

Keeping LNG Facilities Just A Little Bit More In The Dark

Energy companies love to gussy up annual reports with pictures of their plants at night, lights ablaze. However, there's a new trend among engineers for kindler, gentler, less intrusive lighting that doesn't fill the sky with an orange glow. Many of these techniques are incorporated into designs for the four dozen or so regasification terminals proposed for North America, as developers work to allay the concerns of residents and environmentalists.

Take James Kemp, chief engineer for DKRW Energy's proposed 1.3 billion foot per day (10 million ton per year) terminal in Sonora, Mexico. He plans to adopt lighting standards for the plant that were established by astronomers in nearby Tucson, Arizona. Earlier work on a coal-fired power plant along the Natchez Trace Parkway in Mississippi converted Kemp to minimizing light spillover. He has since applied the Tucson standard to projects in Canada and Australia.

Glow from the growing cities of Tucson, Phoenix and Nogales, Mexico, can reduce visibility for observatories built when Arizona's skies were truly dark. So local regulations limit light emission from homes and commercial properties, with tighter restrictions nearer the observatories. Astronomers and other dark sky enthusiasts take the lead in community education and getting support from local governments. "The regulations are on the books, so we can reason with people on how to keep the lid on those lights," says Richard Green, director of the Kitt Peak National Observatory.

"I'm really pleased with the approach," Kemp told WGI. "It's a change of philosophy from the old days when you turned on everything." Hanging lights lower and turning them on only when people enter a zone to work allows designers to use brighter light where and when it's needed, making it easier to see the task at hand. "You can use more lumens, because they're not on all night long," he explained.

Directed lighting can help answer environmental objections to LNG facilities of all types. John Paschal, principal engineer for Bechtel, designed liquefaction plant lighting for ChevronTexaco's Gorgon project in Australia (WGI Apr.7,p8). Three-dimensional and zoom functions in lighting design software allowed him to direct lights so that no glow will reach the beaches of Barrow Island — where the liquefaction plant is to be built offshore Australia — and disorient baby turtles. Light from the plant won't be shielded in other directions.

Chevron may have to use the same techniques for its proposed offshore terminal half a kilometer from Baja California's South Coronado Island, which could receive Gorgon gas. Mexico's environmental agency Semarnat stipulated in Chevron's permit that the company must select lights which least affect nesting birds' behavior (WGI Sep.22,p3). Chevron's choice may determine where Mexican authorities permit nighttime operations at the plant.

Safety is usually the prime concern for people living nearby when an LNG terminal is proposed. But nuisance factors such as light and noise are often brought up in community hearings on LNG facilities, says Exxon Mobil spokesman Bob Davis, who recently attended a federal hearing for Exxon's proposed Golden Pass terminal at Sabine Pass, Texas (WGI Jan.21,p8). It would be in a shipping channel, and Exxon would aim lights away from residential areas, he said.

"In general, we're finding that our clients are building plants in areas where local regulatory authorities, or citizens and residents, are concerned about the environmental impact and nuisance effect of night-lighting," says Kellogg, Brown & Root chief electrical engineer Shan Griffith. Choosing the right type and placement of light is both an art and a science. "Sometimes the goals of optimum

'dark skies' lighting aren't compatible with optimal efficiency. It takes a balance," he explains.

DKRW's Kemp says his approach — designed to match light output from the University of Tucson, in the mid-range of the Tucson standards — raises capital costs for lighting by 5% and reduces long-term operating costs by 25%. Bechtel's designs, which emphasize brighter, better-focused light, raise initial costs by up to 25%, but lower energy costs by 40%. Savings in both cases stem from longer life for more-efficient fixtures and lower maintenance costs. Security is actually increased by turning lights on only when motion is detected, Kemp said. "Perimeter lighting is useless because people become used to it. If the light comes on, *pow!*, you notice it."

Engineers agree that communities with regulations in place before a plant is built will have a better chance of limiting light pollution. Support from local officials is key. Some Mexican observatories have been rendered useless by encroaching glow from booming cities, but the "legal culture doesn't really exist in Mexico" to enforce such regulations, even if they existed, according to Antonio Sanchez-Ibarra, astronomer at the University of Sonora in Hermosillo. Nonetheless, Mexican observatories are starting to talk about promoting light regulations, he says. "The new government in Sonora has a more progressive attitude. They believe development, art and science are needed in the state."

"One of the things I'd like to see is consistent standards, so that it's not such a task each time to meet what the requirements are. If requirements were consistent costs would be easier to predict, and then all the contractors would be bidding on the same basis," KBR's Griffith says.

Code developers could be more effective if they brought in engineers early in the process. "We play in these areas. It's more than a living. It's something we roll around in our minds while driving," says Bechtel's Paschal.

By Lucy Hornby in New York

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