke Ban in 2000, was a stylised skull of a Dinichthys, an extinct genus of fish from the Late Devonian period.

Many fossils belonging to this fauna have been discovered in the sediments of the Devonian Kimberley reef system (known as Gogo fish).

Ichthys
PROJECT

A new Ichthys Project logo was developed in 2009 – an origami design based on the original fossil fish graphic. The new design represents elements of the original logo, acknowledges INPEX's international origins and through a gradient of colour – from purple to deep green – it represents the project's movement from the offshore environment to onshore.

Shinsuke Ban explaining INPEX's activities at the Shinju-Matsuri festival in Broome in September 2006.

OPPOSITE
INPEX crew on the Songa Venus drilling rig in 2008.

Our people, culture and values

Achieving FID in 2012 was a watershed moment for INPEX: years of hard work and determination culminated in a green light for one of the world's most ambitious resources projects. The next challenge facing the business was to attract the very best people to build and operate Ichthys – key to ensuring a successful future.

At its construction peak, the Ichthys Project brought together more than 30,000 people from approximately 40 nationalities working in locations around the world. The project's inherent technical complexity and challenges were a magnet for some of the industy's best, who were drawn from all corners of the globe. One of the greatest achievements and most important part of the Ichthys journey has been the collaboration of a diverse and talented workforce, that has not only built some of the largest LNG facilities on the planet, but at the same time built a new operating company almost from scratch.

Prior to Ichthys, INPEX was primarily a non-operating oil and gas company. Partnering with a knowledgeable and experienced company like Total was indeed a coup de maître, however it was only part of the solution to help deliver Ichthys. In tandem with building the Project, INPEX had to create an entirely new operating business and with it an organisational culture.

INPEX's focus was to bring together people who could impart their ideas and experience as well as their commitment. Management systems, procedures and even a corporate culture had to be created where little existed before, so INPEX drew upon its diverse and multifaceted workforce to build its new operating company.

INPEX's values underpinned the Ichthys Project's construction and continue to provide the foundation for how INPEX operates today. There was a large focus on involving operations teams in project development early on, not only to assist with the technical handover of facilities, but to define values and behaviours that would endure through the decades of LNG production ahead.

INPEX Operations Director Conor Walker said the company had clearly defined its operating culture.

"We have developed behaviours, embraced our diversity and made it clear how we want to work with our partners, our suppliers and our communities over the next 40 years," Mr Walker said.

"Our operating culture will mature as we become more established and confident as an operator, but our values and the behaviours that come with them will endure throughout Ichthys and can set a template for more INPEX projects in the future."

Building an operating culture from scratch was not without its challenges. While the melting pot of people from Japanese, French, Australian and many other cultures provided an opportunity, it also presented some hiccups along the way. Naturally, it took some time for different business styles and cultures to gel.

Today, INPEX's 700-strong operations team includes people from all walks of life, with different levels of experience brought together from many different companies.

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1. Ichthys Project Leadership Team in Perth in 2015.

2-3. INPEX Australia's diverse workforce was built on the strong foundation of the INPEX values.

"We used the term 'extraordinary' in our recruitment branding, we wanted people to appreciate Ichthys wasn't just a regular LNG project."

Craig Hunter, General Manager
Human Resources, INPEX Australia

The Transocean Jack Bates drill rig arrived at the Ichthys Field in February 2015 and departed in June 2016.

Chapter two

Delivering a world-class project

"The highlight of Ichthys for me was the opportunity to work on one of the biggest projects in the world with so many different cultures."

Louis Bon,
Managing Director Ichthys Project, INPEX

Delivering a world-class project

Delivering a world-class project required a world-wide effort. Ichthys LNG is one of the largest and most complex resource development projects ever undertaken, with an operational life of at least 40 years. Creating facilities that could stand the test of time and operate safely in sometimes cyclonic conditions involved people from a multitude of cultures working in many different countries.

From detailed engineering in the United States, United Kingdom, Malaysia and Japan, to fabrication in South Korea, Thailand, the Philippines and China, experts from all over the globe converged to create something special in Australia.

Ichthys Project Managing Director Louis Bon, himself a secondee from French oil and gas super major Total, joined in to lead the project from construction through to operation, building on the work of his predecessor Antoine Serceau who was the Ichthys Project Managing Director between 2009 and 2013.

"One of the biggest challenges considering the size and complexity of the project, was coordinating all of the different offshore and onshore components, and making sure work was done safely," Mr Bon said.

"Contractors and subcontractors were located all over the world and we had up to 30,000 people at any one time working on the project.

"To bring everyone together under the same safety culture was not easy. We recognised the importance of strong leadership and having people onsite to work with and support our contractors, wherever they were located.

"Getting the timing right, making sure everything fit together safely and to the highest quality – this has been an extraordinary accomplishment."

The Ichthys Explorer central processing facility, built by Samsung Heavy Industries in Geoje, South Korea, is the largest semi-submersible platform ever manufactured, displacing 155,000 tonnes.

The 336 metre-long Ichthys Venturer floating production, storage and offloading facility was also built in South Korea, by Daewoo Shipbuilding and Marine Engineering in Okpo. In 2017, these two colossal facilities were floated safely from South Korea to their positions in the Browse Basin off the north-west coast of Australia, to work in tandem for the next four decades.

The onshore processing facility in Darwin comprises 230 modules manufactured in Thailand, the Philippines and China, all seamlessly brought together onsite to create the 520 hectare plant. The Darwin site is connected to the offshore facilities by the longest subsea pipeline in the southern hemisphere: a 890 kilometre gas export pipeline, fabricated in Germany and Japan and coated in yards in Malaysia and Indonesia.

"We should recognise the size and complexity of what has been achieved. When I had the opportunity to join INPEX Australia I was expecting a big project, but I was surprised at how huge Ichthys was," Mr Bon said.

"We brought together some of the industry's best companies and most talented people and were able to remain focused on a single objective – building and handing over the facilities to operations safely."

Safety was the single biggest focus throughout project construction, and remains so today. To make certain there would be a smooth and safe transition to operations, there was a thorough handover program between the construction and operation teams, which started well over a year before first

LNG production. This meant the people who would be operating the facilities had the opportunity to get used to working in an operating environment, working with the project team to refine procedures and embrace the safety culture.

“We’ve learnt lessons along the way and have built these into our HSEQ systems, but we will never be complacent. We are on a journey of continuous improvement and our aim is to make sure everyone can continue to work in a safe environment,” Mr Bon said.

“The Ichthys Project will deliver energy to our customers and create thousands of jobs for future generations.

“The highlight of Ichthys for me was the opportunity to work on one of the biggest projects in the world with so many different cultures.

“Building the project has been a fantastic adventure, but the journey is far from over. We have many, many years of production to come, and we should all be proud of the legacy created by the Ichthys Project.”

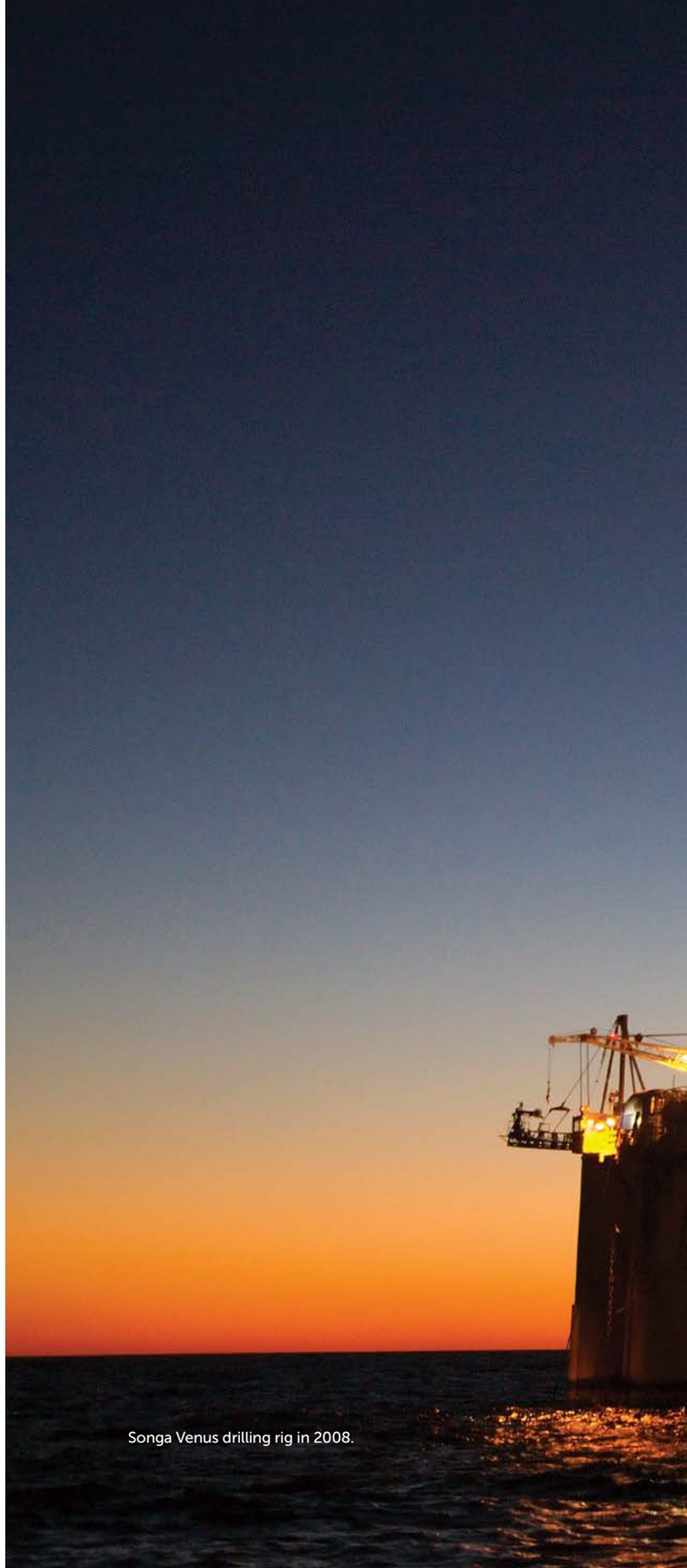
Louis Bon,
Managing Director Ichthys Project, INPEX

Louis Bon, Managing Director Ichthys Project, INPEX

Beneath the surface

The Ichthys Field is located in the Browse Basin, about 220 kilometres off the north-west coast of Western Australia and 820 kilometres south-west of Darwin. It covers an area of about 800 square kilometres and comprises two natural gas and condensate reservoirs: the Brewster Member and the Plover Formation.

The activities to unlock and tap into these huge hydrocarbon reserves – drilling development wells to access gas; laying umbilicals, risers and flowlines to transfer gas and reservoir fluids to the processing facilities; constructing the colossal gas export pipeline to transfer the precious energy to Darwin – were some of the Ichthys Project team's most remarkable achievements, and took ingenuity, tenacity and a lot of hard work.



Songa Venus drilling rig in 2008.

Ichthys Field subsurface

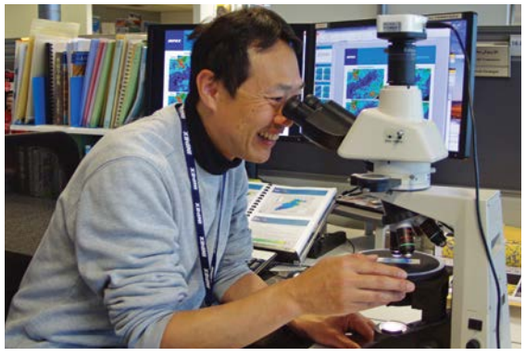
At the heart of the Ichthys Project are two giant reservoirs – the Brewster Member and the Plover Formation.

Following seismic acquisition, geological and geophysical studies in early 2000, INPEX conducted an appraisal drilling campaign (Dinichthys-1, Gorgonichthys-1 and Titanichthys-1). Subsequent infill appraisal wells were drilled: Ichthys-1 and 1A from June to October 2003 to test reservoir quality and the presence of hydrocarbons in the Brewster Member and to explore the separate fault block at Plover Formation level between Brewster-1 and Gorgonichthys-1; and Ichthys Deep-1 from October to November 2003, followed by Ichthys-2, 2A, 2A ST1 and ST2 from November 2003 to February 2004. Finally, Dinichthys North-1 was drilled in April to August 2007, followed by Ichthys West-1 in April to June 2008.

The Ichthys Field is huge – about 40 kilometres long and 20 kilometres wide – and a key challenge was to place wells optimally within the field. The lithologies above the Brewster Member reservoir have very high pore pressures, high formation temperatures and are extremely challenging to directionally drill.

To pinpoint ideal drilling locations, the geophysics team mapped all structural horizons and estimated reservoir quality. Once complete, the geomodelling team integrated this into their Brewster and Plover static reservoir models. The well planning and operations team then worked with the reservoir engineering team to locate the wells by building an integrated dynamic reservoir model and field development plan.

To this day, each new Ichthys well drilled offers new data, revealing new information about the reservoirs. This data collection helps reduce uncertainty, optimise well locations and maximise the value of the field.



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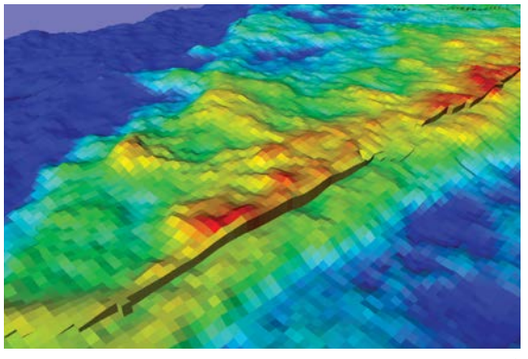

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1. Analysis of subsurface data.

2. A geological model of the Brewster Member reservoir.

OPPOSITE
View over the moon pool on the Songa Venus drilling rig, 2008.

"The sheer size of the Ichthys LNG Project is incredible. Coupled with a colossal development drilling campaign in a highly challenging subsurface environment, it has been amazing to be a part of this momentous project."

