



Toray Plastics America

7.5 MW and 12.5 MW CHP Systems

Project Overview

Toray Plastics (America), Inc. (TPA) is a manufacturer of polyester and polypropylene films for flexible and rigid packaging, lidding, graphic, industrial, optical, and electronic applications. In North Kingstown, Rhode Island, TPA employs approximately 600 people on a 70 acre site.

In 2002, TPA installed a 7.5 MW combined heat and power (CHP) system on site to reduce their operating costs and improve the reliability of their electricity supply. After more than a decade of success with that system, the company decided to expand their use of CHP and installed a second 12.5 MW system in 2014.

Use of CHP has substantially reduced TPA's operating costs and improved the reliability of their electric supply.

Quick Facts

LOCATION: North Kingstown, RI
MARKET SECTOR: Plastics manufacturing
FACILITY SIZE: 70 acre site
FUEL: Natural gas
EQUIPMENT: 1 gas turbine (7.5 MW)
2 reciprocating engines (5.0 and 7.5 MW)
TOTAL SYSTEM CAPACITY: 20 MW
OPERATION: 24/7
USE OF THERMAL ENERGY: Space heating, steam & chilled water for industrial processes
ANNUAL ELECTRICITY GENERATION: 145,000 MWh
ANNUAL STEAM GENERATION: 364 million pounds
BEGAN OPERATION: 2002: 7.5 MW turbine CHP system
2014: 12.5 MW engine CHP system

Reasons for Installing CHP

TPA's facility operates continuously year round, and a reliable power supply is important to productivity. They typically experience disruptions to grid power about five times a year, and even a brief disruption can cause manufacturing to go down for as long as eight hours. That lost production time is very costly, so TPA was interested in CHP as a source of both backup power and utility cost savings.

Use of CHP also supports TPA's commitment to corporate social responsibility and energy conservation. Related efforts at this facility include the 2011 installation of 1,650 solar electricity panels with generating capacity of 445 kW.



TPA North Kingstown Facility

System Design and Operation

TPA's first CHP system, installed in 2002, uses a 7.5 MW gas turbine manufactured by Solar Turbines. A natural gas compressor brings the incoming fuel up to the pressure required by the gas turbine. The turbine generates electricity for use on site. A heat recovery steam generator (HRSG), supplemented by a duct burner, captures heat from the turbine exhaust and transfers it to circulating water to generate high pressure steam for use in the manufacturing processes.

The second CHP system was installed in 2014 to serve a separate part of the facility. It consists of two natural gas-fueled Kawasaki reciprocating engines, sized 5.0 MW and 7.5 MW. TPA selected reciprocating engines for this system, rather than additional gas turbines, because this production line requires a higher ratio of electricity to thermal energy. The engines generate electricity, and a HRSG captures heat from the engine jackets and exhaust to generate steam. Some of the steam is used for manufacturing processes throughout the year. The rest of the steam is fed into a steam turbine driven chiller to generate chilled water for process use from spring through fall, while the steam is used for space heating in the winter and the chilled water is generated through free cooling and existing electric chillers.

Both CHP systems operate continuously year round, except for limited downtime for maintenance. Existing boilers provide backup steam generation for both systems.

Maintenance is performed by the equipment manufacturers. TPA has service contracts with the manufacturers, which include maintenance approximately every six months for the gas turbine and three months for the reciprocating engines.

In the case of instability or an outage on the power grid, TPA's facility automatically goes into island mode to operate independently from the grid. When going into island mode, non-essential equipment is automatically turned off so the CHP systems can meet the facility's full electrical demand. Once in island mode, staff review weather and grid conditions and determine when to restore their connection with the grid. TPA staff report great success with using the CHP systems during outages, after some early challenges in setting systems up to smoothly enter and exit island mode.

System Benefits

In total, TPA's CHP systems generate 145,000 MWh of electricity and 364 million pounds of steam, or 92% of the electricity and 100% of the thermal energy used in the facility. Generating this energy with efficient CHP systems has substantially reduced the facility's energy costs.

The ability to island from the grid and generate enough electricity to continue manufacturing processes during grid disruptions has brought additional savings by reducing production downtime.

"Even a small blip on the power grid can disrupt our production equipment and cause six to eight hours of lost production time. With the CHP systems, if there is a power blip we go into island mode and don't experience any disruption."

*- John Eustis,
Senior Director, Engineering,
Procurement & Logistics*

For More Information

U.S. DOE NORTHEAST CHP TECHNICAL ASSISTANCE PARTNERSHIP

Beka Kosanovic
413-545-0684

kosanovic@umass.edu
www.northeastchptap.org

TORAY PLASTICS (AMERICA), INC.

John Eustis
Senior Director, Engineering, Procurement & Logistics
401-667-2405
www.toraytpa.com

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