



Optimized Thermal Systems, Inc.  
7040 Virginia Manor Road  
Beltsville, MD 20705  
USA

Voice: +1 866-485-8233  
[info@optimizedthermalsystems.com](mailto:info@optimizedthermalsystems.com)

# Energy Savings Initiatives at Optimized Thermal Systems, Inc.

December 2020

## Executive Summary

Optimized Thermal Systems, Inc. (OTS) continuously strives to identify efficiency improvements and energy savings measures for their clients using sophisticated analysis tools and mathematically rigorous optimization. Improving efficiency and saving energy not only result in cost savings, but also have a direct positive impact on reducing harmful greenhouse gas emissions. In an effort to save energy closer to home, OTS implemented several energy savings measures for their own facilities. These environmentally conscious developments include the purchase of Renewable Energy Certificates (RECs) to eliminate carbon emissions from electricity usage, as well as a complete lighting retrofit of the company office and laboratory space.

## Introduction

Optimized Thermal Systems Inc. (OTS) is constantly revamping their analysis methods in order to uphold their mission to optimize energy, materials, and cost savings for their clients. The company has implemented several efforts to apply this mission to their own facility, matching 100% of electric energy with Renewable Energy Certificates in May 2020, and implementing a lighting retrofit, completed in June 2020. Being conscious and proactive in reducing energy usage benefits a company by lowering operating costs and improving the quality of life in the nearby regions. OTS's implementation of a lighting retrofit of the office and lab space results in direct electrical savings, and their utilization of Renewable Energy Credits demonstrates support of a fully renewable energy source.

## Renewable Energy Certificates (RECs)

Renewable Energy Certificates, or RECs, represent electric energy from a power grid that is generated from a completely renewable energy source, such as wind or solar energy. They support environmentally responsible goals of a company by directly reducing global greenhouse gas (GHG) emissions. The purchase of RECs allows companies to claim a reduction in Scope 2 emissions, or the indirect emissions that result from company processes and includes the generation of heat and electricity. Companies have the ability to purchase RECs as a percentage or of their expected electric energy supply.

OTS currently uses NewMix® RECs, provided by Constellation, an Exelon Company. NewMix® RECs are Green-e® Energy certified and meets the environmental and consumer-protection standards set forth by the non-profit Center for Resource Solutions. These RECs are sourced from generating facilities located within the continental United States, and support demand for new, clean wind power. They further aid in reducing GHGs associated with electricity use specifically. Effective May 14, 2020, 100% of the electric energy used by OTS's primary office and laboratory facility is supplied by NewMix® RECs. With wind energy being a renewable energy source, there are no carbon emissions associated with electric energy usage after the aforementioned effective date.

Total carbon emissions were evaluated for the entirety of 2018 and 2019, as well as up to the end of October 2020. Results are depicted in Figure 1. For each year, Scope 3 emissions from employee commuting and air travel, as well as Scope 2 emissions from utilities (gas and electric energy) were included. Appropriate carbon emission rates were applied for commute<sup>1</sup>, air travel<sup>2</sup>, and utility energy consumption<sup>3</sup>. For the utility carbon emissions rate, a transportation and distribution losses rate of 4.88%<sup>4</sup> was included. Calculations for utilities were separated into gas and electric energy to accommodate the change to zero carbon emissions from electric energy after May 14, 2020. As can be seen in the figure, most carbon emissions are attributed to utilities for all years, however, carbon emissions from utilities have decreased significantly in 2020 despite continuing laboratory usage, attributed to fewer employees