Adam Drescher, Lead Development Geologist, INPEX Australia

The Brewster Member comprises early Cretaceous sandstone (about 145 million years old), deposited in a submarine fan setting. The Upper Brewster Member is up to 80 metres thick and contains most of the reservoir's gas, with average porosity of between 8 and 14 per cent, and gas saturations of 80 to 85 per cent. Permeability in the higher quality zones is 30 to 50 millidarcies. A unique feature of this reservoir is its diagenetic history, which makes mapping the productive areas difficult.

The Plover Formation is early-to-middle Jurassic sandstone (about 175 million years old), deposited in a fluvial to marginal marine setting. The reservoir has a more complex mineralogical composition than the Brewster Member, containing coals, iron minerals (pyrite) and volcanics. The reservoir is divided into five sub-units, with gas predominantly in the top and middle units. Average porosity is 64 per cent, although porosity in the most productive areas is up to 9 per cent, with gas saturations of 94 per cent. Permeability in the productive areas is 50 to 80 millidarcies. A unique feature of this reservoir lies in the predictability of the location of the non-productive volcanic intervals.

"We have a great team with a positive attitude. We've taken the time and care to do things safely and correctly the first time, and that is reflected in the successes INPEX has had in the drilling campaign to date."

Tim Lee, Drilling Superintendent, INPEX Australia

Development well drilling

Seismic testing and drilling of appraisal wells during 2007 and 2008 by the Songa Venus semi-submersible drilling rig confirmed the vast quantities of natural gas in the Brewster Member and Plover Formation reservoirs. Throughout the FEED phase of the Ichthys Project and beyond the 2012 FID, INPEX's drilling team worked tirelessly to test, appraise and pinpoint optimal locations for the drill centres that would unlock the huge hydrocarbon reserves.

The first phase of development drilling saw 18 production wells drilled in the Brewster Member reservoir, drilled from five centres clustered in groups to minimise the project's footprint on the sea floor. When LNG production commenced in 2018, three drill centres were commissioned, comprising 11 wells.

Drill depths range from 4200 metres to 6500 metres, in water depths of between 235 metres and 275 metres. Around 50 development wells will be drilled over the lifetime of the project.

Development well drilling to date has been conducted by the Ensco 5006 and Transocean Jack Bates semi-submersible mobile offshore drilling units. Completion of the first three drilling centres to get offshore LNG production up and running was completed with an exceptional safety record.

Top-hole drilling was particularly successful during the campaign. Previous experience during exploration had identified significant issues when drilling the first 1200 metres from the seabed. By using a riserless mud recovery system, the team achieved 100 per cent first-time success in top hole section drilling across all wells.

Another notable improvement over the original exploration and appraisal wells was the application of directional and horizontal drilling. To achieve a wider collection of reservoir potential from fixed surface infrastructure locations, many of the wells required significant horizontal step-out from the surface location. This included extended horizontal drilling through the reservoir and installation of seven-inch reservoir liners, which then had to be ready for completion and flow back.

The specification of the Christmas trees installed in the wellheads was an industry first, comprising a seven-inch vertical production system designed to operate at temperatures of up to 155 degrees Celsius. This combination of large bore and temperature rating placed Ichthys among the world's most advanced and technical subsea drilling projects.

Team members on the Ensco 5006 rig, 2015.

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1. Team members on the Songa Venus semi-submersible drilling rig during appraisal drilling, 2008.

2. Analysis of drilling data on the Songa Venus rig, 2008.

OPPOSITE
Well testing on the Ensco 5006 rig in February 2017.


ENSCO 5006
ENSCO 5006
H

Umbilicals, risers and flowlines

The Ichthys Project saw one of the largest sustained subsea installation campaigns ever undertaken. For an incredible 1294 days the umbilical, risers and flowlines (URF) team worked in tandem with the drilling team to lay almost 190 kilometres of pipework and umbilicals. More than 3.6 million hours were worked, without a single lost time injury, to safely position the flowlines and risers that would transport production fluids from the wells to the enormous central processing facility.

The URF campaign involved several construction and installation vessels, the largest of which was Heerema's 210 metre Aegir deep water construction vessel, used to install the riser support structure and other major structures. Between October 2014 and February 2016 the Aegir never returned to port, remaining at the offshore site through two cyclone seasons.

McDermott's LV108 laying vessel and the brand new DLV2000 derrick lay vessel were used to lay the umbilicals, risers and supporting structures, working safely around the clock for a staggering 42 months. During that time, on average four helicopter transfers per week safely transferred crews to and from the vessels.

Among the many challenges facing the team included suspension of piling installation during humpback whale calving season, to ensure installation noise would not impact newborn calves. This and other technical and environmental challenges were all taken in the team's stride, and overcome with typical determination and conscientiousness.

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1. Celebrating the riser support structure's first steel cut in Batam, April 2013. The process took 18 months to complete.

2. The Aegir deep water construction vessel's reel-lay of six-inch and eight-inch Mono Ethylene Glycol (MEG) flowlines was completed in December 2014.

Riser arch installation by the deepwater construction vessel Aegir, December 2014.


BLOCK WA-275-P


MAERSK SEEKER

"The URF campaign is a major accomplishment that I am very proud to have spent 10 years on from concept to reality."

Philip Remnant, URF Manager, INPEX Australia

The riser support structure, towed from Batam and installed by Heerema's Aegir deep water construction vessel in November 2014, was the Ichthys Project's first offshore permanent structure installed.

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1. The first Ichthys Explorer CPF offshore mooring piles sailed from South Korea in January 2015, bound for the Ichthys Field. In total, 49 mooring piles, each 66 metres long and 5.5 metres in diameter, were installed into the seabed by June 2015.

2. Infield flowline installation crew on the deepwater construction vessel Aegir. Works commenced in October 2014 and were completed in February 2016.

3. The installation of a 42-inch gas export pipeline spool, marking the completion of the vessel DLV2000's scope of work for Ichthys, in January 2017.

4. The vessel LV108 completed several campaigns from July 2015 to December 2017 including:

- MEG and production flowline mechanical completion activities;
- 6 inch and 8 inch MEG spool installation;
- CPF and FPSO flexibles and umbilicals pull-in and installation;
- Jumpers and flying leads installation; and
- MEG flowline dewatering.

Inspection of offshore mooring chains constructed in the Vicinay yard in Spain. The 28 CPF mooring chains required more than 25,000 tonnes of mainly 178 millimetre diameter chain, while the 21 FPSO mooring chains comprise mainly of 161 millimetre diameter chain weighing more than 12,000 tonnes. Each chain link weighed more than 500 kilograms.

Pre-installation checks on board a cargo barge, prior to spool lifting.

OPPOSITE
The vessel DLV200 completed offshore work in two campaigns, commencing in July 2016. The main scope was the installation of large spools (10 x 12 inch, 8 x 18 inch and 1 x 42 inch), subsea structures (one subsea distribution hub, six subsea distribution units and miscellaneous structures), static umbilicals and steel tube flying leads (about 49 kilometres).


DLV 2000
McDERMOTT
IMO 9683142
SHIPS BIN


OVERSIZE
LOAD AHEAD
OVER
582 TSP
RADIOACTIVE
ARMADAL
Jandakot
OVER
SIZE
FATCAB 2
KENWORTH

Constructed in Aberdeen, Scotland, the Ichthys Project Christmas trees were shipped to a facility in Jandakot, Western Australia, before being transported to Darwin for subsequent shipment to the drilling rig for installation.

Subsea production system

The Ichthys subsea production system (SPS) and 42-inch diverless horizontal gas export pipeline connector connection system contains around 7000 tonnes of installed equipment – more than 12 times the maximum take-off weight of the world's largest commercial airliner.

The complex network of subsea apparatus includes one gigantic central electrical/fibre-optic and hydraulic subsea distribution hub connected to the Ichthys Explorer central processing facility, five subsea distribution units, 18 production Christmas tree systems and five production manifolds.

The SPS was engineered and manufactured to exacting standards and rigorously tested to ensure system performance, reliability and durability over a 40-year operational life. SPS components were designed and fabricated across the world: in Scotland, Malaysia, Singapore, Indonesia, Germany and the USA. Packages of components were then carefully coordinated for delivery to the various project teams for installation.

The size and complexity of the SPS required an exhaustive testing program to ensure the control systems worked safely and efficiently. INPEX systematically tested every component of the SPS before installation in an advanced testing environment specifically designed to closely replicate the actual SPS operating environment. The end result is one of the most advanced and efficient subsea systems in the world.

> **"We have exceptional people, very committed, and I am so honoured to have worked with all of the drilling, URF and project teams."**
>
> Xavier Combes, SPS Manager, INPEX Australia

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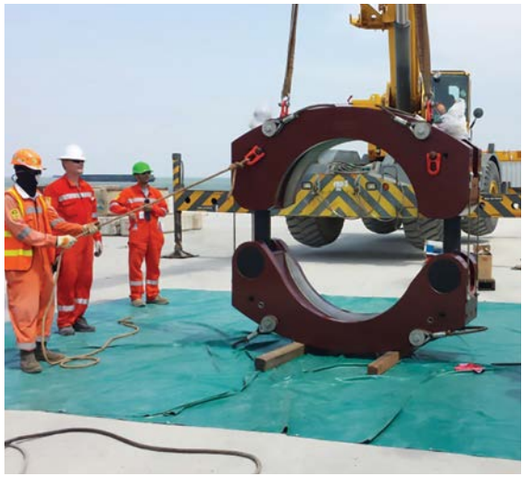

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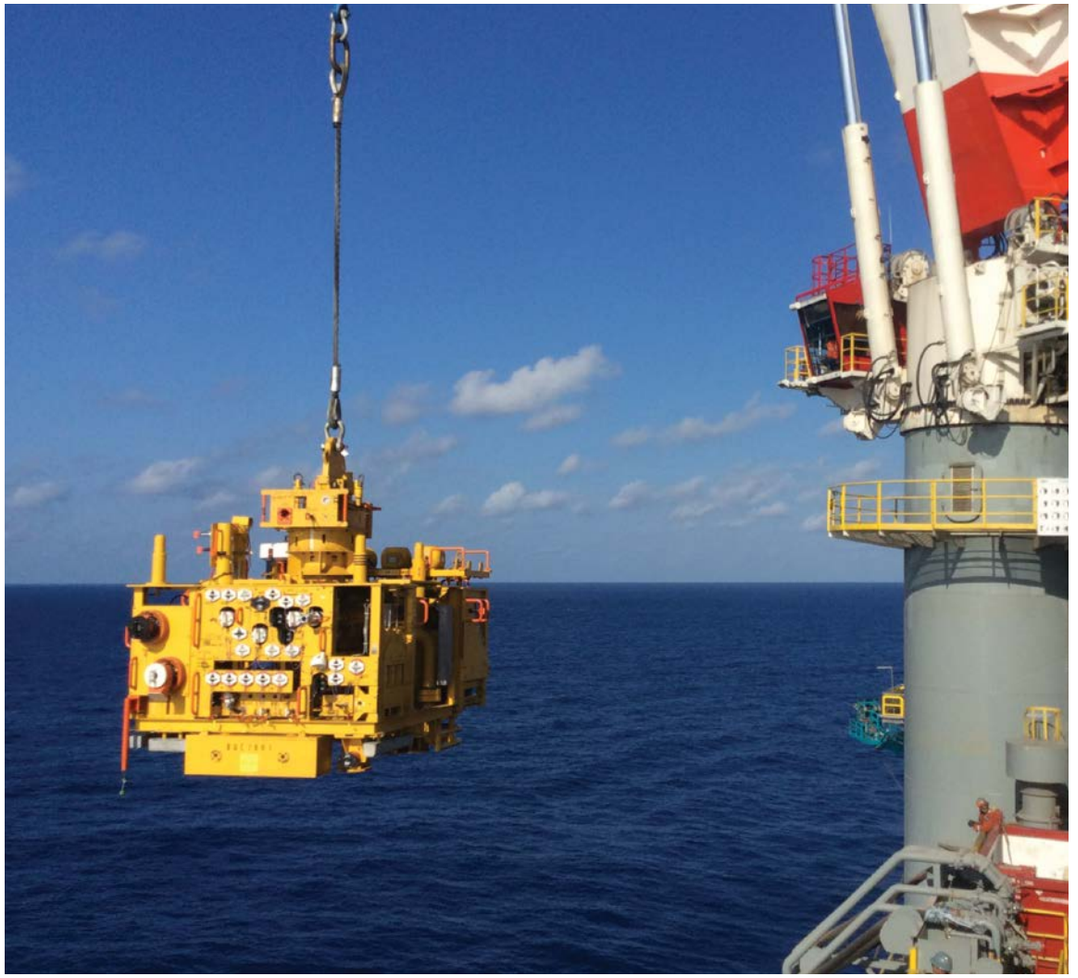

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1. The first Christmas tree – an assembly of valves, spools, and fittings – leaving Aberdeen, Scotland in September 2014. The Ichthys Project has a supply of 22 Christmas trees in total.

2. Inspections of the 42 inch diverless horizontal connector connection system in Batam in 2014. The connectors were installed in June 2016 in the Ichthys Field.

First in the world! A 42 inch connector that is used to connect the gas export riser base to the gas export pipeline prior to the gas travelling 890 kilometres to Darwin.

3. The installation of the first Christmas tree in the Ichthys Field by the Ensco 5006 drilling vessel, December 2015.

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4. Production manifolds manufactured and tested in Malaysia were installed in the Ichthys Field in June, August and September 2015.

5. The official ribbon cutting for the delivery of the first two Ichthys Project Christmas trees to BHGE's Jandakot facility, December 2014.

"A truly once in a lifetime experience to be involved in a beautiful challenging project, delivering massive facilities that we can all be proud of for the rest of our lives."

Jarrad Blinco, Offshore Facilities Completion Manager

Gas export pipeline

The Ichthys Project contains many feats of engineering, but one of the standouts is its gas export pipeline (GEP). At 890 kilometres – about the distance from Sydney to Melbourne – the GEP is the longest subsea pipeline in the southern hemisphere and the fifth longest on the planet.

