

In the United States, large-scale liquefaction occurs at the Kenai, Alaska facility in preparation for exporting LNG to Japan. Generally, however, liquefaction occurs overseas. A typical LNG liquefaction facility includes three or four trains, although the plant in Bontang, Indonesia has eight. Worldwide, there are currently 18 liquefaction plants that export LNG operating 71 trains. Another 14 trains were under construction as of February 2005.<sup>30</sup> The LNG production capacity of individual trains has increased from 0.5 to 1 million tons per year for the early plants to 1 to 5 million tons per year for plants under construction. This trend has been matched by a five-fold increase in LNG storage tank size, from 40,000 cubic meters to 200,000 cubic meters. While steam turbines were used as mechanical compressor drivers in early plants, more efficient natural gas turbines are now standard. Continual evolution in both turbine and compressor designs has resulted in a steady decrease in the power required to liquefy natural gas. LNG formed in each train—the natural gas now at about  $-260^{\circ}\text{F}$ —is transferred to insulated tanks for storage at atmospheric pressure. Just as the temperature of boiling water remains constant even if heat is added (thanks to the thermodynamics of steam evaporation), so does the temperature of boiling LNG at atmospheric pressure—as long as the gas vapor (LNG “steam”) is removed. This “boil off” gas, about 0.15 percent of the volume per day, fuels the liquefaction facility, LNG transport ships, and receiving terminals where LNG is regasified. At the liquefaction plant, LNG is transferred from the storage tanks to the ship using specially constructed pumps and jointed loading pipes that are designed to withstand the very low (“cryogenic”) temperatures necessary for liquefaction