

Features



Welding and wading go hand in glove on Thailand's Ratchaburi-Wang Noi natural gas pipeline job.

Light at the End of the Tunnel

Eurostar trains will hit 300 kilometers per hour between the Channel Tunnel and central London thanks to a \$7.8 billion rail link.

Wading to Wang Noi

Monsoon conditions haven't slowed progress on a strategic segment of Thailand's natural gas network, which will deliver fuel to a hungry new power plant.

The Atom & the Dove

A Bechtel-led consortium manages world-class resources at the U.S. Department of Energy's premier environmental lab.

Making Safety Stick

At Bechtel, where even one accident is too many, working safely is a passion.

Feeding the Behemoth

When it comes to building coking facilities that ingest heavy crude, blazing speed and low capital cost mark the new approach at a refinery in Old Ocean, Texas.

DEPARTMENTS

FRONT END



Expanding Dubai International, on-line procurement bidding, and a new wireless broadband network across Germany.

MILESTONES

Keeping up with Bechtel projects and people on job sites and in offices worldwide.

LIFE'S WORK

Bechtel's Mary O'Donnell enhances her front-line leadership skills as a rear admiral in the U.S. Coast Guard.

Wading to Wang Noi

Turning the rainy season to advantage in Thailand

OFTEN CALLED THE RICE BOWL OF SOUTHEAST ASIA, the Chao Phraya River basin is the richest and largest agricultural region in the Kingdom of Thailand. More than 122 centimeters of rain fall on the basin annually, accumulating in marshes where the rice crop thrives.

With Bechtel's help, the Petroleum Authority of Thailand (PTT) is carefully building a 153-kilometer-long natural gas pipeline across this basin, one of six major pipeline projects Bechtel has completed with PTT since 1990. The pipeline, a strategic segment in PTT's natural gas network, opens a direct link between the offshore Yadana gas field through Ratchaburi to a major power plant in the northeastern city of Wang Noi.

"Many development and construction projects throughout Thailand have been delayed by the economic downturn that started in 1997," says Khun Prasert Bunsumpun, PTT's president of gas business. "As part of PTT's policy to enhance security for the supply of natural gas, PTT chose to continue with the Ratchaburi-Wang Noi pipeline construction, which ties the Yadana Pipeline in the west to the Parallel Pipeline in the east."

NEW YEAR, NEW PIPELINE

Songkran, celebrated April 13, is Thailand's New Year, marking the start of the rainy season, when the weather shifts from hot and dry to nearly continuous monsoon. Songkran is also known as the Water Festival, and many of the local people believe the ample rains will wash away bad luck.

Mild rains typically begin in May, leading to heavy rain from July to October. And while heavy rain may bring good luck to the farmers, whose rice crops depend on it, it challenges those who build pipelines. Even small amounts of rain can turn an excavated

trench into a water channel.

As the rainy season of 1999 started in earnest, so began construction of the Ratchaburi-Wang Noi pipeline. Between September and November, at least two-thirds of the pipeline alignment lay under one to two meters of water. Even when it wasn't raining, the groundwater level remained at or near the surface.

A DELICATE BALANCE

The monsoon was hardly a surprise to Bechtel. "If it weren't for the water, constructing this pipeline would be relatively straightforward," Brian Erickson, Bechtel's project manager, says wryly. "Maintaining the correct water balance in the rice fields during construction has been far and away the team's biggest challenge."

With a pipeline route that crosses 765 bodies of water, including four major rivers, numerous fish and shrimp ponds, ditches, and countless rice fields, the project is a case study in water management. Rice fields are flat, and the crucial water levels are maintained

PEAK OF CONSTRUCTION SAW NEARLY 1,400 PEOPLE AT WORK ON THE STRATEGIC RATCHABURI-WANG NOI PIPELINE.



BY SYBIL HATCH PHOTOGRAPHS BY TIM PELLING/LIAISON INTERNATIONAL

PROJECT PROFILE



LOCATION

Ratchaburi to Wang Noi, Thailand

CUSTOMER

Petroleum Authority of Thailand

PARTICIPANTS

Bechtel Pipeline

DESCRIPTION

Installation of 153 kilometers of 30-inch-diameter natural gas pipeline

SCOPE OF WORK

Engineering, procurement, and construction management

VALUE

\$300 million

SCHEDULE

To be completed in August 2000

through a system of ditches. If water levels get too low in the fields, rats move in and eat the rice. Too high and the crop is ruined.

The construction crews have devised several techniques to properly handle water in and around the pipeline trench. Where the pipeline runs through a rice field, crews pump water from one side of the trench to the other to maintain water levels in the adjoining fields and avoid negative impacts to the crop.

DRENCHED IN THE TRENCHES

The high water levels have made some aspects of the project easier. In traditional pipeline construction, a trench is excavated, and the pipe segments are welded together trenchside and lowered into the dry trench with side-boom cranes, after which the trench is backfilled.