The GEP transports natural gas and condensate from the Ichthys Field to the onshore LNG processing facility at Bladin Point in Darwin, in Australia's Northern Territory. The 890 kilometre pipeline is made up of an 882 kilometre subsea section and a 7.6 kilometre onshore section. It measures 42 inches in diameter and is constructed from more than 74,000 pipe joints – each joint is 12.2 metres long, weighs about 20 tonnes and is made from 30 millimetres-thick high grade rolled steel plate, finished and coated with concrete. The huge sections of pipework were fabricated by Europipe in Germany and Nippon Steel and Sumitomo Metals in Japan, and installed along the sea floor by Saipem's SEMAC 1 and Castorone pipelaying vessels.

Pipelaying began in Darwin Harbour in July 2014, with more than 2000 people investing five million work hours to complete this mammoth engineering achievement.

One of the unique challenges overcome by the Ichthys teams was shallow water pipelaying in Darwin Harbour. The busy harbour is the vibrant heart of Darwin and the GEP had to cross several major submarine cables, as well as carefully navigating around several heritage-listed wrecks in the harbour dating back to the Second World War and beyond.

Laying the pipeline without impacting the wrecks, the natural marine environment or the submarine cables in Darwin Harbour was a sensitive task that required diligence and specialist equipment. Saipem's semi-submersible pipelay barge Semac 1 helped the team carefully navigate the harbour and install the first 18 kilometre section of shallow water pipeline. Tidal flows were carefully modelled to ensure dredging and pipelaying work had minimal impact on water quality and the many species found in the harbour including turtles, dolphins, crocodiles and varieties of coral.

After more than 1000 helicopter flights making 16,000 personnel transfers, the GEP was completed in February 2016, uniting the offshore facilities with Bladin Point.

Once fully operational, around 1657 million standard cubic feet of natural gas will flow through the GEP every day, before being processed safely in Darwin and exported to fuel homes, businesses and entire industries.

The Ichthys Project's gas export pipeline's 12.2 metre long, 42-inch diameter steel pipes, each weighing about 10 tonnes, were manufactured in Japan and Germany. The pipes' 18-month manufacturing period commenced in April 2012.

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1. Pipes were transported by bulk carrier ships from Germany and Japan to Malaysia and Indonesia for protective coatings.

2. Fifty per cent of the pipes were stockpiled in Indonesia, awaiting delivery to the Ichthys Project pipeline installation vessel offshore.

3. Externally, pipes were coated in asphalt and reinforced concrete for corrosion and impact protection. Internally, they were coated with 'flow-coat' paint designed to improve gas transmission. In total, the Ichthys pipeline weighs 1.5 million tonnes.

4. A trench is prepared along the pipeline route. Pre-lay dredging in Darwin Harbour was completed in July 2014.

OPPOSITE
Sophisticated welding equipment was used to produce more than 73,000 high quality pipeline welds.


VICTORIAN
AMIWU
BRANCH


WESTSEA VICTORIA
SINGAPORE
IMO 9647033
WESTSEA VICTORIA
SINGAPORE
RESCUE

The large pipelay vessel Castorone installed the final 713 kilometres of the 882 kilometre Ichthys offshore pipeline over a period of nine months.

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1. The semi-submersible pipelay vessel Semac1 arrived in Darwin Harbour to commence the Ichthys pipeline installation in July 2014. Nearshore lay was completed in November 2014.

2. The Ichthys pipeline's 'string' is pulled ashore by a cable winch from the installation vessel Semac1.

Landfall construction of the Ichthys pipeline was completed in July 2014.

3. Pipelay vessel Castorone arriving in the Ichthys Field. Deep water pipelay works began in February 2015 and were completed by November 2015.

4. An aerial view of land reinstatement works underway (near); a permanent pipeline 'beach valve' station (middle); and pipeline precommissioning and testing equipment area (far).

OPPOSITE
A view of the welded Ichthys pipeline 'string' being installed to a seabed depth of 250 metres by pipeline installation vessel Castorone.

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1. A ceremony marking the Ichthys Project's offshore contract signing on February 10, 2012.

2. The Ichthys Explorer CPF team in Korea 2017.

OPPOSITE
CPF team members offshore 2018.

"I would like people to remember the time and effort spent on the project, and that it was such as big project at the time. What today might seem like a routine operation was built on a lot of hard work by a lot of people."

Claude Cahuzac, Offshore Project Director, INPEX Australia

Working offshore

Put simply, the offshore components of the Ichthys Project are huge: The Ichthys Explorer central processing facility (CPF) and the Ichthys Venturer floating production, storage and offloading (FPSO) facility are two of the largest ever manufactured. The FPSO alone is longer than three soccer pitches; together they displace almost 500,000 cubic metres of water, and are anchored to the sea floor by chains weighing in excess of 40,000 tonnes.

For the next 40 years, these two mammoth facilities will work around the clock, processing and exporting trillions of cubic feet of gas and millions of tonnes of condensate. Their construction and installation involved people from many different countries and a variety of cultures.

At construction peak, more than 10,000 people worked on the two offshore facilities every day.

At the installation, hook-up and commissioning phase peak, around 2000 people were working offshore, striving together to build the very foundations of Ichthys. Combining a wealth of experience from all parts of the globe and all aspects of the oil and gas industry, teams worked together to design, engineer and construct the CPF and FPSO, safely delivering these two icons of the Ichthys Project.

The Ichthys Explorer CPF sailed from Samsung's yard, Geoje South Korea to the Ichthys Field, offshore Western Australia.


THYS EXPLORER

Ichthys Explorer central processing facility

The Ichthys Explorer CPF is a column-stabilised, semi-submersible production unit. The largest of its kind ever built, the CPF is used to separate gas from liquids, extract condensate and water and pressurise dry gas to make it suitable for transmission to Darwin via the 890 kilometre Ichthys gas export pipeline.

The Ichthys Explorer is also home to around 200 people, and has been designed to be one of the safest production facilities ever built. Despite the scale and complexity of the CPF's production processes, where possible its safeguards, personnel separation and safety processes are designed to be immediately familiar to operations teams, many of whom will have worked on similar (albeit much smaller) facilities. INPEX's aim is to make it as easy as possible to remain safe.

The Ichthys Explorer CPF topside was designed by Mustang Engineering in Houston, USA, and built in South Korea at the Samsung Heavy Industries shipyard in Geoje. The topside comprises more than 40,000 piping spools and 1.8 million metres of cable.

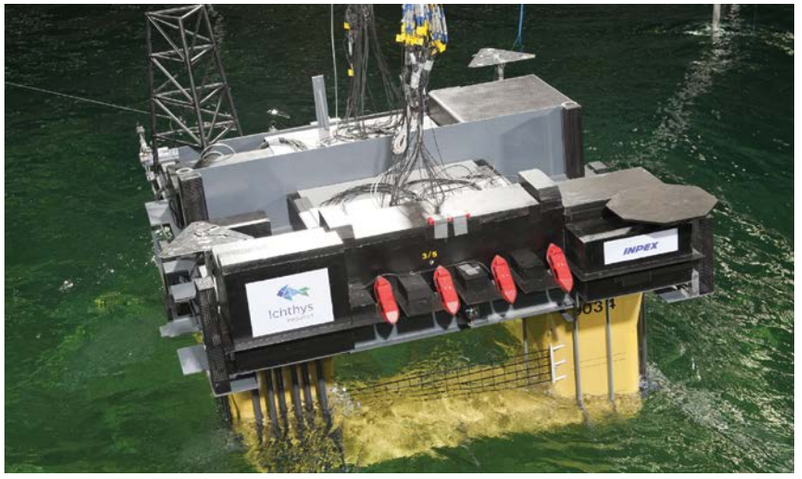
The facility is comprised of 12 prefabricated components which were assembled in a dry dock by a team of around 5,000 people. Once built and tested, the giant platform was towed 6,000 kilometres to the Ichthys Field in the Browse Basin, where it is permanently anchored by 28 mooring lines.

At an overall height of 208 metres, the huge semi-submersible facility displaces 155,000 cubic metres of water. Its flare tower stands at 144.5 metres, while its 49.5 metres hull sits serenely beneath the waves securely anchored by 25,000 tonnes of chain, the largest of which contains links one metre in length and 17.8 centimetres in diameter. The facility's design was engineered to withstand the strongest tropical storm likely to arise in 10,000 years.

The topside platform of this floating giant includes four powerful gas export compressors, required to push the dry gas the vast distance to Darwin.

The Ichthys Explorer CPF is capable of processing 1650 million standard cubic feet of natural gas and condensate per day and will run 24 hours a day, seven days a week for the next four decades.

The Ichthys Explorer CPF safely launched from the floating dock, September 2015.



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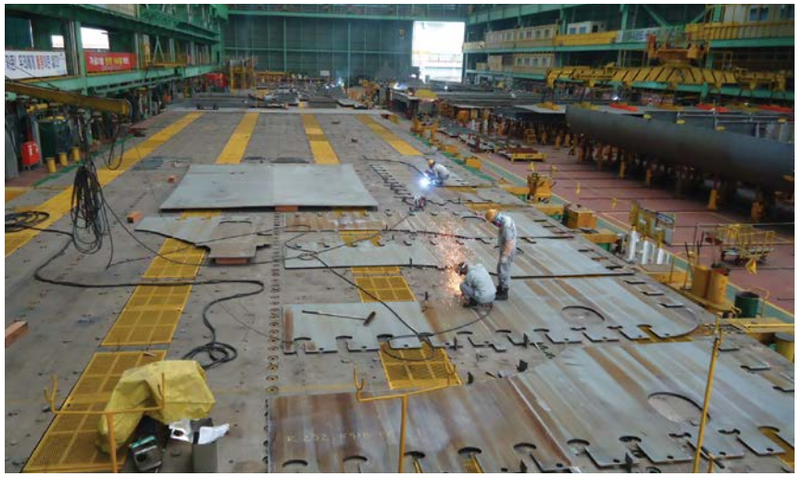

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1. Model testing of the Ichthys Explorer CPF by Marin in the Netherlands, August 2012.

2. The first hull steel for the Ichthys Explorer CPF being cut in the Samsung yard in Geoje, South Korea, January 2013.

3. Construction of the Ichthys Explorer's hull, June 2013.

4. A ceremony to commemorate the Ichthys Explorer's hull block erection, April 2014.

OPPOSITE
The first of four pontoon blocks for the Ichthys Explorer, each weighing approximately 2000 tonnes, July 2014.

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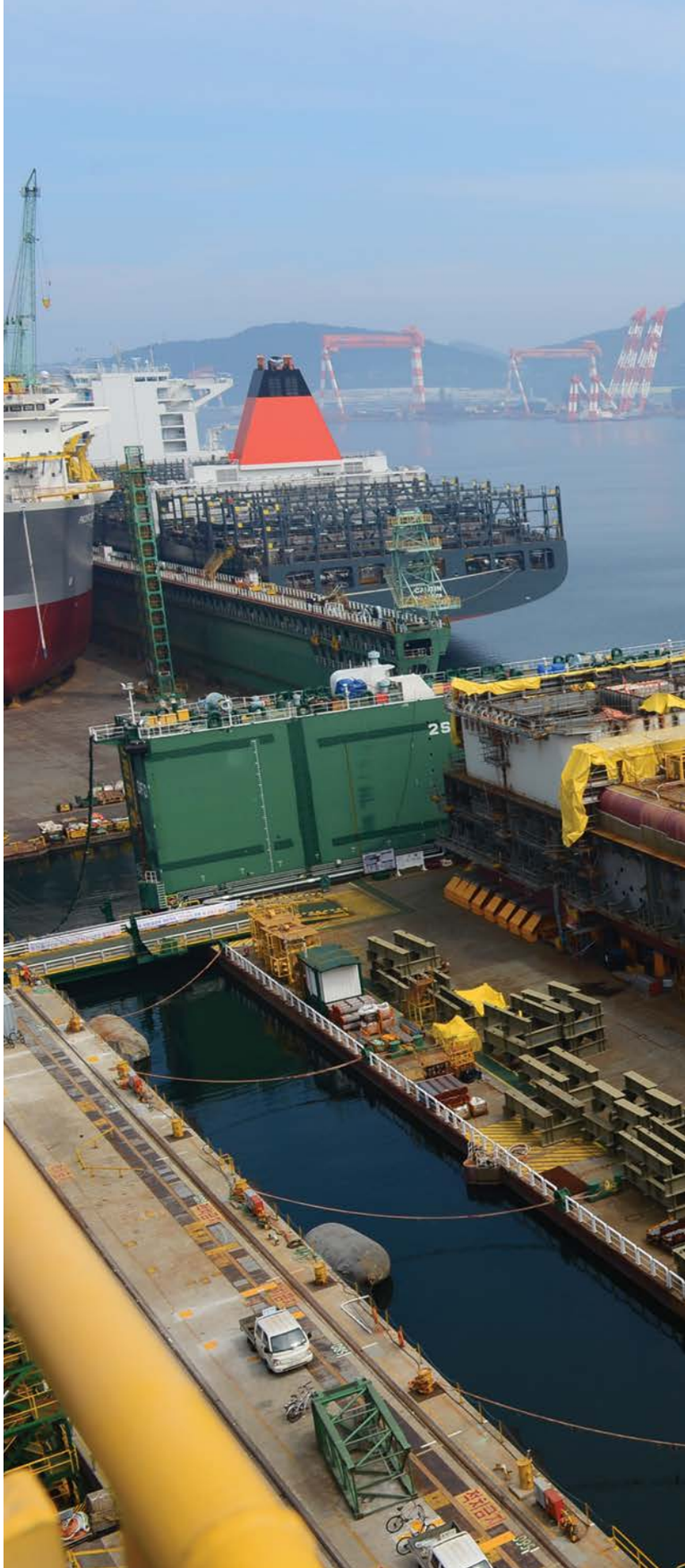
1. Lifting of the module incorporating the main Ichthys Explorer electrical and instrumentation rooms, June 2015.

2. Installation of the third Ichthys Explorer column, October 2014.

3. The Ichthys CPF hull installed on the floating dock, November 2014.

OPPOSITE
Installation of the first Ichthys Explorer column, August 2014.




SAMSUNG
OFD


SAMSUNG
13.04

Former Australian Minister for Foreign Affairs the Hon. Julie Bishop MP and INPEX President and CEO Toshiaki Kitamura at the official naming of the Ichthys Explorer CPF, February 2017.

