

# A CLOSER LO

THE ROYAL COMMISSION & BECHTEL CORP.,

What was once a sleepy fishing village is now a cornerstone of Saudi Arabia's industrial power—and, quite possibly, the largest civil engineering project in the world. After investing billions of dollars and decades of work, the Saudi government has its very own enormous economic engine in the middle of the desert: Jubail Industrial City.

But the megaproject is still many years away from completion. In fact, it just keeps growing.

The first part of the infrastructure behemoth, Jubail I, was launched by The Royal Commission in the mid-1970s. Located in the Eastern Province of Saudi Arabia on the Persian Gulf, it included the construction of facilities for more than a dozen primary industries, including a steel mill, petrochemical plants and a refinery.

Jubail is more than just a manufacturing center, though. It's also a community of over 105,000 residents. That means the urban planning called for mosques, a golf course, more than a dozen shopping centers and 24 schools. In addition, Jubail boasts what's billed as the largest combined desalination and power plant in the world, pumping more than 850,000 cubic meters (30 million cubic feet) of water every hour.

Already, Jubail's economic output is substantial. It produces 7 percent of the world's petrochemical products and contributes more than 11 percent of Saudi Arabia's non-oil GDP.

The action didn't stop there. The Saudi government now has Jubail II, located about 8 kilometers (5 miles) west of the first site.

"This expansion effectively duplicates the existing Jubail I development," says George Dinic, PhD, program manager at Bechtel Corp., the U.S. construction giant that has been working on the megaproject from the start.

## TWO FOR THE MONEY

Bechtel's Jubail II expansion projects have an estimated value of US\$6 billion, but Dr. Dinic says the true number is higher.

"Something to bear in mind is that, due to the low cost of labor in the kingdom, the value of projects quoted is very low compared to Western costs," he explains. "If a



George Dinic, PhD, Bechtel Corp.



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An infrastructure megaproject  
transforms a desert landscape into  
an urban center—with everything from  
a petrochemical plant to mosques.

## JUBAIL INDUSTRIAL CITY, SAUDI ARABIA

PHOTOS BY HANY MUSALLAM



# DESERT GREEN

Saudi Arabia is making a hard industrialization push with the Jubail megaprogram—but it's trying not to do so at the expense of the environment.

The Saudi government has established a comprehensive program for Jubail to monitor air and water quality, manage solid and industrial waste, and study wildlife. Every five minutes, nine stations in the city measure the air for up to 30 components, including carbon monoxide and ammonia. That information is then wirelessly transmitted to a central computer for analysis.

At the same time, 13 stations closely monitor water quality. Electronic probes measure factors such as salinity, dissolved oxygen, temperature and acidity. Water samples are then analyzed for potential problems, including the presence of heavy metals, with the results stored in a database.

In addition, Jubail's wastewater is recycled and reused for landscaping purposes. The excess is pumped into the desert, which has created an ideal environment for Sabkhat al-Fasl, a popular bird-watching spot that draws more than 20,000 birds during peak migration.

similar program was being undertaken in the United States, the value would probably be three to four times as much."

And that doesn't include the cost for industrial or housing projects to be launched by private investors.

The expansion is slated to cover development of more than 9,000 hectares (22,239 acres) of land, port expansions, an 18,000-student university and residential areas to accommodate 100,000 people.

But the project's emphasis is on petrochemicals. Plans call for a refinery that Dr. Dinic estimates will cost just under US\$10 billion. Set

to debut in early 2013, it will have the capacity to process 400,000 barrels of Arabian heavy crude oil a day.

In what was its greatest test of nerves, the project team had to construct a US\$115 million pump station and pipelines.

"The main technical challenge was to get the seawater, which is used for cooling of industrial equipment, from the end of the existing canal in Jubail I to Jubail II, across the Saudi Aramco oil and gas pipelines," explains Dr. Dinic.

"Just the thought of a possible failure and having a disruption of oil flow to the world markets—which in turn would have probably caused a major rise in the world's oil prices—was enough to have sleepless nights," he says. "Every step of the operation was carefully planned, approval was obtained from Aramco engineers for all our construction activities prior to undertaking any construction, and the work went smoothly."

As in any city, the Jubail project plan had to include transportation infrastructure. To that end, the team has expanded the port for an 80-hectare (198-acre) petrochemical

quay with five new berths to allow room for massive tankers up to 230 meters (755 feet) long and carrying as much as 80,000 tons of liquid petrochemical products.