In the monsoon season, it's impossible to keep the Ratchaburi-Wang Noi pipeline trench dry during construction. So Bechtel and the contractor use the abundant water to their advantage. Long sections of pipe are installed using a "push-pull" method while the trench remains full of water.

A large working pad is built near one end of the trench. The pipe is welded together, coated, and tested on the pad. Up to a kilometer of welded pipe is then pushed off the pad on rollers into the trench, floating along the pipeline alignment. These longer segments are then connected, and the trench is backfilled.

The water-filled trenches quickly become a magnet to wildlife, especially fish. Although Bechtel uses the same sophisticated and highly effective project control systems on this pipeline as on any other major

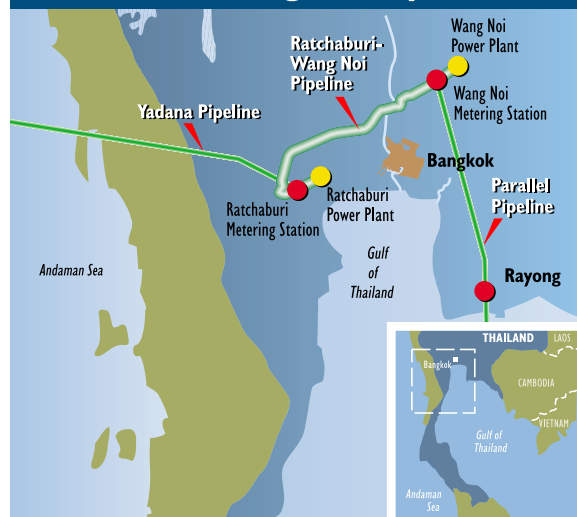
project, local crews have an easier way to gauge their progress. "We can tell if we're behind schedule without complicated graphs and charts. We just take note of when the local residents start fishing in our trenches," says Erickson.

ALL IN A DAY'S WORK

In a region where water flows all around, land and business deals are also sometimes fluid. "We solve a new issue every day with local landowners and tenants," comments Khun Suphon Tubtimcharoon, PTT's project director. "Although we successfully arranged to acquire the land to support the contractor's construction schedule, right-of-way acquisition and negotiations regarding construction disturbance are an ongoing process."

In one case, at the outset of the project, PTT paid a landowner for temporary and permanent right of way through his prawn farm. Six months later, when construction was to begin, the prawn farm had evolved into a full-fledged fish farm and hatchery, and the owner claimed significantly higher compensation. Construction crews had to herd ducks from the right-of-way and pay the farmer compensation for lost egg production caused by construction noise. Another fish pond owner requested compensation because

Ratchaburi-Wang Noi Pipeline



he felt the construction activity would affect his pond's breeding conditions.

A VITAL LINK

Despite these and other one-of-a-kind challenges, pipeline installation is moving along rapidly. At the height of construction, there were nearly 1,400 people working on the project at 15 to 20 individual work sites. The natural gas will start to flow this August.

Just in time. Originally, gas flowing from the Yadana gas field was intended to supply a new power plant in Ratchaburi. But because the Ratchaburi plant was delayed, under its "take-or-pay" contract PTT had to purchase gas for which it had no destination. The new pipeline will bring the gas directly to Wang Noi.

As the Thai economy picks up, power demand should increase, further fueling economic growth. With each passing Songkran, Thailand's economic "bad luck" appears to be washing away. 🍀

Natural Gas: Fueling a Nation

Economic growth relies on affordable and dependable electricity, and natural gas is one of the cleanest and most economical power-generating fuels. Found in abundance in both the Gulf of Thailand and the Andaman Sea, natural gas is Thailand's fuel of choice. In 1998, natural gas fueled more than half of Thailand's electric power production.

The government-owned Petroleum Authority of Thailand (PTT) is responsible for natural gas procurement, production, storage, transportation, and distribution to domestic and regional customers. PTT was formed in response to the world oil crisis in 1978. One of its primary goals is to promote energy stability within the country by making Thailand more energy self-reliant and not as subject to heavy fluctuations in energy price or supply.

To tap the nation's 12.5 trillion cubic feet of proven reserves, PTT accelerated construction of the infrastructure needed to bring natural gas to the locations with the greatest demand. PTT built the first pipeline segment in the infrastructure from the Erawan gas field in the Gulf of Thailand north to Saraburi in the mid-1980s.

Bechtel's first assignment with PTT was a 1990 feasibility study for an extension of that pipeline from Saraburi northeast to Nam Phong, says Emad Khedr, manager of Bechtel's pipeline business in the region. "Bechtel has worked with PTT ever since, studying domestic and import system upgrades, and then performing engineering, procurement, and construction management for major onshore and offshore gas pipelines throughout the country."