The name Ichthys Explorer was selected after being submitted into an INPEX competition by Melissa H. M. de Oliveira in August 2013.

OPPOSITE
An aerial view of the Ichthys Explorer CPF helideck, February 2017.

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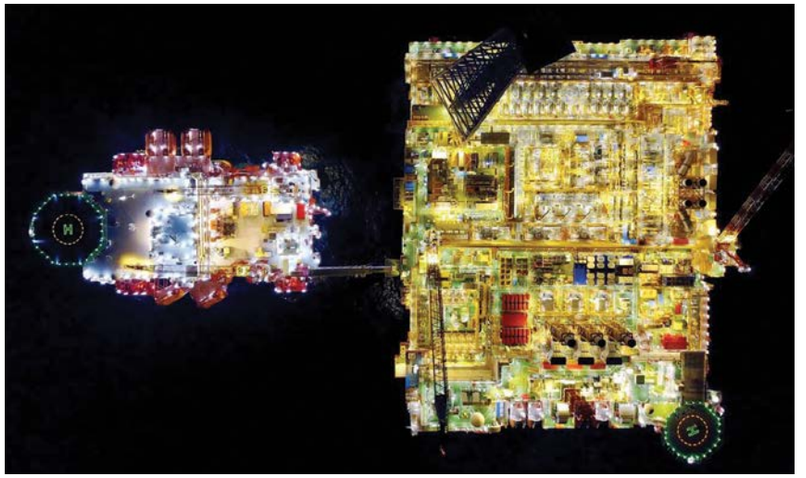

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1. Farewelling the Ichthys Explorer CPF on 28 April 2017, after about 50 months of construction.

2. The Ichthys Explorer journeyed 33 days from Geoje in South Korea to the Ichthys Field, offshore Western Australia.

3. On its arrival at the Ichthys Field the Ichthys Explorer was positioned and hooked to piles on the seabed by 28 chains.

In November 2017, the semi-submersible flotel Triumph was connected to the Ichthys Explorer to accommodate personnel working on the CPF's hook-up and commissioning phases, supported by the vessel LV108.

4. An aerial view of the Ichthys Explorer CPF central processing facility.

OPPOSITE
A Management HSE tour, November 2016.

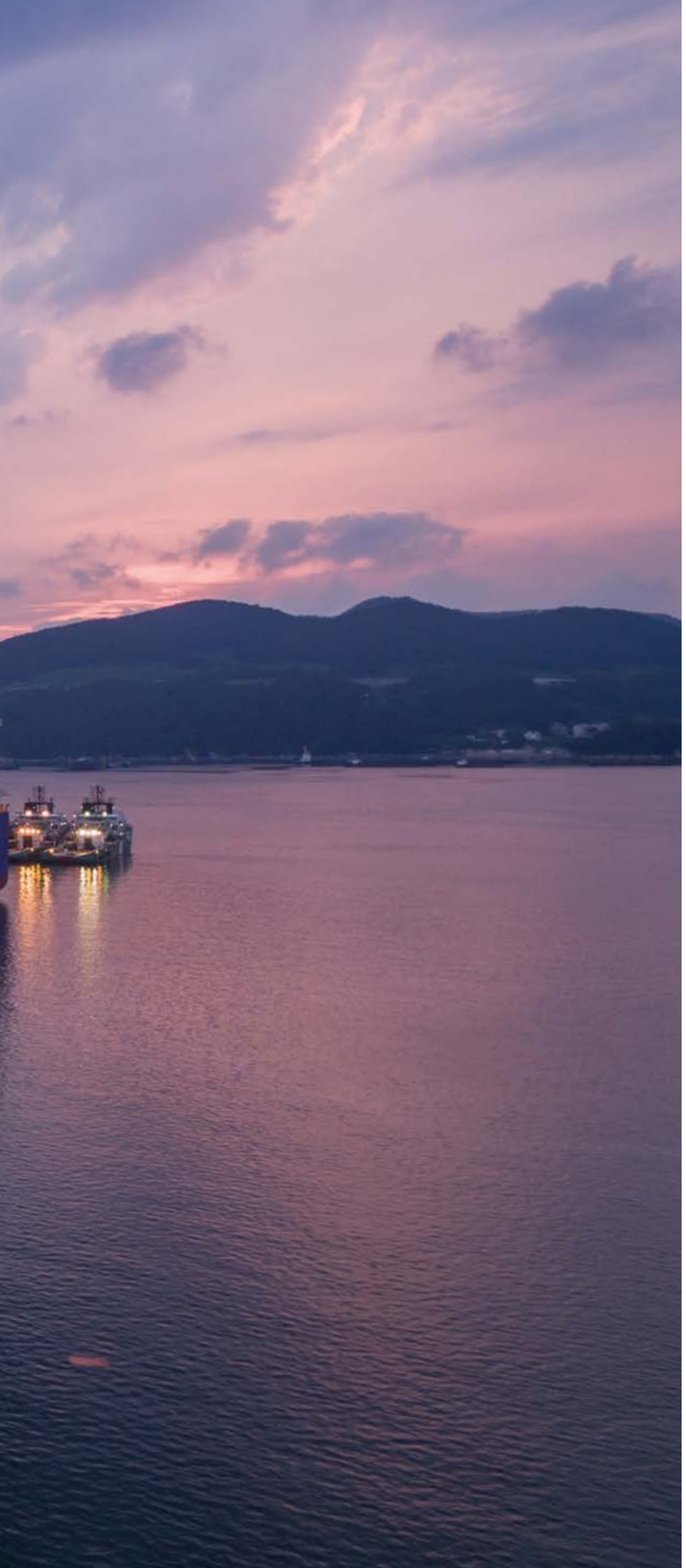
The Ichthys Explorer CPF arrives in Australian waters.

OPPOSITE
Work underway on the Ichthys Explorer CPF living quarters, November 2016.


INPEX
Ok-kyun LEE
P089

The Ichthys Venturer FPSO preparing to depart Daewoo Shipbuilding and Marine Engineering's shipyard, July 2017.

OPPOSITE
INPEX Representative Director, President and CEO Takayuki Ueda visiting the offshore facilities in 2018.




INPEX

Ichthys Venturer floating production, storage and offloading (FPSO) facility

Moored just 3.5 kilometres from the Ichthys Explorer central processing facility (CPF), the Ichthys Venturer floating production, storage and offloading facility (FPSO) processes and stores most of the condensate delivered from the CPF. From there, field condensate is periodically offloaded to carriers for export to market, with any surplus condensate compressed and returned to the CPF for export along the pipeline to the onshore processing facility in Darwin. The Ichthys Venturer can process around 80,000 barrels of condensate per day and can store more than one million barrels.

The Ichthys Venturer FPSO is 336 metres long and weighs approximately 150,000 tonnes. Shaped like a ship, the FPSO is larger than the world-famous QEII ocean liner and if it stood on end would be taller than the Eiffel Tower. The facility is home to more than 200 people and is designed to operate safely during the harshest marine conditions. It is moored on a non-disconnectable turret and anchored to the sea bed with around 12,000 tonnes of chain, the largest of which contains links that are one metre in length and 16 centimetres in diameter.

The Ichthys Venturer's turret mooring is one of the largest and most complex ever installed on an FPSO. At 85 metres high and weighing 8700 tonnes, the fixed turret is attached to the hull of the FPSO, which can swivel around the turret under the force of the winds and sea current. The Ichthys Venturer has three thrusters that position and stabilise the vessel during loading, and the entire facility has been designed to withstand the strongest tropical storm likely to arise in 10,000 years.

The Ichthys Venturer FPSO was designed by Technip in Kuala Lumpur, Malaysia, and built by Daewoo Shipbuilding and Marine Engineering in Okpo, South Korea. Its turret was design by SBM Offshore and built by its sub-contractor in Keppel shipyard in Singapore. The FPSO was constructed in dry dock from custom-built modules and was towed 6000 kilometres to its current position in 2017.

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1. Signing of the Ichthys Venturer FPSO contract by INPEX and Daewoo Shipbuilding and Marine Engineering, March 2012.

2. FPSO power generator checks, November 2016.

OPPOSITE
An aerial view of the FPSO turret moonpool.

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1. Model testing in Korea, July 2012.

2. The Ichthys Venturer's first turret steel strike took place on January 22, 2013.

3. A ceremony to mark the Ichthys Venturer first hull steel cutting, in the Daewoo Shipbuilding and Marine Engineering yard in Okpo, South Korea on 18 June, 2013.


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"WE POUR OUR TRUST AND PASSION INTO
THE WORK TO BE THE WORLD'S BEST PARTNER"
STEEL CUTTING
FOR
DSME HULL NO. 6054
INPEX OPERATIONS AUSTRALIA PTY LTD.
JUNE 18, 2013
DAEWOO SHIPBUILDING & MARINE ENGINEERING CO.,LTD.
DSME
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INPEX
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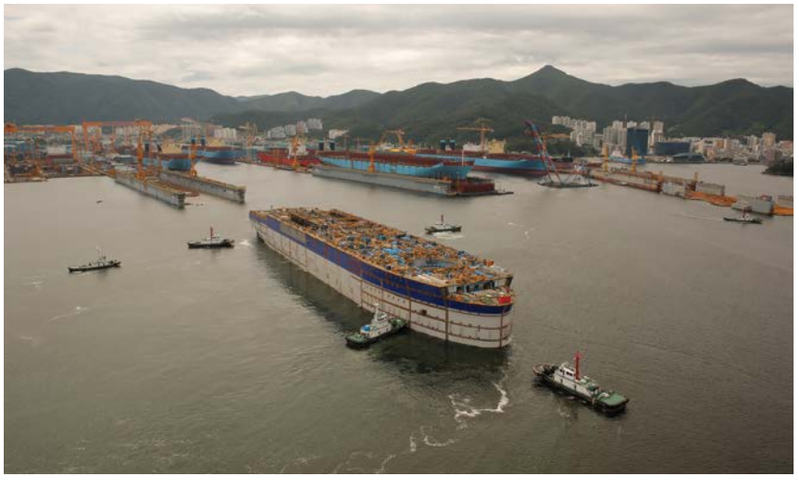

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1. The Ichthys Venturer FPSO hull in Daewoo Shipbuilding and Marine Engineering yard's pre-erection area, March 2014.

2. The Ichthys Venturer hull, March 2014.

3. The Ichthys Venturer hull, April 2014.

4. The Ichthys Venturer hull being moved from quayside to a floating dock, August 2014.

OPPOSITE
INPEX Managing Director Ichthys Louis Bon and a Daewoo Shipbuilding and Marine Engineering representative at the FPSO keel laying ceremony on 14 February, 2014. A gold coin, minted in Perth, was inserted below the hull for good luck.

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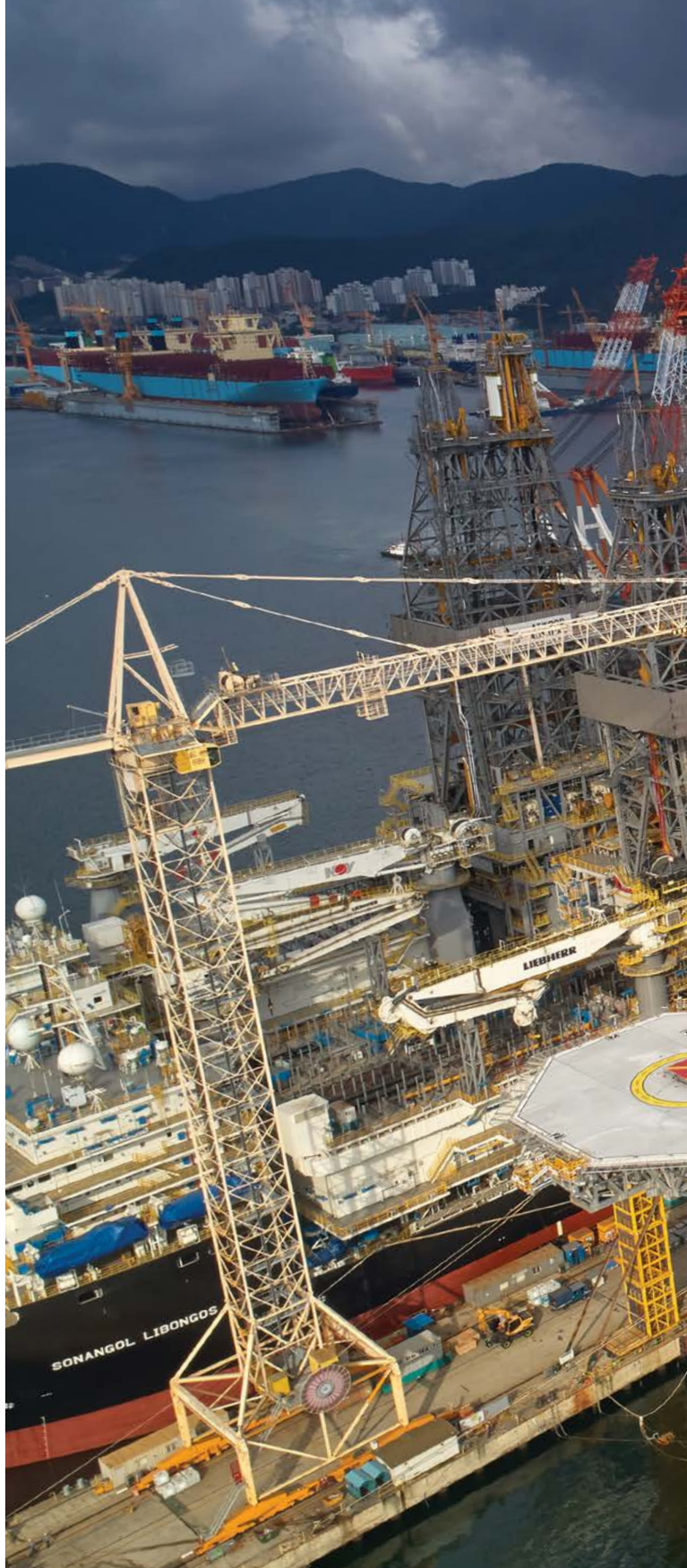
1. The Ichthys Venturer's heaviest module, M10, weighs more than 5000 tonnes. It was lifted onto the hull in December 2015.

