6

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About us

Sustainability

Energy and innovation

You are in: Shell Global > About us > Our major projects > Prelude FLNG > Prelude FLNG - overview PRELUDE PRELUDE FLNG – OVERVIEW

Key facts

Floating liquefied natural gas (FLNG) is a revolutionary technology that will allow Shell to access offshore gas fields that would otherwise be

Location: Browse Basin, Australia

Depth: ~250 metres

Category: Floating liquefied natural gas Interest: Shell 67.5%, INPEX 17.5%, CPC 5%, KOGAS 10%

Fields: Prelude and potentially other Shell natural gas assets in the region

FLNG facility production capacity: At least 5.3 million tonnes per annum (mtpa) of liquids: 3.6 mtpa of LNG, 1.3 mtpa of condensate and 0.4 mtpa of liquefied Cookie Preferences etroleum gas

Key contractors: Technip Samsung Consortium

Current developments

We started building a floating liquefied natural gas (FLNG) facility to produce and export LNG off the coast of Australia.

Geoje and integrated into the hull.

under way. The first well was completed in late December 2014.

South Korea to work on operations readiness for Prelude.

such as liquefaction and offloading, to run at sea.

it uses an efficient double mixed refrigerant liquefaction cycle;

Engineers worked more than 1.6 million hours during the engineering and design phase of the Prelude FLNG project.

is safe, robust, reliable and with high availability to enable continuous, stable LNG production.

Ocean conditions and the extreme cold of the LNG were simulated and the tests were deemed a success.

Shell took the final investment decision (FID) on the Prelude FLNG project on May 20, 2011.

Since FID, Shell has welcomed three joint venture partners to the project – INPEX (17.5%), KOGAS (10%) and CPC Corporation (5%).

too costly or difficult to develop. Prelude FLNG is the world's first FLNG development.

The construction phase of the Prelude FLNG project is well under way. Our aim is to deliver Prelude FLNG safely and to do it right. This means developing a facility that

Safety and quality are the priority for Shell at all Prelude project locations. Together with our contractors, we are constantly working to ensure that safety comes first and that everyone goes home safely every day. We have a team of 250 inspectors deployed at project locations to check that all equipment and material is delivered in accordance with our specifications.

Prelude is a global project, with fabrication of components taking place all over the globe. A key location is Geoje, South Korea, where the Prelude FLNG hull and topsides are under construction at the Samsung Heavy Industries (SHI) shipyard – which has one of the few dry docks in the world big enough to construct a facility of this size.

In November 2013, Shell celebrated the launch of the Prelude FLNG hull. For a whole year, steel was welded together by thousands of workers at the SHI yard to create the biggest hull ever built. Once structurally complete, and weighing approximately 200,000 tonnes, the hull was floated in the dry dock before it was towed by nine tug boats through the Geoje harbour to its new position on the guay, where it is secured by 32 heavy mooring ropes.

commissioning has begun. As many as 5,000 people work on the Prelude FLNG facility on any given day at Geoje. In the Middle East, in Dubai, the construction of the Prelude FLNG turret mooring system is progressing well. Once assembled, it will be the largest turret in the world, almost 100 metres high. The first turret module was completed in

September 2013 and transported to Geoje, where it was installed into the hull before it was floated. Since August 2014, four more turret modules have been shipped to

The Noble Clyde Boudreaux drilling rig was towed to the Prelude FLNG location off the coast of Western Australia in August 2013, and drilling of the production wells is

At Geoje, the topside modules, many of which weigh as much as a single typical offshore platform, are now being installed on the hull and integrated. Early

Malaysia has been the main location for the project's subsea system design and the construction of subsea Christmas trees, manifolds and control equipment, with two Christmas trees already installed subsea at the Prelude location in late 2014. The Prelude loading arms are under construction at the FMC manufacturing facility in Sens, France, and in February 2014, the first Prelude loading arm was tested.

In Darwin, Australia, the main onshore supply base for Prelude is complete. The site is already receiving spare parts and equipment for the Prelude FLNG facility.

Shell has founded a dedicated search and rescue helicopter service in Broome, Australia, to support drilling activity and later the Prelude FLNG facility. It is supported by a dedicated team of highly trained pilots, paramedics, engineers and crew. The service is on standby 24-hours a day and is able to respond within 15 minutes during daylight hours and 30 minutes at night.

Shell started recruiting Australian production and maintenance technicians in 2012. Since then, more than 1,200 people have been employed and moved to Geoje,

35,000 bbl/d) and 0.4 mtpa of liquefied petroleum gas (LPG). Prelude FLNG is the first of what we expect to be many FLNG projects, which will build on our existing capability and LNG leadership.

Once operational, the Prelude FLNG facility will produce at least 5.3 million tonnes (mtpa) per annum of liquids: 3.6 mtpa of LNG, 1.3 mtpa of condensate (equivalent to

Technology

the world.

The Prelude FLNG facility will be 488m (1,600 feet) long, 74m (240 feet) wide and along with its contents, will weigh around 600,000 tonnes. It will be the largest floating offshore facility in the world. Once constructed, the facility will be towed to its location, some 475 kilometres (around 300 miles) north-east of Broome, Western Australia.

The floating facility will chill natural gas produced at the field to -162°C (-260°F), shrinking its volume by 600 times so it can be shipped to customers in other parts of

There the facility will be moored and connected to the undersea infrastructure and the whole production system commissioned.

