

Solar Thermal at the Indianapolis International Airport



Solar thermal collectors on the IND Consolidated Snow Removal and Equipment Storage facility's roof

CASE STUDY July 2024

LOCATION
Indianapolis, Indiana

INDUSTRY TYPE
Airport

FACILITY TYPE
Equipment storage

TEMPERATURE
Up to 85°C (185°F)

TECHNOLOGY DEPLOYED
Solar thermal

EMISSIONS IMPACT
Avoids approximately 574 metric tons of CO₂ emissions annually

Project Overview

In October 2021, the Indianapolis Airport Authority (IAA) commissioned a solar thermal system at the Indianapolis International Airport (IND) in Indianapolis, IN. The IAA partnered with Solar UV Solutions, an Indianapolis-based solar thermal distributor, to install 70 solar thermal collectors on the roof of its new Consolidated Snow Removal and Equipment Storage facility. The solar thermal collectors heat a 10,000-gallon water storage tank during the day, which then feeds into the facility's hydronic loop to be used for space heating for large snow removal equipment. The solar thermal installation contributes to the IAA's long-term goal to be Net Zero by 2050 and aligns with its commitment to sustainability and resilience.

“The solar thermal system exemplifies the Indianapolis Airport Authority's commitment to meeting our operational needs without compromising the natural environment.”

- Todd Cavender
Director, Environment & Sustainability at IAA

Project Origination and Installation

Airport snow removal equipment is critical to airfield operations at IND. This equipment must provide a reliable and rapid response during each snowstorm event. Equipment storage is key to mitigating operational impacts, and an on-demand heating system enables the equipment's response. In 2015, the IAA initiated a project to construct a new 74,000 square foot Consolidated Snow Removal and Equipment Storage facility to house large snow removal equipment, including 13 snowplows which were previously stored in airplane hangars.

The IAA elected to implement a renewable heating system, rather than a traditional heating system, to meet operational requirements while making progress toward its goal of being Net Zero by 2050.



Snowplows in the Consolidated Snow Removal and Equipment Storage facility



10,000-gallon hot water storage tank preheated by the solar thermal array

The IAA began scoping a solar thermal system for the facility with Solar UV Solutions in 2016 and established plans to install a heating system with 70 solar thermal collectors, a 10,000-gallon storage tank, and two natural gas boilers. The IAA selected the solar thermal collectors offered by Solar UV Solutions because of their ability to deliver carbon-free, reliable heat, as the collectors can operate well on cloudy days in areas with relatively low direct normal irradiance (DNI), like Indianapolis. Pairing the solar thermal collectors with a water storage tank enhanced the system's ability to provide consistent heating throughout the day and into the evening hours, thereby limiting the use of the natural gas boilers. The system was designed

to provide an average heat load of 1,540,000 BTU per hour at temperatures up to 185°F with zero operating costs.

Facility construction began in 2019 when the IAA received a grant from the Federal Aviation Administration (FAA) Airport Improvement Program for essential airport facilities. In 2020, the IAA purchased 70 solar thermal collectors and Solar UV Solutions installed them on the roof of the facility during its construction in 2021. Today, the solar thermal collectors heat the 10,000-gallon water storage tank during the day and the hot water feeds into the facility's hydronic loop to be used for space heating.

Key Outcomes

The solar thermal collectors generated 20% of the facility's heat demand between December 2021 and March 2022. Throughout this period, the natural gas boilers installed at the facility operated either in low-burn mode to supplement the solar heat or not at all. The solar thermal system maintains the required temperature for the snow removal equipment stored in the facility to start up readily, and rapidly returns the facility's ambient air temperature to 70°F after snow removal vehicles enter and exit the building. By installing the solar thermal system, the IAA reduced its energy costs by over 20% and avoided 574 metric tons of annual carbon dioxide (CO₂) emissions, equivalent to removing 137 gasoline-powered passenger vehicles from the road.

The IAA has not incurred any operating or maintenance (O&M) costs for the solar thermal system. To date, the solar thermal collectors have not required any maintenance, and facility personnel can perform any future maintenance using the basic training that Solar UV Solutions provided during installation. Reduced usage of the natural gas boilers further minimizes the IAA's maintenance costs.

Building on the success of the installation at the Consolidated Snow Removal and Equipment Storage facility, the IAA installed 10 additional solar thermal collectors for domestic hot water heating at an airport fire station and is currently installing 15 more collectors for radiant floor heating at the IAA's new Airfield Deicing Materials Storage Building in 2024.

“This has proven to be a very versatile system. We’re already using it in several different ways, which opens a lot of possibilities for how we can continue to use this type of solar thermal technology in the future.”

– Jim Cates
Project Manager at IAA



Close up of solar thermal collectors

Lessons Learned

- **System durability minimizes costs.** The simplicity of the solar thermal collectors and the facility’s thermal system reduces the potential for breakage and the need for maintenance. This makes the system durable and reliable, enabling continuous operations and minimizing O&M costs for the IAA.
- **Solar thermal pairs well with storage.** Solar thermal paired with thermal storage can extend the hours of operation and increase energy and emissions savings, particularly in the winter months and in areas with low-to-medium DNI. By pre-heating a 10,000-gallon hot water storage tank during the daytime, the solar thermal installation at the IAA’s facility supplies heat into the evening hours or whenever the sun is not shining.
- **Initial success proves the case.** Installing solar thermal at new-build facilities can demonstrate successful performance and enable future installations at other new or existing facilities. The IAA gained familiarity and comfort with the solar thermal collectors after the first installation and decided to deploy them at other facilities for different applications to further reduce the airport’s CO₂ emissions.

“The simplicity of the system and the lack of moving parts make it easy to understand, implement, and replicate.”

– Don Frank
Founder and Owner of Solar UV Solutions

Next Steps

Buyers interested in learning more about renewable thermal solutions should:

- See more information on the applications and market potential of solar thermal energy in the RTC’s [Solar Thermal Action Plan](#) and [Renewable Thermal Vision Report](#).
- Read more [case studies](#) from the RTC to learn how energy users and solutions providers are deploying renewable thermal technologies.
- Find solutions providers through the RTC’s [Partner Locator](#).
- Join the RTC to participate in Working Group meetings, learn from other renewable thermal buyers, and connect with solutions providers. Contact the RTC’s Membership Director, Perry Hodgkinds Jones (perry@dgardiner.com) to learn more.



The Renewable Thermal Collaborative (RTC) is the global coalition for companies, institutions, and governments committed to scaling up renewable heating and cooling at their facilities. Learn more about our work at www.renewablethermal.org.

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