2. Former Northern Territory Chief Minister Clare Martin officially naming the Ichthys Venturer FPSO at Daewoo Shipbuilding and Marine Engineering's shipyard in February 2017. The FPSO's name was submitted into an INPEX competition by John Comrie-Greig in August 2013.



The Ichthys Venturer FPSO leaves dock in July 2017 after approximately 53 months of construction.

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1-2. The Ichthys Venturer FPSO joined the Ichthys Explorer CPF in the Ichthys Field in December 2017.

3. The Ichthys Explorer CPF (foreground) with the Ichthys Venturer FPSO visible in the background.

OPPOSITE
Ichthys Venturer FPSO in the field in 2018.


安全第一
Safety Number One
ICHTHYS VENTURER
安全第一
Safety Number One

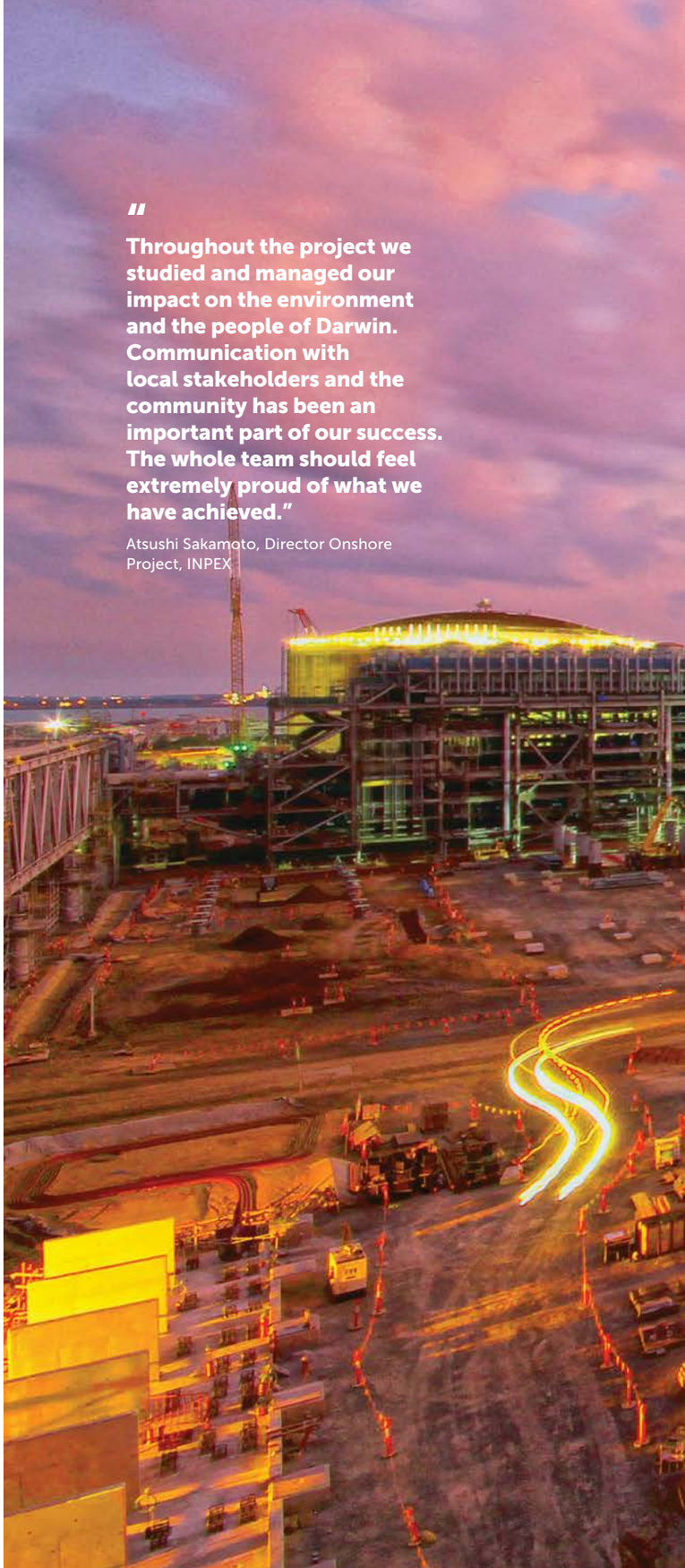
Bladin Point, 2017.

Building onshore

In 2008, INPEX announced Darwin in Australia's Northern Territory as the preferred location for its onshore processing facilities. Four years later, then Prime Minister Julia Gillard officially launched construction at the 360-hectare[3] Bladin Point site with a ground-breaking event.

Throughout construction, INPEX worked with the local community and the Northern Territory Government to maximise the benefits that the Ichthys mega development would provide to the people of Darwin, as well as protecting the beautiful environment and heritage of Darwin Harbour and surrounds.

Today, the onshore facilities comprise a gigantic LNG, LPG and condensate processing plant, six huge hydrocarbon storage tanks, a loading jetty and many other state-of-the-art facilities. The Ichthys Project has helped breathe new life into the Northern Territory's capital, creating jobs, prosperity and a lasting legacy.



"Throughout the project we studied and managed our impact on the environment and the people of Darwin. Communication with local stakeholders and the community has been an important part of our success. The whole team should feel extremely proud of what we have achieved."

Atsushi Sakamoto, Director Onshore Project, INPEX

[3] The main Bladin Point site is 360 hectares. The total onshore footprint is 520 hectares.

Sunrise on Bladin Point in 2015.

Bladin Point, October 2013.

Bladin Point onshore processing facilities

Located almost 900 kilometres east of the Ichthys Field, the Bladin Point onshore LNG processing facilities in Darwin Harbour is the powerhouse of the Ichthys Project. Capable of producing 8.9 million tonnes of LNG per annum (MTPA), 1.65 MTPA of LPG, and 15,000 barrels of condensate per day, the facility is one of Australia's largest in terms of nameplate capacity.

The total footprint of the onshore LNG facilities is 520 hectares. The facility includes two LNG processing trains, two 165,000-cubic metre LNG tanks, one 85,000 cubic metre propane tank, one 60,000 cubic metres butane tank and two 60,000-cubic metre condensate tanks. The Bladin Point site also features a y-shaped jetty, with one arm for LNG and one arm for LPG and condensate, which will service around 170 export carriers per year at peak.

The Ichthys onshore facility was designed in Yokohama, Japan and constructed by main contractor JKC Construction. Construction involved around 40 different subcontractors, and at its peak involved about 10,000 people working on site.

Tanks, compressor shelters, a ground flare and other technical equipment were built in-situ, however a significant amount of the facility was constructed from pre-fabricated modules. A total of 230 modules were built in four fabrication yards – two in Thailand, one in China and one in the Philippines – before being transported to Bladin Point for assembly. The modular construction approach was taken to manage the amount of building works at the site, reducing environmental impacts and disruption to the local community.

The first of the 230 modules arrived in Bladin Point in June 2014 and the final module was delivered in September 2016. Correct timing and coordination of module delivery was a huge logistical effort, and one of the biggest challenges of the onshore construction program.

Another major logistical challenge was the transportation of huge volumes of rock, sand and soil to build the shore protection and material offloading facilities. In total, approximately 760,000 tonnes of rock and aggregate were transported from quarries in Mount Bundey, about 100 kilometres east of the Bladin Point site.

INPEX's aim was to move these huge volumes of material safely and without disrupting public transport and local traffic too greatly. To help ease the impact on the community and to keep people safe, new intersections were built and the roads around the quarries and the onshore site were upgraded.

Minimising impacts on the local community and environment was a major focus throughout construction of the onshore facilities and remains an important part of INPEX's work today. The dredging campaign required to make Darwin Harbour navigable for large LNG export vessels and was one of the biggest success stories of the project, with more than 16 million cubic metres of soil and sand removed with minimal impact on the environment and local fishing enthusiasts.

A conscientious approach was also applied to the design of the onshore facilities, including the selection of a low-profile open ground flare over a vertical flare stack to reduce visual and aviation impact. INPEX also installed a 500 megawatt combined cycle power plant to power the facility – a world first for an LNG facility. Rather than adopting the industry-standard single cycle gas turbine generators (GTG), INPEX wanted to find ways of reducing carbon dioxide emissions and chose to incorporate a combined cycle power plant, offering an improvement in efficiency of about 50 per cent over a traditional power plant. INPEX was also able to use fuel gas from the Northern Territory's Power and Water Corporation to support commissing and the Bladin Point facility prior to start-up.

One of the major benefits of building a facility so close to an Australian capital city was that much of the required construction and operations support infrastructure was already in place. Darwin Harbour is a successful commercial port, and the site's proximity to Darwin International Airport and accommodation options ensured optimum accessibility for Ichthys.

The greatest benefit of the project's Darwin location continues to be the support received from the local community and the Northern Territory Government. Government and local stakeholders have shared in INPEX's vision and contributed hugely to the Project's success. More than 11,000 local job opportunities were created on the Ichthys Project during construction, and more than 1100 Territory businesses have secured contracts and purchase orders.

A ground-breaking ceremony was held at Bladin Point on 18 May, 2012.

(L-R) INPEX Representative Director Naoki Kuroda, former Australian Prime Minister Julia Gillard AC, former Northern Territory Chief Minister Paul Henderson and Total Managing Director Michael Sangster.

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1. Bladin Point, October 2013.

2. Bladin Point, February 2014.

3. Bladin Point, June 2015.

4. Bladin Point, January 2016.

5. Bladin Point, January 2017.

6. Bladin Point, April 2018.

OPPOSITE
Bladin Point, October 2012.

Bladin Point site preparations, June 2012.

OPPOSITE
Compressor suction drums, January 2015.


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1. Construction inspections on site at Bladin Point, 2013.

2. An aerial view of construction work on the Bladin Point export jetty, January 2013.

3. Jetty construction, October 2016.

OPPOSITE
LNG tank construction, April 2015.

1. Work inside one of the two Bladin Point LNG tanks, December 2015. The tanks stand nearly 47 metres tall and each have a volume of 165,000 cubic metres.

2. Steel LNG tank roof structures, each 90 metres in span and weighing 1100 tonnes, were constructed on the tank floor and raised into place using two powerful fans in June 2015.

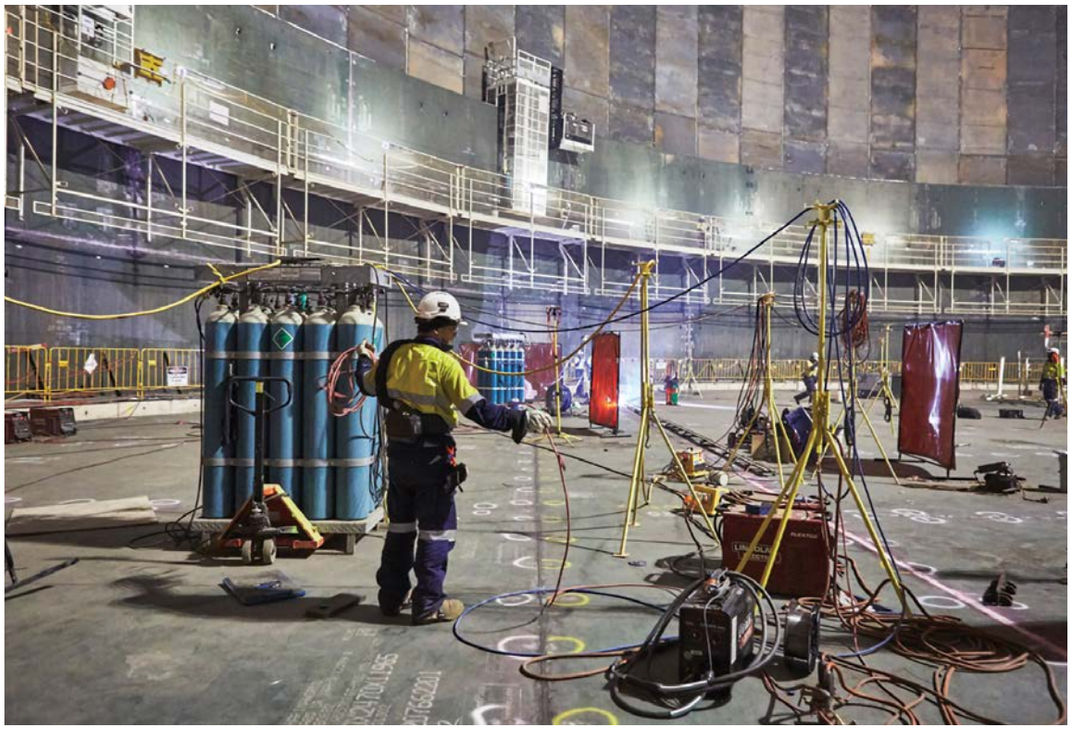
3. A module in position at Bladin Point, February 2015.

4. An aerial view of a transition pontoon and module delivery vessel in action, September 2016.

5. Working at the Bladin Point onshore facility in 2016.

6. Power generation section, May 2018.

OPPOSITE
One of 230 modules transported into position by self–propelled modular transporters, January 2015.



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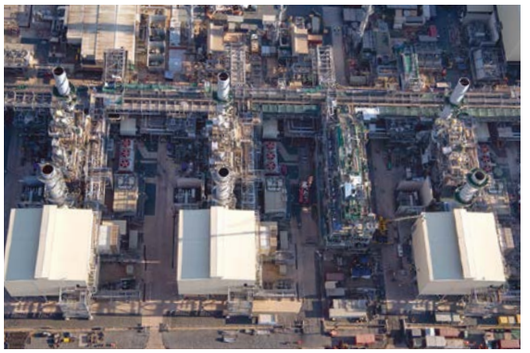

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FINESSE

Module delivery, February 2017.

1. The Bladin Point loading jetty in January 2015.

2. Construction of LNG train one underway, consisting of 29 modules, May 2016.

3. Acid gas removal tower (centre), June 2015.

OPPOSITE
Furnaces lit up at night, March 2017.

