

Chicago District Energy System Project



Project Description

CenTrio owns and operates North America’s largest downtown district cooling system in Chicago. The system features North America’s largest ice thermal storage system (“ice battery”), which produces ice at night to melt during the day to reduce cost and carbon emissions. CenTrio’s district also leverages the Chicago River for aqua-thermal heat rejection and other proprietary technologies to reduce freshwater consumption by 225,000,000+ gallons annually. These advantages promote resiliency by minimizing reliance on the city’s water utility. This provides a major benefit to the local and regional utility and its customers through CenTrio’s ability to drop demand significantly in times of extreme grid strain. CenTrio has demonstrated the ability to drop 50 MW of capacity off the electric grid by utilizing ice thermal storage.

CenTrio’s Chicago system began operation in 1995 and boasts a 99.99% reliability record. Throughout that time, the system has grown from a single central plant serving a handful of downtown customers to a district of five distribution plants interconnected by 8 trench-miles of piping and several satellite chiller plants that serve over 53 million square feet of commercial, residential, hospitality, retail, entertainment, and critical process load customers. The scale and long-term phased growth of the system has required strategic planning around operations, plant design, and construction. This has led to CenTrio becoming the standard bearer for operational excellence in district energy systems. With multiple plants being built, maintained, and modernized over a 27-year period, numerous technologies and operational strategies have been deployed to maximize efficiency, reliability, and water savings while minimizing real estate footprints and capital costs.

Recent plant construction and upgrade projects have utilized the newest, most efficient equipment and control systems. CenTrio has also identified ways to leverage existing infrastructure in new ways that were not contemplated at the time of original construction. For example, CenTrio’s 310,000 ton-hour ice thermal storage system was developed primarily to leverage low-cost nuclear power at night in the 1990’s. While still valuable for reducing electricity costs, lowering carbon emissions, and improving grid stability, CenTrio has further leveraged this asset through participation in demand response programs. CenTrio has invested over \$300 million in the growth and operation of its Chicago system. A small sample of projects include:

The Post Office

One of CenTrio’s newest customers, The Post Office entailed tunneling under the Chicago River to bring district service to the site and the development of a new on-site satellite plant. The district connection was made by constructing a pair of shafts approximately 55’ deep on the east and west banks of the Chicago River. A 60” diameter bore was made to bring 24” supply and return chilled water pipes and several conduits from CenTrio’s existing distribution network. Various regulatory bodies including CDOT, the Illinois EPA, and the Army Corps of Engineers were involved in the review and approval of the project. Complicating construction of the shafts were their proximity to the structural river wall, requiring advanced engineering and construction methods.

Due in part to the timeline required to complete such a complex interconnection project, an on-site plant was constructed to serve The Post Office during construction and initial occupancy. It now provides additional on-site reliability. The developer’s plans for a rooftop park and surface level plaza eliminated the possibility of using cooling towers for the on-site plant. A river water system was installed for heat rejection. CenTrio also supplies condenser water as a service to tenants within the Post Office utilizing river water.

River Water Heat Rejection

Two of CenTrio’s five distribution plants and one of its satellite plants utilize the Chicago River for heat rejection in lieu of cooling towers, reducing freshwater usage associated with cooling systems by 143,000,000 gallons annually. The permitting and construction of these systems required strict adherence to environmental standards and review/approval from the City of Chicago, U.S. Army Corps of Engineers, and the Illinois Department of Natural Resources. In addition to complex initial construction, extensive maintenance is required for reliable operation, and upgrades to the systems have been required to meet new NPDES permitting requirements.



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Plant 2 Modernization

In 2021 CenTrio completed a modernization project at distribution Plant 2. This project replaced end of life equipment with more efficient chillers and cooling towers, reducing reliance on R-22 refrigerant, and increasing chilled water and ice production capacity by approximately 6,000 tons to support new customer growth.

