

Hong Kong Natural Gas Pipeline

As one of the world's most populous cities, Hong Kong needs a consistent stream of clean energy resources to supply its 7.1 million residents with power. The city relies on a mix of fuels, chosen with an eye on reliability, sustainability and efficiency.

One of those energy sources is natural gas. Since 1996, Hong Kong's Black Point Power Station had drawn natural gas from the reserves of the Yacheng 13-1 gas field in Hainan, a nearby Chinese province. But those reserves had begun to deplete, and by the late 2000s, it was clear that CLP/CAPCO (a joint venture of ExxonMobil Energy and CLP Power Hong Kong) needed a new plan—not only to maintain a consistent supply of natural gas, but also to comply with the tightened emission caps that will be required by the Hong Kong Special Administrative Region (HKSAR) Government in 2015.

In 2008, HKSAR Government and Central Government of the People's Republic of China signed a memorandum of understanding on energy cooperation, which identified three new gas sources from which mainland China could supply gas to Hong Kong.

One of the sources is the Second West-East Gas Pipeline (WEPII), which is the world's longest natural gas pipeline. Stretching approximately 8,600 km, it starts in Xinjiang in China, where it connects to the Central Asia-China Gas Pipeline, and carries 30 billion cubic meters of gas from Turkmenistan to 15 Chinese provinces and regions.

Building an additional pipeline to bring WEPII's gas to Hong Kong by the end of 2012, however, would be no easy task and would require top-notch project management.

A HIGHLY COMPLEX PROJECT

Connecting the WEPII network from mainland China to Hong Kong presented numerous, complex challenges to all involved.

Regulations: Because it crossed the border between mainland China and Hong Kong, the project team had to acquire permits from both jurisdictions. The project had to fulfill differing practices and statutory approval processes between the jurisdictions.



Image courtesy of GE Oil & Gas Press Images

PMBOK® GUIDE PRACTICES AT WORK

The project and program managers on the Second West-East Gas Pipeline Hong Kong Branch Line project had to handle enormous complexity. To accomplish the task of building a subsea pipeline in one of the world's busiest marine channels, they implemented a number of good practices outlined in the *PMBOK® Guide*, including:

- Effective planning
- Effective scope management
- Proactive quality monitoring
- People management
- Proactive risk and safety management
- Effective communication
- Effective decision making
- Effective stakeholder management

The result was a project that finished on time, with minimal environmental impact and zero reportable incidents or fatalities.

Communications: The various working teams used several different languages, and all of the parties involved had different requirements for documentation and reporting. The teams predominantly used English, Putonghua and Cantonese. However, they used English and Chinese for documents and PowerPoint presentations. The project team also had to manage a multitude of stakeholders, including over 30 authorities in both jurisdictions.

Environmental requirements: The project needed to fulfill stringent environmental requirements for the two jurisdictions. The project managers instituted a robust monitoring and audit program during the project execution phase, with intensive water quality monitoring, marine mammal monitoring and site inspections. Mitigation measures also included the deployment of silt curtains and limitations on working speed during marine dredging and jetting operations.

The groundwork: The actual laying of the pipeline was subject to many physical constraints. The project required a 20 km undersea pipeline through three shipping channels—Dachan Fairway, Tonggu Channel and Urmston Road—the latter of which is one of the world’s busiest marine channels. There were also challenges involving shallow water with a dredged marine channel, anchorage areas and an existing subsea pipeline and cables.



TIME-TESTED SOLUTIONS

To handle a complex project of this magnitude and to finish on time and on budget, the project team needed careful planning. Before project initiation, the team thoroughly planned, scheduled and engineered the project to ensure that it would work properly and, most importantly, that it would be safe.

The project had a tight schedule. To meet its deadlines, it implemented elements of waterfall methodology, where certain milestones had to be completed before the next tasks could start. For example, the channel dredging had to be finished before the pipeline could be laid. Proper planning, critical path monitoring, and close coordination between Hong Kong and China helped ensure the project finished on time.

Before laying the pipeline, the project team conducted an extensive marine traffic impact assessment (MTIA). They also liaised heavily with local marine and port control authorities to successfully work around the channel traffic, laying the entire 20km undersea pipeline in only six or seven months.

To further manage timelines, the project team tightly controlled the scope. Any changes had to go through a rigorous change management process, which kept everything on track.

The team also realized that communication was a key component to success. Project and program managers took special efforts to enhance their communication and to build effective teams. They established processes to always engage the right person for the right task and to encourage teamwork. Project and program managers also sought to provide adequate support for their personnel. And, given the different nationalities involved, all materials and discussions were in multiple languages.

The project managers also strove to enhance control and monitoring, with a focus on quality and safety. The project managers performed daily site visits, as well as scheduled and non-scheduled management walkthroughs, which were very effective in ensuring that the highest quality work was performed. There were also third party inspections done on critical tasks, such as the pipe welding, which earned a 100 percent acceptance rate.

SUCCESSFUL OUTCOMES

As a result of using the good practices and methodologies from the *PMBOK® Guide*, CLP/CAPCO finished the Hong Kong branch line of WEPII on time. The first gas arrived on 19 December 2012, and WEPII officially started supplying gas to Black Point Power Station for power generation in 2013.

The project was a remarkable success, with timely completion and a minimal impact on heavy marine traffic in the area, especially on container ships that are vital to the economy. In addition, there were no environmental incidents reported. And most impressively, the three million hours of pipeline construction went off without a single recorded incident.

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