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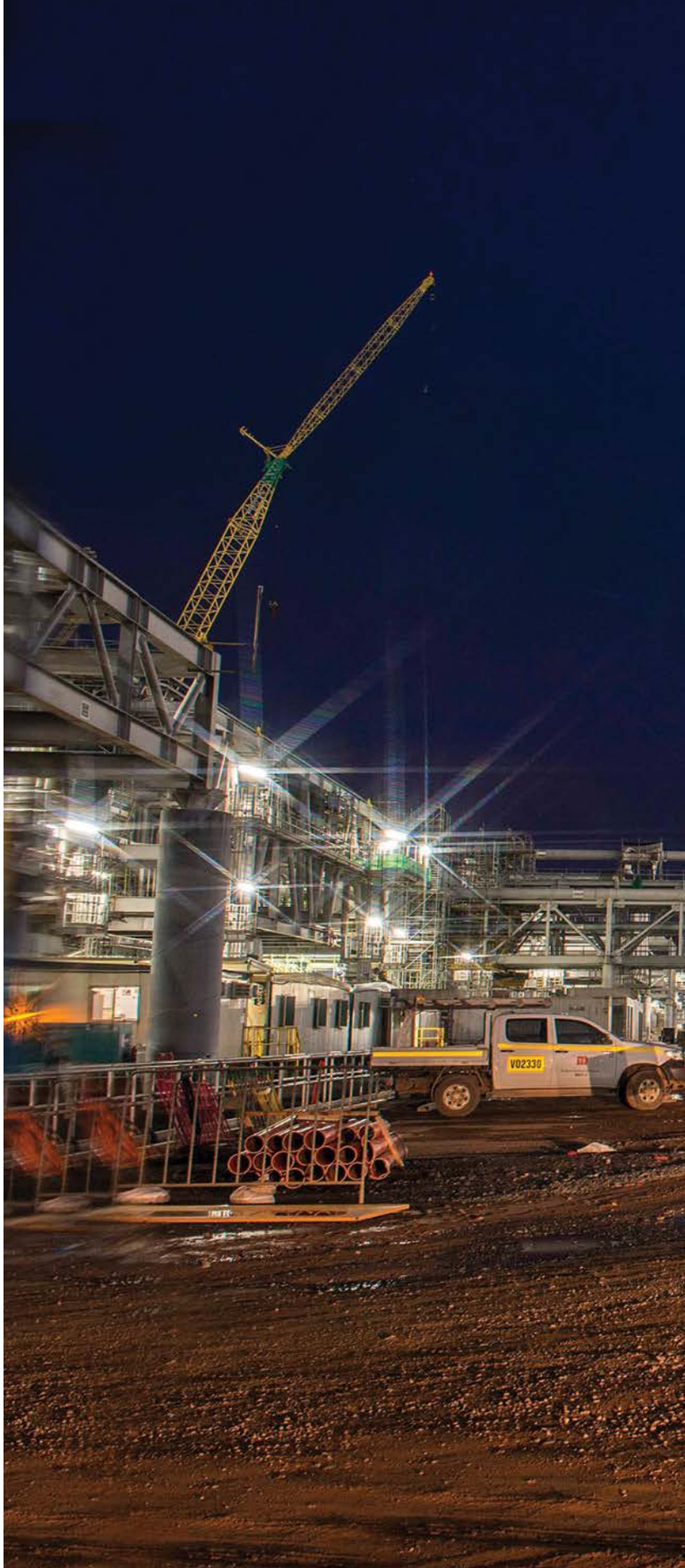

World-leading accommodation

One of the most important requirements of the Ichthys Project's onshore component was the provision of safe and comfortable accommodation for the thousands of people who would build the Bladin Point facilities. The Manigurr-ma Village at Howard Springs, just a 25-minute drive from the Bladin Point onshore LNG plant, provided world-leading accommodation for up to 3500 people.

The village consists of 875 modular units each housing four single-person accommodation units. The modules were constructed in China and installed in four phases between August 2012 and November 2013.

Facilities include a 50-seat cinema, swimming pool, library, outdoor beach volleyball court, cardio and spin room, gym, 2700 metre running track, music room, basketball and tennis courts, cricket nets, internet room, dining facilities, tavern, shop and more. A 24-hour medical centre alleviates pressure on public health services and reduces unnecessary emergency call-outs.

As well as keeping employees and contractors safe and healthy, one of INPEX's aims was to develop a village that would benefit local businesses. Around 60 per cent of capital expenditure on Manigurr-ma Village was spent on local contracts.

Northern Territory-based businesses completed a range of works, from fencing to fire detection and alarm systems. Around 95 per cent of the village construction workforce was from the Territory and of the ongoing operational workforce, 85 per cent are local and 12 per cent are Aboriginal and Torres Strait Islander peoples.

Manigurr-ma Village was officially opened in September 2013 with a ceremony attended by more than 100 guests, including then Northern Territory Chief Minister Adam Giles, Larrakia Elders and neighbouring residents.

The village provides a safe and comfortable environment for its residents and employs about 200 management and maintenance staff including security guards, landscapers, gardeners, cleaners, caterers, kitchen and laundry staff, bus drivers, administration officers and medical specialists.

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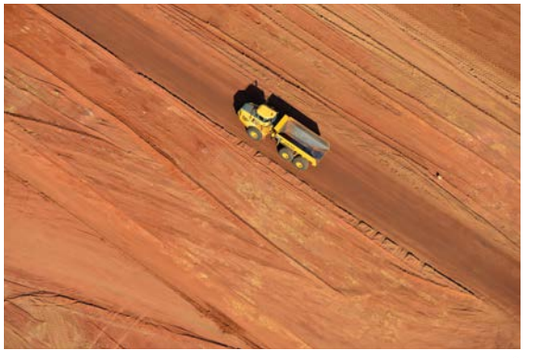

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1. The name Manigurr-ma is derived from the Larrakia name for the native stringybark tree, which grows in the area near the accommodation village.

2-3. Construction of Manigurr-ma Village commenced in April 2012.

4. The first of four Manigurr-ma construction phases was completed in July 2013 and the village welcomed its first 300 residents the following month.

5. The final Manigurr-ma Village single accommodation unit was completed in November 2014.

6. Incoming INPEX Managing Director Ichthys Project Louis Bon (left) and outgoing Managing Director Ichthys Project Antoine Serceau (right) at the official opening of Manigurr-ma Village, September 2013.

7. The village consisted of 875 modular units.

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Operations staff on Bladin Point.


INPEX
CONNA WILSON
FR


INPEX
FR

Transition to operations

The Ichthys Project's transition from construction to operations began well before LNG production commenced. Growing from a group of just 12 in 2009, the 700-strong operations team working on the Ichthys offshore and onshore facilities joined INPEX a few years prior to commencing operations, bringing with them expertise and experience from all over the world.

The operations team played a crucial part in the Ichthys Project design and construction phases, particularly during the commissioning and handover of facilities. A close partnership between the operations and project teams ensured facilities were aligned to the focused systems, processes and culture that continues to drive Ichthys today.

The teams worked hand-in-hand to test and challenge the safety, technical specifications, quality and integrity of the onshore and offshore facilities in preparation for the next 40 years of production. The operations team developed and tested individual operating procedures and familiarised themselves with the equipment they would be operating long before plant came into use.

When first offshore production commenced in July 2018, the key facilities and their support infrastructure had been meticulously designed, built and handed over from the project team. Each facility passed through an exhaustive Verification of Readiness process which ensured every part of every plant was ready for start-up.

The operations and project teams provided natural checks and robust critique of each other's systems and deliverables, all of which contributed to a thorough handover process.

In addition to physical checks of plant and equipment, the transition to operations also involved the less tangible aspects of readiness, asking essential questions: *Is the business organisationally ready? Do we have the right operating culture in place? Will the thousands of operating procedures we've written work?* All these questions were factored into the handover phase, with every effort made to ensure INPEX and its people were as ready as they could be when production began.

Of course, commencing operations is one thing; being a safe, established and world-class operator is quite another. INPEX Australia Director Operations Conor Walker said first cargo was just the beginning of the next phase of the Ichthys journey.

"We've stood this project up, built the facilities, put the groundwork in place – and that is a huge achievement," Mr Walker said.

"But we still have a long way to go before we can say we are a success.

"Over the coming years we need to show what sort of operator INPEX is. Show that we can operate safely and deliver on our promises."

Mr Walker said the early years of operation were one of the most important periods for INPEX in its quest to be recognised as an international oil and gas exploration and production company. Though the planning and execution of the Ichthys Project was as meticulous as it was colossal, he said INPEX recognised it was still learning what it took to be a world-class operator.

"In operations we have to live our safety values every day. We have to show we can keep the plant running and start paying back the time, patience, goodwill, and of course the capital our partners and our people have poured into the Ichthys Project," Mr Walker said.

"We will face challenges. It is how we respond to them and the decisions we make that will determine whether we can stand up and say we have been successful.

"It is a very exciting time and our operations people have a big, big role to play in shaping our future."

The Ichthys Venturer FPSO team offshore 2018.

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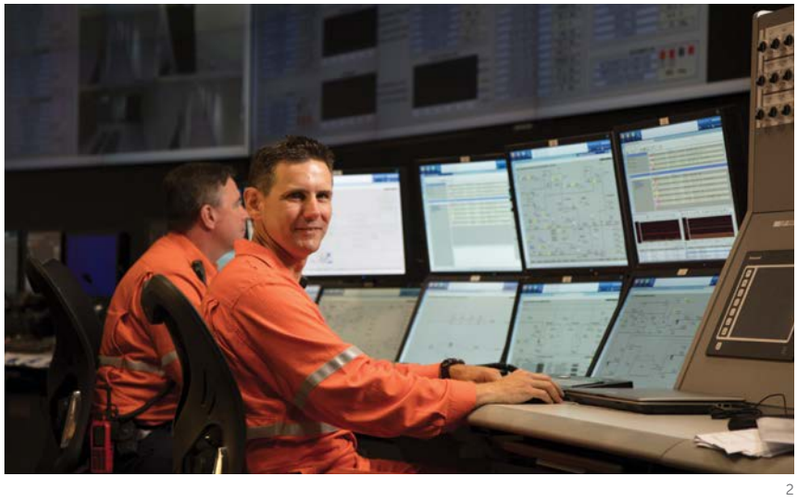

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1. Working in the Bladin Point laboratory in 2018.

2. Operations control room, March 2017.

3. Larrakia Elder and INPEX Larrakia Advisory Committee Chairperson, Mr Bill Risk (left) and his countrymen conducting a smoking ceremony at the Ichthys Project operations building, 27 September 2017.

4. The LPG import vessel Astomos Earth in Darwin Harbour on route to Bladin Point, May 2018.

OPPOSITE
Arriving to work on Bladin Point in 2018.


LEE BAILEY
FR
RIPEX

"Over the coming years we need to show what sort of operator INPEX is. Show that we can operate safely, that we can deliver on our promises."

Conor Walker, Director Operations, INPEX Australia

The LNG carrier Pacific Breeze delivers LNG used to cool tanks and pipes in preparation for the start-up of the Ichthys onshore facilities, April 2018.

A safety stand down attended by approximately 3000 workers in the DSME yard in South Korea.

Chapter three

Anzen Dai Ichi

“Our challenge was to build something around INPEX’s strong existing HSEQ principles. We wanted to create a safety culture that could be applied to a mega-project and its ongoing operations.”

Henk Feyen, General Manager HSEQ 2011-2015, INPEX Australia

The HSEQ challenge

In a project as large and complex as Ichthys, technical and engineering feats often steal the limelight. However, the effort and determination required to create and embed world-class health, safety, environment and quality (HSEQ) systems and an effective safety culture almost from scratch is equally as impressive.

Though INPEX CORPORATION already had an HSE management system in place, it was designed to support a business that was largely engaged in drilling and exploration activities. While many of its elements were relevant to the Ichthys Project, the existing system could not simply be applied to construction and operation of an LNG project of such magnitude.

The challenge facing the INPEX Australia HSEQ team was enormous. INPEX had to build a fully integrated, robust and fit for purpose HSEQ management system and successfully deploy it across two offshore facilities and an onshore LNG processing plant. Further to this, the regulatory requirements to gain approval to operate these facilities were extensive and required significant team work and stakeholder consultation.

Development of the Ichthys HSEQ management system was instrumental in demonstrating to the various regulators that INPEX had the required systems and processes in place to successfully operate a complex, multi-faceted LNG development.

To ensure HSEQ system requirements were at the forefront of everyday business activities, INPEX also realised the importance of building a safety culture that would resonate across team members, with contractors, and subcontractors located all over the world, in multiple time zones, speaking several different languages.

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1. Ichthys Project Contractors' HSE Forum in Perth 2012.

2. Ichthys Project CEO HSE Forum in Geoje South Korea in November 2013. The CEO Forum was established in 2012 to bring leaders from the Project's contracting companies together to discuss safety.

3. Offshore Contractors' HSE Forum in Perth, March 2014.

OPPOSITE
FPSO Operator offshore, August 2018.


INPEX
INPEX

Sikorsky S-92 helicopters, used to transport workers from Broome via Lombadina (Djarindjin) on the two-hour long range flight to the Ichthys offshore facilities in the Ichthys Field.

OPPOSITE
Onshore staff completing an HSE Observation Card.


DAN O'DRISCOLL
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Superintendent
Production Team Leader
Maintenance Team Leader
Medical Centre
RADish
Permit Office
Radio Room
Cadmi Central Room
HSE Toolkit

Building the systems and culture

As the Ichthys Project gathered momentum, a team of HSEQ professionals was recruited from around the world to join INPEX Australia, bringing with them a wealth of HSEQ experience and expertise.

This team commenced the build of an integrated HSEQ framework that would set the path for the development of the various facility safety cases and environmental management plans.

During this development phase, a decision was made to broaden the HSE management system scope to encompass process safety and quality. Adopting this integrated approach increased efficiency and consistency, with each function aligned to a single goal: supporting the safe and sustainable delivery of the Ichthys Project.