It will remain permanently moored at the location for around 20-25 years before needing to dock for inspection and overhaul.

The LNG, LPG and condensate produced will be stored in tanks in the hull of the facility. LNG and LPG carriers will moor alongside to offload the products.

Many of the technologies used on the FLNG facility are ones we have used successfully onshore, but some have been adapted or modified in order for the processes,

The Prelude FLNG facility has been designed to withstand the most powerful tropical cyclones.

Important attributes of Shell's FLNG design are:

 it can provide high production rates of up to 6 million tonnes per annum (mtpa) of liquids (including LNG, LPG and condensate); it can process a wide range of gas compositions and can export LPG and condensate;

New technology that has been developed for FLNG includes LNG tanks that can handle sloshing, close coupling between the producing wells and the processing facility, LNG offloading arms, cooling water intake risers, turret and mooring systems, and the marinisation of processing equipment such as absorption columns and the main cryogenic heat exchangers. All of these technologies have been extensively modelled and tested to ensure they can operate safely and efficiently under marine

Markets The Prelude FLNG project is well placed to help meet the growing natural gas demand of Asia.

it can stay on station and does not have to be moved during severe weather conditions such as cyclones, which will increase the availability of the plant.

Environment and society

conditions.

Shell started recruiting Australian process and maintenance technicians in 2013. Since then, more than 120 people have been employed and many have been deployed to Geoje, South Korea to work on operations readiness for Prelude.

the FLNG facility, which will be crucial during the commissioning, start-up and operation and maintenance of Prelude.

Most of the service technicians will be recruited in 2015. They will manage the support services for Prelude (rigging, scaffolding crane operations, materials handling and emergency response).

the full support of Shell so they can pursue a career in the industry.

experience offshore in research projects, and from his teaching of undergraduates.

The project will create around 350 direct and 650 indirect jobs.

Shell has teamed up with the Australian work experience programme, Work Inspiration, to offer high school students the opportunity to learn more about a career in energy. Shell ran a pilot of the programme in Perth in 2014, and is now rolling it out with schools in Broome, Western Australia. Students learn about careers from Shell employees and contractors, and get real-life experience to see if a career in energy is for them.

The technicians recruited are highly skilled, with extensive experience in either LNG or relevant industries. Training them in Geoje gives them hands-on experience of

maintenance, supply vessels and underwater services contracts taking place this year. In Western Australia, to build local capacity and expertise to support the Prelude FLNG project, Shell is investing millions of dollars in Australian universities and education providers.

Challenger is currently delivering the foundation training programme for Prelude FLNG technicians before they begin work at Geoje, South Korea. Training takes place

Prelude will also provide taxes and revenue to Australia and create opportunities for local businesses. Shell is awarding about 200 contracts to support the Prelude FLNG facility during operations and maintenance. There will be significant contracting activity throughout 2015, with the award of the facilities management services,

at Challenger's Australian Centre for Energy and Process Training (ACEPT). It is the first training of its kind anywhere in the world. This investment in the Challenger Institute and ACEPT is key to supporting the growth and capability development of the ACEPT centre, so it can continue to train future talent which is in high demand in the Australian LNG industry.

Shell has committed to sponsoring a Certificate II Process Plant Technology scholarship class at ACEPT. This will allow selected participants to undergo training with

Shell has partnered with the Challenger Institute of Technology in Western Australia to develop a bespoke FLNG training programme for Prelude technicians.

Through a multi-million dollar partnership with the University of Western Australia (UWA) and its Energy and Minerals Institute, Shell is funding geotechnical engineer Winthrop Professor David White, as the Shell EMI Professorial Chair in Offshore Engineering, to improve offshore capabilities in Western Australia. The Shell EMI team teach 100 undergraduates in offshore engineering and deliver courses to the industry in Perth and internationally. The EMI Chair is seen as a

Through the partnership with EMI, Shell partly funds former chief Shell engineer, Mike Efthymiou – who played a significant role in the development of Shell's FLNG design, and developed patented FLNG technology – in a part-time professorial role. Through the partnership, UWA is able to benefit from Mike's extensive industry

The Prelude project will use significantly less materials, land and seabed than developing the same gas via a similar onshore facility. Developing the gas at the location of the gas field will reduce impact on sensitive coastal habitats, as FLNG avoids the need for shoreline pipe crossings, dredging and jetty works. Product carriers will be far from coastal reefs and whale migration routes.

May 8, 2013, Shell lays keel for world's first floating LNG project

April 29, 2010, Shell floating LNG technology chosen by joint venture for Greater Sunrise project

The Australian Government gave the Prelude FLNG project environmental approval on November 12, 2010.

valuable industry resource for companies like Chevron and Woodside, who also work closely with the Chair on research.

October 18, 2012, Major construction begins on the Prelude FLNG project - the world's biggest offshore floating facility May 20, 2011, Shell decides to move forward with groundbreaking Floating LNG November 12, 2010, Shell's Prelude Floating LNG Project receives environmental approval

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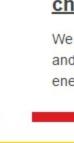
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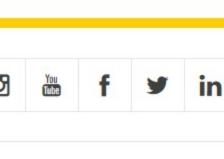
A revolution in natural gas Shell is building the world's first floating

natural gas resources are developed. It will help to unlock vital energy resources offshore, without the need to lay pipelines and build processing plants on land.

liquefied natural gas (FLNG) project, which has the potential to transform the way







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