NLINE ENERGY

Case Study

How one company achieved its greenhouse gas reduction goals while simultaneously creating energy

Targeting Ambitious Environmental Sustainability Goals

Operating as a contract development and manufacturing organization (CDMO), a preferred global partner in the pharmaceutical, biotech, and nutrition markets provides a wide range of services and products. Some of its offerings include early-phase discovery, custom development and manufacturing of active pharmaceutical ingredients, and innovative dosage forms. In 2022, the CDMO supported more than 825 preclinical and clinical small and large molecules, more than 195 commercial small and large molecules, and produced around 250 billion capsules.

In an effort to be a good corporate citizen of the world, the CDMO has very aggressive sustainability goals, which include the reduction of CO_2 and improved energy efficiency. In the case of the CDMO's New England site, the plant's HVAC hot-water steam system offered an exciting opportunity for greenhouse gas reduction.

(continued)

Project Statistics	
Application	Hot Water Heat Exchanger
Steam Flows	13,000 lb/hr
Inlet / Outlet Pressures	100 psig / 15 psig
Generation Capacity	275 kWe
Utilization Rate	96%
Availability	100%

▲ The Microsteam turbine arrives at the CDMO's New England facility.

> **"The NLine team is a collaborative and technically proficient partner. We found great value in their engineering expertise."**
>
> **Head of Utilities and HVAC Engineering**

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"We generate and distribute high-pressure steam for a variety of industrial applications across the New England facility," said the CDMO's Head of Utilities and HVAC Engineering. "Many of these applications require a pressure-reducing valve to supply the equipment with a lower steam pressure, which results in energy losses. One of our largest applications is for the generation of HVAC hot water, which supplies our air handling equipment year-round."

The CDMO liked the idea of being able to gain some efficiency during the pressure transition and create electricity on-site while simultaneously reducing greenhouse gas emissions. The company had already planned to make some improvements to the HVAC hot water steam system. However, those upgrades, while helpful for equipment reliability, would do nothing to improve energy efficiency.

So, when the team at NLine Energy reached out to the CDMO about the possibility of leveraging a Microsteam® turbine, the CDMO was happy to listen.

More Energy and Fewer CO_2 Emissions with a Microsteam Turbine

Because of the small amount of space available, the team at NLine Energy knew that a Microsteam turbine would work perfectly in the CDMO's New England site. The team also knew that the local utility wanted to invest in this facility and partner with this large pharmaceutical manufacturer. With a practical application identified, the NLine Energy team could put together an attractive project complete with sizable tax credits and utility support.

The CDMO used two heated equipment skids for its processes. Because the company intended to reduce pressure from 40 PSI to 15 PSI on one of the skids, there was a potential opportunity for a turbine.

Alternate turbines in the marketplace would have been a poor fit for the CDMO. Not only were they too large, but they also used antiquated technology. NLine's smaller, modular turbines, however, were a good physical fit while also accommodating the range of steam flows at the CDMO's New England facility. *(continued)*

Project Benefits	
Annual Generation	2,285,000 kWh
20-Year Generation	45.7 GWh
Annual Savings	$190,000+
20-Year Net Savings	$3,417,000
20-Year GHG Savings	12,000+ tons of CO_2e
CAPEX Incentives	>$1.0MM
Simple Payback	<2.5 years

▼ The Microsteam turbine recoups energy during pressure reduction and converts it into electricity for the CDMO.

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The NLine Energy team recommended that the CDMO run one of the skids on low-pressure steam and then have the option of using high-pressure, medium-pressure, or low-pressure steam from any of the nearby headers in order to heat that skid.

Essentially, the CDMO skims a layer of energy from the steam flow that the site already uses. While the site uses the bulk of the steam for heating processes, a portion of the steam is used to create clean energy through the turbine.

“What we liked about the Microsteam turbine is that it performs a significant pressure reduction, but instead of losing energy, the system actually recoups energy during the pressure reduction and converts it into electricity,” said the Head of Utilities and HVAC Engineering. “We loved the idea of being able to gain some efficiency in that pressure transition and actually create some electricity here on site.”

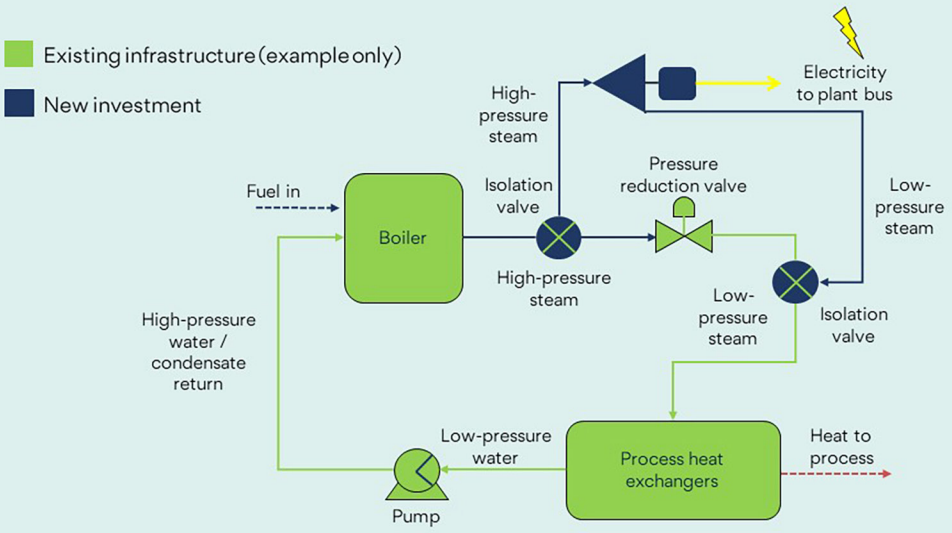
Turnkey Installation

The NLine Energy team delivered a turnkey energy recovery solution. Serving as a one-stop shop for planning, design, equipment, and construction management, NLine Energy completed the entire project, which included interfacing with the local utility.

“One of the biggest challenges we have in the pharmaceutical industry is that we must always consider quality compliance issues,” said the Head of Utilities and HVAC Engineering. “For example, the United States Food and Drug Administration (FDA) regulates our New England plant operations. So, any kind of efficiency project that we do that has a potential impact on our processes can be very time-consuming and expensive since we have to modify the process to ensure that the quality attributes of the drug products are maintained.”

However, since adding a turbine was one step removed from potentially having an impact on the CDMO’s processes, making changes to comply with FDA regulations was not a concern. Not having to revalidate a direct impact system made it easier—and cost-effective—for the CDMO to install a turbine.

“Because we added the Microsteam turbine in parallel with our existing system, we also added redundancy and security to our HVAC hot water supply," said the Head of Utilities and HVAC Engineering.



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$200,000+ Annually

Energy prices in America's Northeast are rising steadily. This project represented a hedge against those price increases and an opportunity to do so in an environmentally friendly way. The Microsteam turbine lowered overall demand from the grid, thereby creating substantial annual cost savings.

12,700 Tons of CO_2 Savings

The Microsteam turbine project is a major contributor to the CDMO's greenhouse gas reduction goals—it'll save 12,700 tons of CO2 during the course of 20 years.

Built-In Redundancy

By installing the Microsteam turbine in parallel with the pre-existing application, the CDMO was able to establish system redundancy. This significantly improved the reliability of a system that contributes to the uptime of a continuously operating bio-manufacturing facility.