INPEX undertook core actions that helped shape the HSEQ systems and culture that exists today. These actions included:

- early engagement with contractors and subcontractors to develop a project-wide HSE Charter aimed at building a best in industry HSE culture;
- developing and embedding safety programs targeted at managing high-risk work activities;
- setting HSEQ objectives and targets to drive HSEQ performance;
- early engagement with regulators on safety cases and environmental approvals;
- driving HSEQ leadership at all levels of the business; and
- setting the HSEQ vision and strategy that would see the Ichthys Project through to operations and beyond.

From the outset, INPEX Australia understood that visible safety leadership was the key to strong safety performance. During the construction phase of the Ichthys Project, assigned Project Directors were each accountable for HSEQ performance. Through leadership and clear communication, they drove the safety culture and helped their teams and the contractors they worked with to take ownership for HSEQ performance – a process that the project's operations leaders continue to drive today.

Rather than solely dictating safety expectations to its many contractors and partners from afar, INPEX had a strong local presence at all construction and operational locations around the globe which helped embed the company's safety culture. INPEX took on contractors' ideas and learned from the many partners it worked with, always encouraging HSEQ performance improvement opportunities.

This collaborative approach was encapsulated in what became and remains INPEX's core value – Anzen Dai Ichi, or 'Safety Number One'.

"We will never take anything for granted. We will learn from incidents and near misses, using every opportunity to learn from our people, our partners and the communities we operate in.

Our aim is to continue to protect people and the environment for decades to come."

Craig Haymes, Director HSEQ, INPEX Australia

Operations team on Bladin Point in 2018.


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Anzen Dai Ichi

"Safety is a daily affair. It is not just a mantra or a note in a book. It is in the decisions you make every day: on the front line, onshore, offshore, at executive levels – everywhere."

Conor Walker, Director Operations, INPEX Australia

At INPEX, safety is number one – 'Anzen Dai Ichi'. Everyone involved in the Ichthys Project, during construction and now in operations, is empowered as a safety leader and given the support and encouragement they need to put safety before anything else.

Our number one core value is to look out for our own safety, the safety of the people we work with, and the safety of the communities in which we work.

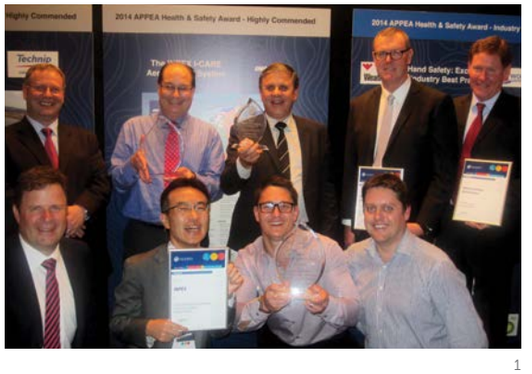
We are absolutely committed to having and maintaining best-in-industry HSEQ culture and to continually learn and improve throughout the lifetime of the Ichthys Project and in all our exploration, development, operations and corporate undertakings.

Today, during LNG operations, Anzen Dai Ichi resonates as clearly as ever. With more than 700 people working in LNG production, in harsh offshore environments and in close proximity to onshore communities, the need to work safely underpins everyday routines and practices.

Throughout the Ichthys Project construction phase, the teams of people who would ultimately be operating the facilities worked closely with construction teams to develop and test the HSEQ practices that would apply during production.

The team developed safety procedures, learnt lessons from other LNG projects and drew upon their own expertise to build the world-class Ichthys HSEQ management system that runs today. This approach ensured that the operating mindset and safety culture was firmly in place long before the commencement of production, with this robust culture continuing to mature to this day.

One of the most important things about Anzen Dai Ichi is that it applies in perpetuity: safety will always be number one. There is no room for complacency and INPEX is committed to continued development and improvement of its HSEQ culture and systems, to help protect people and the environment for the lifetime of its Ichthys operations.



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1. The 2014 APPEA HSE awards.

2. APPEA Environment Award 2007.

OPPOSITE
Stand down for Start-up on Bladin Point in 2018.

Aerial of Bynoe Harbour, near Darwin, during a turtle and dugong aerial survey for the Nearshore Environmental Monitoring Plan during the capital dredging program between 2012 and 2014.

Chapter four

Protecting the environment

“Through a combination of ingenuity, collaboration and sheer dedication our environment team truly made a difference.”

Jamie Carle, Senior Environmental Advisor – Dredging, INPEX Australia

A conscientious approach

Onshore and offshore, the Ichthys Project operates in majestic natural environments featuring some of Australia's most iconic marine fauna and flora and important heritage sites. From mangroves, corals, dolphins and turtles to Aboriginal cultural heritage sites and underwater Second World War wrecks there are many precious areas of environmental and heritage importance that INPEX recognises must be protected for future generations.

From the outset of the Ichthys Project, the challenge for INPEX was clear: How can we build and run our facilities to minimise impact to the environment in which we work? What do we need to do to continue to work responsibly within the natural environment for the next 40 years?

As a first-time operator, INPEX had a near-blank canvas to work with – bringing with it both opportunities and challenges.

The first step was to study the environment and learn from similar LNG projects in Australia. During the project design phase, INPEX carried out targeted environmental surveys in and around Darwin Harbour, at the Ichthys Field and along the subsea pipeline route from the field to Darwin. Surveys included marine ecology, water and sediment quality, onshore fauna and flora, hydrology, air quality, traffic impact, visual amenity and cultural heritage.

Survey data was then used to develop an Environmental Impact Statement and associated Environmental Management Plans, all of which were made public. Transparency of information was central to INPEX's environmental management approach, and close consultation with the community and key stakeholders, particularly around onshore development in Darwin, was fundamental to the project's success.

Throughout the onshore construction in Darwin, local people were invited to provide feedback on INPEX's plans and to share their comments and concerns. The community was kept informed of what INPEX was doing and how. With several of the INPEX Environment Management Team hailing from Darwin themselves, the team was passionate about making sure the Ichthys Project was done well.

The result was a construction program that, based on the results from a suite of environmental monitoring programs, had minimal impact on the Australian natural environment and helped to preserve Darwin Harbour and the lifestyle of which Darwinians are so passionate and proud.

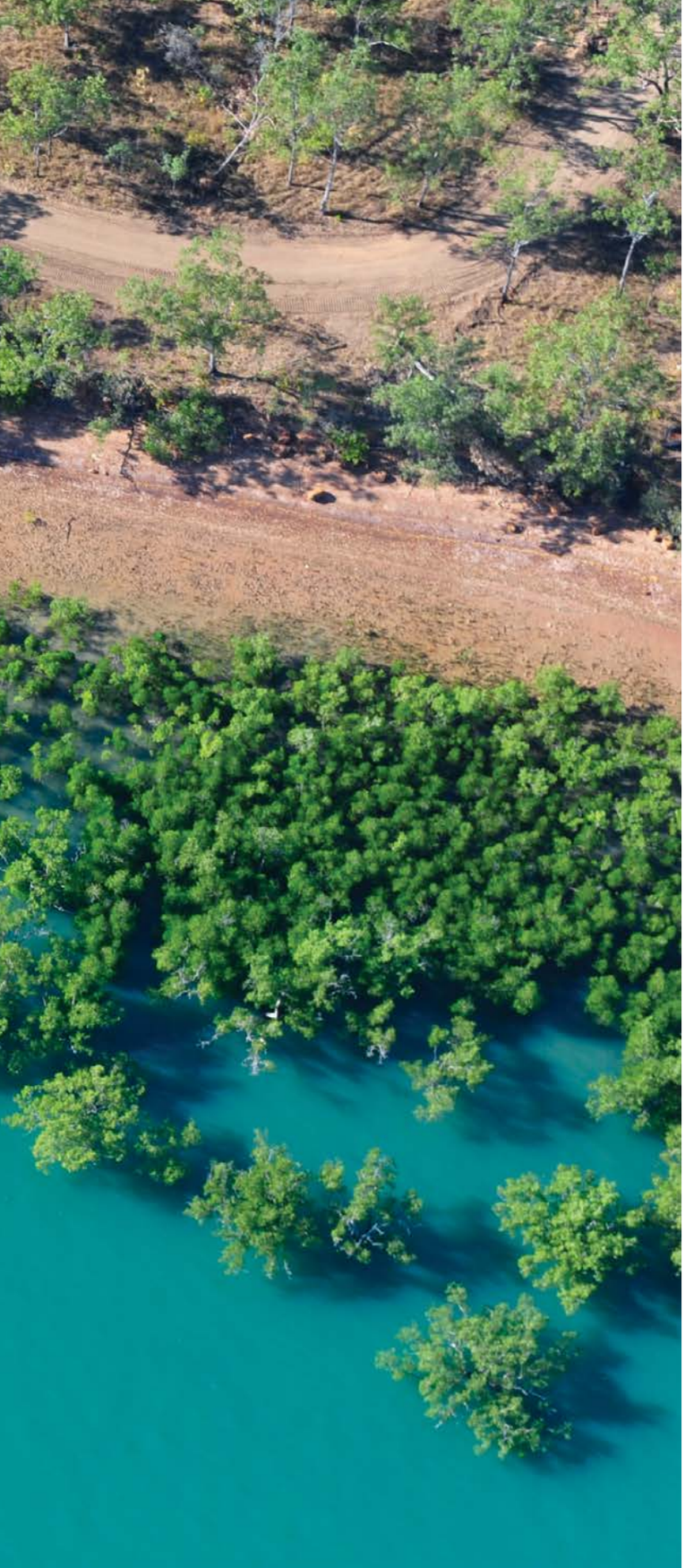
Perhaps more importantly, INPEX established a conscientious and responsible approach to environmental management that applies today and will endure throughout all of INPEX's operations.

Mangrove rehabilitation at the pipeline shore crossing site at Bladin Point, January 2015.

"

We understand the value to the community of the environment we work in, so we take environmental management very seriously."

Sandy Griffin, Environmental Manager, INPEX Australia



Nearshore dolphin monitoring programs were undertaken in Darwin Harbour, Bynoe Harbour and Shoal Bay.

OPPOSITE
Darwin Harbour's large tidal range inundates the rich and diverse mangrove communities at Bladin Point.

Thanks to the large tidal range in the Northern Territory, mangrove seedlings are successfully transported throughout the region resulting in more than 20,000 hectares of mangroves in the Port of Darwin. This constitutes around five per cent of the Territory's entire mangrove area.


INPEX
Ichthys Project
MSA
INPEX
DBI-SALA

"The dredging campaign was an opportunity to show that we could meet our environmental and heritage commitments to the community."

Harutoshi Usui, Dredging Manager, INPEX Australia

Dredging in Darwin Harbour – an extraordinary success story

One of the Ichthys Project's biggest environmental challenges was the dredging program in Darwin Harbour. To allow large LNG carriers to safely navigate and berth in the harbour, around 16 million cubic metres of sediment had to be removed from the seabed.

Darwin Harbour is at the centre of the community's way of life, so understandably, the dredging campaign was the biggest worry for locals. Of greatest concern was the potential impact on water quality and fishing. Fish and mud crabs were carefully monitored, with no measurable impacts on health recorded. There was also regular engagement with the local fishing community to keep them informed of progress and reinforce safety awareness around dredging activities.

The harbour also contains large mangrove areas, discrete areas of coral and items of historical significance, including wrecks of the famous Catalina flying boats used during the Second World War. To help minimise environmental impact, more than 120,000 work hours were spent designing and monitoring the Ichthys Project's dredging footprint alone. Prior to the commencement of the dredging program, around 7000 cultural artefacts were unearthed and either preserved or carefully relocated.

A shining example of how INPEX listened to and worked with the community was the removal of Walker Shoal, an underwater obstacle of extremely tough rock. Initial plans to clear Walker Shoal included using underwater explosives, but the prospect of blasting in the harbour was a cause of major community and regulatory concern.

Taking on board the community's feedback, INPEX investigated alternative options for removing Walker Shoal, ultimately adopting a newly developed state-of-the-art cutter suction dredging method to break away the rock. Cutter suction dredging is less invasive than blasting, although considerably more expensive. The Ichthys Project campaign featured the most powerful cutter suction dredge in the world at the time, and while it was more time consuming and challenging than blasting, it underscored the project's commitment to protecting the environment.

By changing the dredging method and carefully managing water turbidity, no mangroves or seagrass were impacted. Only a small amount of coral immediately next to the dredging area in East Arm was temporarily affected, but was considerably less than the losses originally predicted. Access to popular fishing channels was also maintained and there was no impact on fish health or fish catchability.

Throughout the dredging campaign, INPEX's environmental management and monitoring information was made available to the public. The extensive monitoring program managed by INPEX's environment team contributed to understanding the ecology of Darwin Harbour.

In recognition of the successful dredging campaign, in 2014 INPEX Australia received two awards – the APPEA Environmental Excellence Award and the Environment Industry Choice Award for its "environmentally and socially successful dredging program."

These awards were testament to the hard work and dedication of INPEX's environmental management team and all the contractors and crews who took environmental management to heart during the Ichthys Project construction. That same ethos of conscientious environmental management continues today and will be central to Ichthys LNG's operations over the decades to come.

The cutter suction dredger Athena worked approximately 5000 operational hours and had over 16,000 cutter head teeth changed over the East Arm dredging program. The teeth on the cutter head weigh over 20 kilograms each.

1. The cutter suction dredger Athena was contracted to remove around 10 million cubic metres of material between October 2012 to June 2014, including a six-month cessation for the 2013 dry season. During this time, the Athena's greatest challenge was the removal of Walker Shoal, where it took around eight weeks to remove 210,000 cubic metres of hard rock. The Athena completed its scope of works and departed Darwin Harbour in June 2014.

2. Low intensity dredging by backhoe dredgers commenced in August 2012 and was completed in April 2013. A total of around 1.15 million cubic metres of soft sediment was removed during the period.