The project required complex coordination due to the fixed footprint of the plant and equipment that was retained. The entire project had to be completed on a firm offseason schedule to ensure plant availability for the entirety of the cooling season.

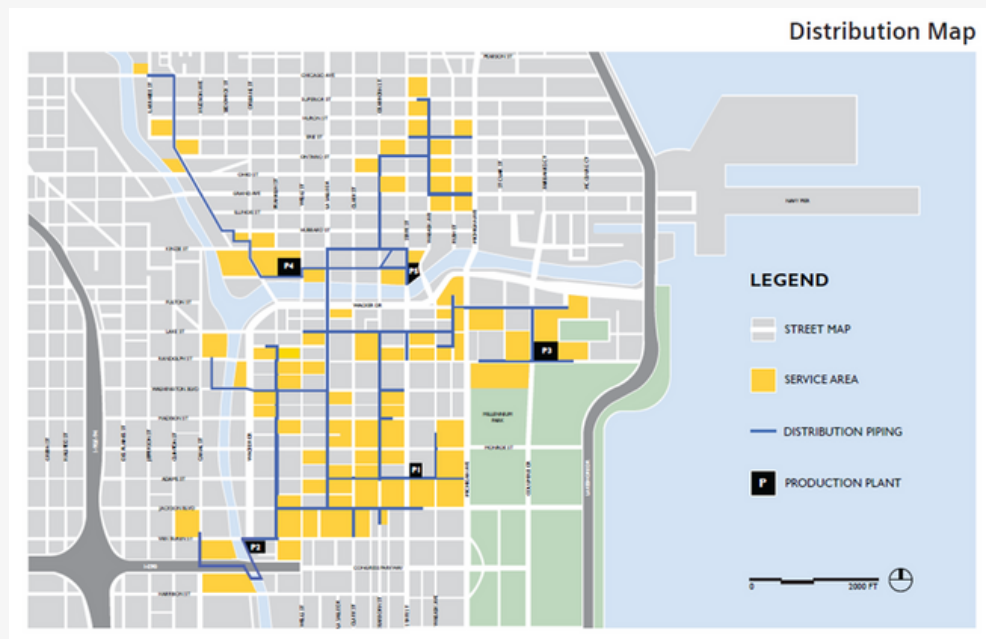
Plant 3

Distribution Plant 3 was constructed as part of the initial development of the Blue Cross Blue Shield building in 1997. The building was designed as a phased development and topped out at approximately 50% of the height it stands today.

In 2007 CenTrio undertook phase 2 of the Plant 3 project, relocating cooling towers to the roof of the building at full height. The plant remained online throughout the construction process to continue serving customers without interruption. The phase 1 cooling towers operated while the second half of the building was constructed on top of them. New cooling towers were installed after the building topped out and the original cooling towers were decommissioned.

During its operating history, CenTrio has negotiated and received city approval for its initial Use Agreement and more than 30 amendments thereto. The Use Agreement requires 25% MBE contractor participation and 5% WBE contractor participation, which CenTrio has met or exceeded. CenTrio also employs Local 399 engineers to operate its plants 24 hours a day, 365 days a year.

With over 125 customers in Chicago, CenTrio has unparalleled experience in delivering value to building owners and developers, while navigating complex regulatory challenges, and designing/constructing/owning/operating/maintaining thermal energy plants and distribution systems.



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System Size

101,000 tons of cooling (including river water cooling) across an 8-mile distribution network

Commercial Operation Date

Plant 1 - 1995
Plant 2 - 1996
Plant 3 - 1997
Plant 4 - 1999
Plant 5 - 2002
Plant 6 - 2018

Overall Construction Time

Plant 1 - 24 months, including new purpose-built building
Plant 2 - 30 months, including new purpose-built building
Plant 3 - Phase I (12 months); Phase II (6 months)
Plant 4 - 12 months
Plant 5 - Phase I (7 months), Phase II (7 months)
Plant 6 - 6 months

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