The team is also working on a 195-kilometer (121-mile) rail line that will traverse Jubail I and II to connect local industries to the ports. Slated to wrap up by 2014, the first phase will focus on Jubail I, linking the new Ras al Zawr line and the Dammam railway with the port, creating spurs to all of the industries. The second phase will connect Jubail II's industries to the network, with completion hinging on the schedule of the Jubail II build-out.

## BIG PROJECT, BIG CHALLENGES

Such a diversified program on such a huge scale is bound to come with its fair share of issues.

To put things in perspective, Jubail Industrial City covers 1,016 square kilometers (392 square miles)—which makes it larger than some countries. To prepare the site, workers must level entire dunes and relocate more than 35 million cubic meters (1.2 billion cubic feet) of sand.

"Running projects over an area of this size is a challenge in itself," says Dr. Dinic. "We have, on average, some 50 contracts in construction at any point in time throughout the year. At the same time, we are planning, scoping and getting approval for new contracts to go into design, procurement and construction."

It's a bit like a factory production line, he says—and that conveyor belt never stops.

"Integrating all the projects and sequencing the projects in the right order is another challenge," adds Dr. Dinic, "especially if they are not awarded in the planned sequence."

To keep projects moving, Bechtel has learned to leverage the capabilities of local contractors.

"We work closely with these companies to educate and improve their awareness of safety and quality to meet the expectations of Western standards," says Dr. Dinic.

# 50,000

The Jubail Industrial City project workforce at its peak in the early 1980s

# 50

The average annual number of Bechtel's construction projects in Jubail



The team holds monthly workshops to show “good and bad examples of their practices” and runs spot checks designed to “ensure safe working practices and quality of the end product.”

Bechtel is also trying to improve the procurement process to attract better-qualified bidders, Dr. Dinic says.

“The current system is based on the Saudi procurement law, which means that, generally, the lowest bidder wins. We are working with our client to make improvements by pre-qualifying bidders and asking for specific project-related experience.”

Along with the procurement issues, Dr. Dinic contends the media’s portrayal of Saudi Arabia has made recruiting team members from outside the country a difficult proposition.

“Many people have developed an inaccurate perception of Saudi Arabia due to ill-informed and misleading publicity,” he says. The region’s negative portrayal in the press has potential workers running scared, but Dr. Dinic says those fears are largely unfounded.

“The security situation has improved substantially in the past five years, as the Saudi government has taken huge steps toward improving security. And yet that is not publicized in the media,” he says. “I feel safer here than I probably would feel walking in downtown New York or in some parts of London at night.”

For its part, Bechtel is working to address preconceived ideas about Saudi Arabia.

“We have made a video and have posted it on Bechtel’s website to show what life in Jubail is like,” Dr. Dinic says. “In addition, when we have job fairs or interview potential employees, we try to describe to people the actual situation on the ground and what they can expect.”

### BIGGER AND BIGGER

The southern part of Jubail II is 75 percent complete, while work on the north sector has just begun. And before all this wraps up, a new megaproject is already on order.



In addition to the expansion, the Saudi government announced plans for Ras al Zavr Minerals Industrial City. Located north of Jubail, it’s aimed at developing the kingdom’s minerals and metals potential.

And Bechtel is hoping to add that megaproject to its roster as well.

The economic downturn may be squeezing funding for projects and development work in some spots, but Saudi Arabia is investing strongly in infrastructure projects.

“Unlike other economies in the world, and especially in some of the neighboring Gulf Cooperation Council countries, the Saudi government has been very prudent in how they invested money,” explains Dr. Dinic.

“They carefully planned their investments based on real demand and not on speculative markets,” he says. “In addition, the price of oil continues to be healthy. That is why the Saudi economy has not suffered from the global economic crisis and that is also why the Saudi government has enough money to continue investing in infrastructure projects. The outlook for the Jubail project remains very positive, with the investment in projects in 2010 exceeding last year’s investment.”

And Dr. Dinic isn’t complaining about the workload.

“Our challenge is how to spend the annual budget,” he says. “It is a fortunate position to be in, but at the same time a very challenging one.” —Sandra A. Swanson

US\$10 billion

The estimated cost to construct the new Jubail II refinery

400,000

The number of barrels of Arabian heavy crude oil the refinery will be able to process per day