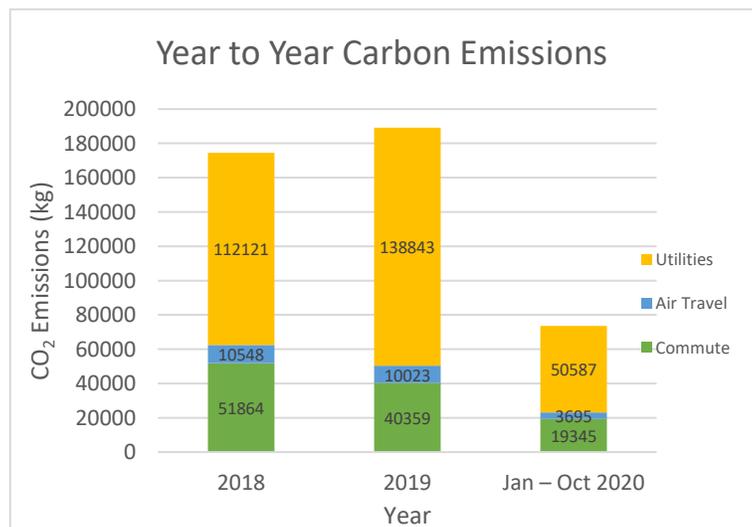


Figure 1: Year to Year Total Carbon Emissions

<sup>1</sup> Emissions rate for typical passenger vehicle from [EPA](#)

<sup>2</sup> Simplified emissions factor for air travel from [carbonfund.org](#)

<sup>3</sup> RFC East emissions rate from [eGRID](#)

<sup>4</sup> T&D losses rate for Eastern Region from [eGRID](#)

occupying the office due to the COVID-19 pandemic. There has also been a reduction in carbon emissions from commute, correlating to the reduced number of employees traveling to the office.

To normalize yearly carbon emissions, the total carbon emissions was divided by the number of actual days for

Year	Normalized Carbon Emissions (kg CO <sub>2</sub> /day)
2018	478.2
2019	518.4
2020	241.4

Table 1: Year to Year Normalized Carbon Emissions Rates

each year (i.e. for 2018 and 2019, the respective carbon emission totals were divided by a full 365 days, while the calculated carbon emissions total for 2020 was divided by 305 for the number of days in 2020 up to the end of October). A lower daily carbon emissions rate can be observed in 2020 as compared to previous years (Table 1).

It should be noted that due to the COVID-19 pandemic, most employees began working remotely starting mid-March of 2020. This results in a reduction in commute, and the corresponding carbon emissions especially as

compared to previous years. With only a select few employees conducting work in the office from mid-March to May 14<sup>th</sup> when the RECs took effect, generally less electric energy is used in the facility, contributing to a decrease in carbon emissions from utilities. With the likelihood that remote work will continue, these factors should be taken into consideration as observation and analysis of carbon emissions continues.

## Lighting Retrofit

A lighting retrofit is an upgrade of outdated light fixtures to increase energy efficiency by producing less heat and consuming less energy while improving lighting output. Lighting can be thought of as the low hanging fruit of energy savings due to improved technologies and ease of implementation. The initial upfront cost of a retrofit may be significant; even so, utility programs often offer incentives, such as lower installation costs or utility rebates. Replacing older lighting sources with newer ones bring about numerous advantages for a company, such as lowered operation and maintenance costs, less heat emission, and a decrease in “light pollution,” among others. Ultimately, a lighting retrofit will bring about energy and cost savings while improving the light quality of the building for employees, customers, and clients.

In June 2020, OTS completed a full lighting retrofit of the office and lab space of their main office and laboratory facility. Fluorescent (T8 and T12) and halogen (PAR38 halogen) lightbulbs were replaced with high efficiency LEDs. As the T12 lightbulb is being phased out, performing the retrofit assured easier maintenance. Upgrades in the laboratory space specifically provide for much better lighting in general, a benefit that makes for better working conditions, productivity, and safety for OTS employees.

With this new lighting retrofit in place, OTS would anticipate saving an estimate of around 35220.9 kWh per year. Using an equivalent carbon emissions rate<sup>5</sup> of 0.744 kg CO<sub>2</sub>/kWh, this results in a reduction of 26,217 kg CO<sub>2</sub> per year. This equates to taking 4 passenger vehicles<sup>6</sup> off the road.

## Summary

In 2020, Optimized Thermal Systems, Inc. transitioned to exclusively utilizing Renewable Energy Credits to supply electrical energy and concluded their lighting retrofit at their main Beltsville, MD office and laboratory facility in May and June, respectively. These energy initiatives bring to light the company’s dedication to work towards and sustain a positive environmental impact on the planet, by actively reducing energy consumption and greenhouse gas emissions.

<sup>5</sup> Equivalent Carbon Emissions Rate from [EPA](#)

<sup>6</sup> Greenhouse Gas Equivalencies Calculator from [EPA](#)