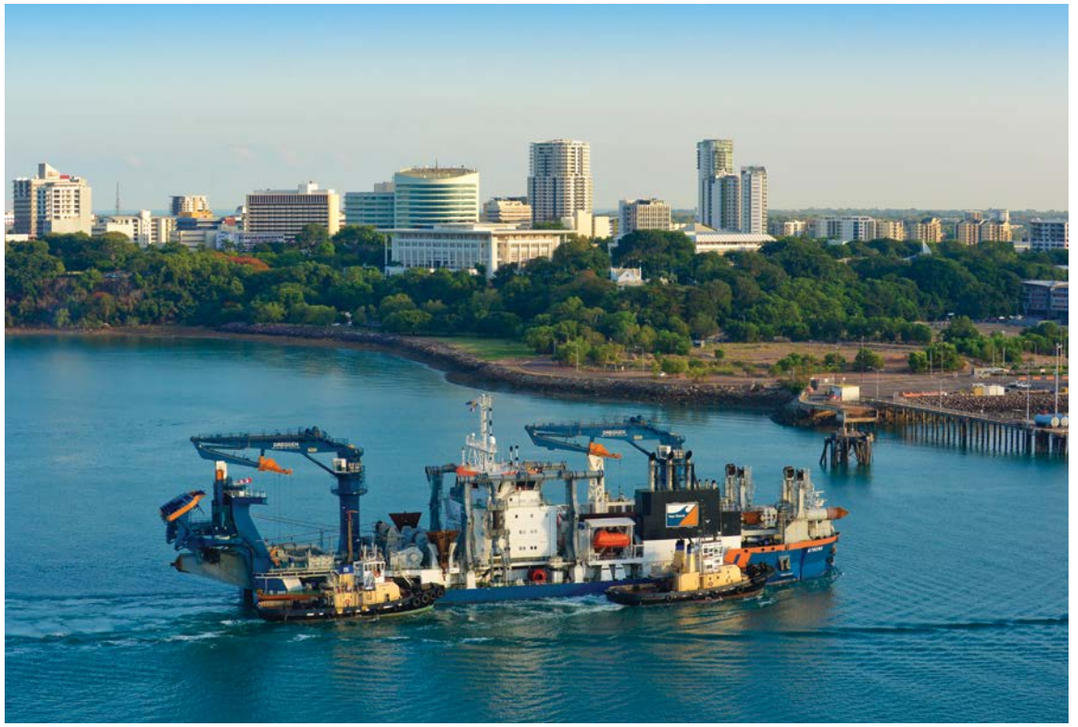
3. The backhoe dredger Hippopotes loading a split hopper barge, October 2012.

Other backhoe dredgers involved in the project included the Simson and the Baldur.

Once loaded, split hopper barges had to travel 45 kilometres to the dredge spoil disposal ground located 12 kilometres offshore from Lee Point. Split hopper barges involved included the Cornelis Lely, Pieter Caland, Le Sphinx and L'Etoile.

4. Turbidity monitoring was undertaken to determine impact to corals and seagrasses. Fifteen turbidity loggers were situated in Darwin Harbour and outer regions.

OPPOSITE
Direct dredging in deep water was predominantly conducted by the trailing suction hopper dredge Rotterdam. Dredging commenced in April 2013 was completed in April 2014, with around 3.35 million cubic metres of material dredged.



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Fire Earth and Sea. Artwork by Riki Salam-Gilimbaa.

Chapter five

Benefitting communities

"The journey has been amazing. Absolutely amazing. Being able to make positive change has been a real highlight."

Irene Stainton, Aboriginal Affairs Manager, INPEX Australia

Fire, Earth and Sea

Water flows and winds its way to the sea. This is the sacred place of our ancestors.

Ceremony by firelight keeps us connected to this land.

Over vast country the Creation Spirit forms the mountains, rivers, escarpments and valleys. We are Saltwater peoples connected to both land and sea.

Travelling through crystal blue waters the Spirit burrows deep within the earth's surface giving energy and life to all.

Engaging with the community

"Though the construction activity is complete, we are still here and still have a big part to play in Darwin."

Rebecca Cass, External Affairs Manager NT, INPEX Australia

In 2018, production from Ichthys LNG commenced. Nowhere is the transformation and scale of that achievement more visible than in Darwin, home to the new onshore LNG processing and support facilities at Bladin Point.

For INPEX, its relationship with the Northern Territory (NT) community is vitally important. In 2007, long before the Ichthys final investment decision, INPEX began engaging with the community, local businesses and the NT Government to share information about what the Ichthys Project might mean for them and understand how the company could work with the people of Darwin to make the project a reality. INPEX opened an office in Darwin in 2009 and established a permanent presence.

Construction formally commenced in 2012, marked by a ground-breaking ceremony with then Australian Prime Minister Julia Gillard. Six years of cooperation, anticipation and work that would change the very landscape of Bladin Point required a great deal of understanding and patience on the part of the Darwin Community. INPEX remains grateful to the Territory's people and Government for their ongoing support.

Throughout construction and today during operations, INPEX's aim is to minimise impact on the greater Darwin community and maximise the safety of road and harbour users. Effective communication and engagement activities were instrumental during construction and included regular information sessions, community notices, telephone and email helplines, local sponsorships and site tours and local business partnerships.

Thousands of hours of engagement were conducted, leading to some notable successes. While the harbour dredging campaign (discussed in chapter four) was one of the highest profile, most successful activities, a great example of effective community engagement related to maintaining public access to the Catalina Creeks.

The Catalina Creeks are two popular fishing spots in Darwin Harbour, located near the Ichthys onshore processing plant. Early in the project, the local fishing community and residents voiced concerns about access to the Catalinas and wanted to know whether they could still be fished.

Initial jetty designs meant the safety zone around the LNG facility prohibited public access to the creeks during construction. Recognising the importance of the Catalina Creeks to the local community INPEX altered its plans and ensured public access could be maintained throughout the period.

Perhaps more importantly, the INPEX team in Darwin went to great lengths to communicate the change in plans to the community, making people aware of the marine exclusion zones to maintain safety and that they could still fish the Catalinas.

This desire for hands-on engagement and being a part of the Darwin community continues throughout LNG operations. Around 300 permanent staff work at the operating facilities on Bladin Point. Rather than the fly-in-fly-out nature of construction, INPEX's operating personnel are part of the local community: they are residents in greater Darwin, patrons of local businesses and players in local sports teams.

The key to INPEX's success over the next 40 years will be the company's ability to be a safe operator, to be a force for positive change and to continue to benefit the NT community. While the scale of the work in Bladin Point today is smaller than during the project's construction phase, 40 years of operations provides INPEX with the opportunity to enter into longstanding partnerships with local businesses and support local community initiatives.

On average, the Ichthys Project will create around 600 jobs per year in the Territory, many of which will be filled by local people. For the next four decades, Ichthys is forecast to generate around $2.6 billion in tax revenue for the Northern Territory.

The Ichthys LNG Project sponsors the Red Cross Safe Hangout for All Kids centre in Darwin.

A Nyoongar language naming ceremony for INPEX's Perth office meeting rooms, April 2014.

Aboriginal heritage

The Northern Territory has been home to the Larrakia people for tens of thousands of years. The Ichthys LNG processing facility at Bladin Point is in the heart of Larrakia country and will be a part of the Darwin community for the next 40 years.

As soon as INPEX began work in Darwin, the company recognised the importance of collaborating with the Larrakia people. Not only was it vital to gain their community's understanding and support, but a key part of INPEX's ambition was to understand how it could help preserve Aboriginal heritage and support Aboriginal and Torres Strait Islander communities over the decades to come.

INPEX endeavoured to build strong relationships with the Larrakia people and over time, the company's relationship with the Larrakia people evolved. In 2017 INPEX established a Larrakia Advisory Committee, comprising a broad range of Larrakia representatives. The committee provided a channel for meaningful two-way conversation, allowing INPEX to take advice from the community and work closely with Larrakia people.

The INPEX Larrakia Advisory Committee is still going strong today and will continue throughout the Ichthys Project's operations. It features representatives of the nine Larrakia family groups with a blend of skillsets including heritage specialists, people with environmental knowledge, Larrakia Elders, young people, government employees and representatives of the two main Larrakia organisations – Larrakia Development Corporation and Larrakia Nation. It is an effective, working committee with the capacity to address and resolve big issues.

One of the biggest challenges during construction of the Bladin Point facilities was preserving local Larrakia heritage. INPEX was extremely conscious of the potential for disturbing heritage sites of significance and cultural artefacts during construction.

Seeking advice from local heritage experts, INPEX carefully uncovered and preserved several Aboriginal heritage sites, returning artefacts – some more than 1700 years old – to the committee and the Larrakia Development Corporation.

INPEX also took a conscientious approach to land access: although the Larrakia people had no Native Title claim over the land at Bladin Point, meaning there was no legislative requirement to engage on the issue of land tenure, INPEX chose to consult with the Larrakia community and seek advice on land access, particularly from an environmental and heritage prospective.

INPEX Manager of Aboriginal Affairs Irene Stainton, herself an Elder of Western Australia's Nyoongar community, lead INPEX's efforts to build relationships with the Larrakia community.

"INPEX's approach is refreshing and very respectful," Ms Stainton said.

"The company has developed a detailed heritage management plan and consulted, surveyed and engaged with the community throughout the project's construction.

"It was clear people at INPEX had a genuine desire to work with the Larrakia and protect their rich heritage in the NT."

In 2013, INPEX's first Reconciliation Action Plan was agreed to. The plan set out INPEX's vision for supporting Aboriginal and Torres Strait Islander peoples throughout project construction and into operations. As part of the plan, in 2015 INPEX launched the INPEX Aboriginal and Torres Strait Islander scholarship program, providing access to university education through The University of Western Australia.. This initiative was broadened in 2017 when INPEX committed to funding the Larrakia scholarships, offering opportunities for study of any tertiary qualification at any Australian university, and the Larrakia School Participation Program which was implemented to support Larrakia primary and high school students.

As at October 2018, more than 200 Larrakia children had participated in the schools program and twelve university scholarships had been awarded.

Since construction of the Ichthys Project began, more than 62 Aboriginal or Torres Strait Islander-owned businesses have won contracts for work on the project, undertaking over 600 scopes of work worth more than A$ 167 million.

INPEX's contribution in the local Indigenous community is not limited to employment and education: the company is a proud supporter of the NT Thunder Australian Rules Football Club. The club's roster is comprised on 65 per cent Aboriginal players, with many from remote communities. INPEX also promotes cultural awareness in the region and among its workforce, celebrating Aboriginal community events such as the Barunga and Garrmalang festivals.

Delivery of INPEX's Reconciliation Action Plan, May 2015.

1. The Ichthys LNG Project is a sponsor of the Petroleum Club of WA's Next Generation program.

2. INPEX Australia Director Corporate Coordination Hitoshi Okawa with Palmerston Girls Academy students on their INPEX-sponsored bus.

3. The Ichthys Project has sponsored the Michael Long Learning and Leadership Centre since 2016.

OPPOSITE
INPEX sponsored Science and Engineering challenge in Broome in 2018.

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"I am so grateful to have been involved. Building Ichthys was a big part of so many people's lives for so long, and I am very proud of what we have achieved."

Hitoshi Okawa, Director Project Coordination, INPEX Australia


ST MARY'S COLLEGE · BROOKLYN

A cafe owner who won a catering contract to supply food to Ichthys LNG Project offshore workers at the Broome heliport in Western Australia.

OPPOSITE
A meeting to strengthen relationships between Australia and Japan at Kirribilli House in Sydney, 2017.

Lasting economic benefits

Though the project's construction phase is over, Ichthys LNG will continue to generate economic benefits in the Northern Territory and Western Australia for decades to come. INPEX commissioned renowned consulting company ACIL Allen to conduct an independent economic impact assessment of the project.

The assessment focused on a study period from 2012 to 2050, covering key construction and operational phases, based on conservative assumptions. Highlights included:

Australia

Forecast economic contributions to Australia during the period 2012 to 2050:

- A$ 195 billion in exports for Australia;
- A$ 190 billion in additional GDP for Australia;
- A$ 91 billion increase in Australian real income;
- A$ 73 billion in taxation revenue for Governments in Australia (on average A$ 1.9 billion per annum); and
- 1800 full-time jobs per annum on average.

Western Australia

- A$ 75 billion boost in economic output;
- More than A$ 8.9 billion of taxation payments to the Government of Western Australia;
- A$ 20 million per annum in generated payroll tax payments to the Government of Western Australia;
- A$ 34 billion increase in real incomes in Western Australia; and
- 1,100 full time equivalent (FTE) jobs on average per annum for the next 40 years in Western Australia.

Northern Territory

- More than 1100 Northern Territory-based businesses securing work through 5000 subcontract and purchase order commitments awarded to date;
- More than A$ 159 million in contracts and purchase orders awarded to over 60 Aboriginal and Torres Strait Islander businesses;
- More than A$ 9 million to develop training and education institutions in the NT;
- More than A$ 3.4 million invested in local communities since 2012 across a range of initiatives;
- More than 11,000 employment opportunities for locals in the Territory; and
- More than A$ 10 billion flowing through the Territory economy as a result of project activity to date.

Bladin Point October 2018.

Chapter six

Here for the long haul

"We can look back with immense pride at what we have achieved. Together we have created something special, something that many people thought could not be done."

Seiya Ito, President Director Australia, INPEX

Ichthys Project Onshore facilities lighting up the night sky.

Here for the long haul

Ichthys LNG's start-up of production marked the beginning of INPEX Australia's transition to an LNG operating company – and the start of 40 years of contributions to the communities in which INPEX operates.

With decades of cargoes ahead, an exciting new chapter in history has begun. Ichthys LNG will play a significant role in supplying clean energy for millions of people for the next four decades.

With cargoes regularly departing from Ichthys LNG's world-class facilities, the focus is now on delivering full operations – safely, reliably and efficiently.

Through unwavering belief and determination, a vision that started with a small group and a A$ 3000 cheque has grown into a diverse global workforce, with the support of INPEX Corporation and joint venture participants, successfully delivering one of the world's most impressive LNG facilities – Ichthys LNG.

The contribution Ichthys LNG is making to the world is cause for great pride. By providing a vital need for many households, and by delivering multi-generational economic benefits, Ichthys LNG is helping to build a brighter future.

The Pacific Breeze LNG carrier leaving Bladin Point, Darwin with the first Ichthys LNG cargo on 22 October, 2018.


TUG

On board the Ichthys Venturer FPSO in August 2018.