REPORT TO COUNTY COUNCIL

2024 Annual Energy Report

To: **Warden and Members of County Council**

From: **Director of Public Works**

RECOMMENDATION

1. **That County Council receive Report PW 2025-21 entitled "2024 Annual Energy Report" as information.**

REPORT HIGHLIGHTS

- The purpose of this report is to summarize the County's 2024 renewable energy (RE) generation results and provide an overview of annual energy consumption and greenhouse gas (GHG) emissions by County-owned facilities and fleet assets in 2024.
- The County's annual RE generation has increased by approximately 203% since 2015 baseline levels, with 5.56 million kilowatt hours (ekWh) of RE produced in 2024 from various solar, biogas and geothermal applications - reaching 85% of the County's 2025 target of 11.7%.
- County facilities consumed just over 47.6 million ekWh of energy in 2024, costing approximately $4.7 million. Despite total energy consumption by facilities increasing 2.9% since 2015 due to expanded provisions of municipal services, the actual energy use intensity (EUI) for buildings/minor assets and water/wastewater treatment plants has reduced by 25.2% and 5.1%, respectively.
- The County's fleet and equipment consumed approximately 8.5 million ekWh of energy in 2024, including $1.09 million in fuel purchases of unleaded gasoline, diesel, compressed natural gas (CNG) and electricity. Approximately 32% of the County's in-service fleet (57 out of 179 units) have been converted to alternative fuels as of the end of 2024 to reduce fossil fuel consumption and GHG emissions.
- County facilities and fleet produced 5,744 tonnes of carbon dioxide equivalent (tCO2e) in GHG emissions in 2024 which were 7.7% lower than 2015. Factoring in service growth, the actual GHG intensity for facilities and fleet decreased by about 26.4% and 8.5%, respectively.

IMPLEMENTATION POINT

As required by O. Reg. 25/23, the 2024 energy consumption data and GHG emissions will be reported through the Broader Public Sector reporting portal by July 1, 2025.

Financial Impact

There are no financial impacts as a result of this report. Any required actions that will result in expenditures have been accounted for in the 2025 Business Plan and Budget based on the County's *2024 Energy Management Plan, 2022-2032 Renewable Energy Action Plan and 2021-2025 Green Fleet Plan.*

Communications

Upon Council approval, this Council report will be circulated to Area Municipalities, Smart Energy Oxford, the County's staff Energy Team and Extended Leadership Team as information outlining the progress of Oxford County's corporate organization relating to the goals of the *100% RE Plan*.

As all municipalities are required under *O. Reg. 25/23: Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*, the County communicates energy performance to the Ministry of Energy, via annual energy consumption and GHG emissions reporting. This is completed annually, as well as through the County's *2024 Energy Management Plan* (EMP) updated in 2024.

Annual energy updates are posted to the Oxford County website at www.oxfordcounty.ca/en/your-government/reports-and-publications.aspx, with highlights shared on social media. In addition, the County will further communicate 2024 performance highlights of key Public Works systems, including energy initiatives, to the public through an annual social media campaign during National Public Works Week (May 18 – 24, 2025).

2023-2026 STRATEGIC PLAN

Oxford County Council approved the 2023-2026 Strategic Plan on September 13, 2023. The Plan outlines 39 goals across three strategic pillars that advance Council's vision of "Working together for a healthy, vibrant, and sustainable future." These pillars are: *(1) Promoting community vitality, (2) Enhancing environmental sustainability, and (3) Fostering progressive government*.

The recommendation in this report supports the following Strategic Plan pillars and goals:

		
Promoting community vitality	**Enhancing environmental sustainability**	**Fostering progressive government**
Goal 1.2 – Sustainable infrastructure and development	Goal 2.1 – Climate change mitigation and adaptation	Goal 3.1 – Continuous improvement and results-driven solution

See: Oxford County 2023-2026 Strategic Plan

DISCUSSION

Background

On June 24, 2015, Oxford County Council unanimously passed the 100% RE goal by 2050. This was followed up when County Council adopted the 100% RE Plan on June 27, 2018, which lays out a strategic approach to achieving the goal of 100% RE by 2050. This initiative seeks to reduce energy consumption while at the same time increasing RE generation to achieve net-zero performance across the geographical County by the year 2050.

The 100% RE Plan is based on a community-wide initiative. The County organization is a major contributor to the potential achievement of the 100% RE Plan by addressing the energy consumption and generation potential of the County's facility and fleet portfolio, striving to be a leader within the community and demonstrating active support for this important community goal.

As shown in Figure 1 below, the 100% RE Plan has a number of contributor groups, including individual residents, organization groups, businesses residing in the community and governments, which include the area municipalities, as well as the County organization.

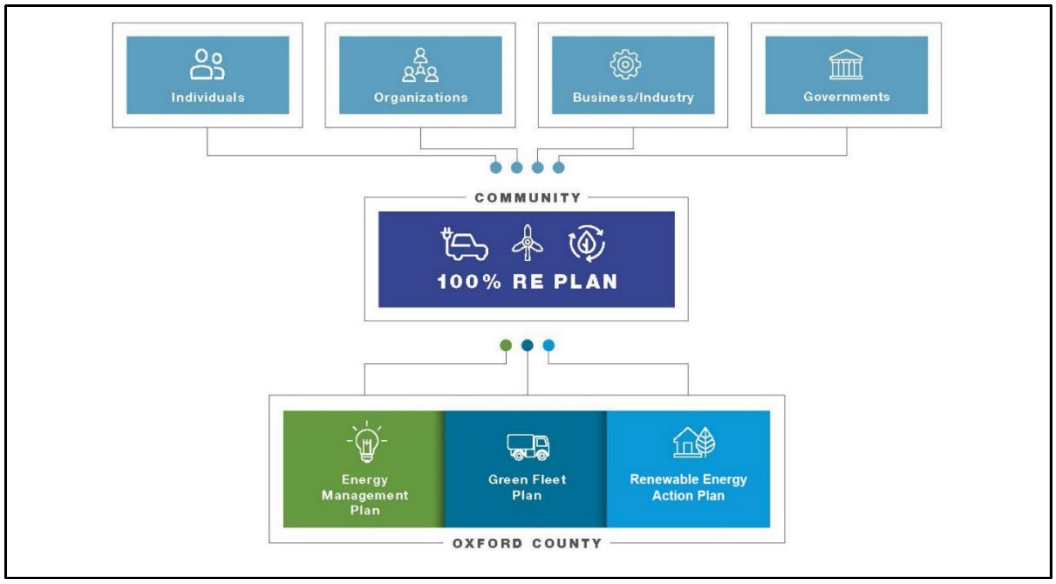


Figure 1 – 100% RE Plan Contributors

Over the last number of years, Oxford County has set organizational goals to help advance the progress of the 2050 100% RE community goal. Of note, the County has developed and implemented various plans to drive efforts of energy conservation and RE generation (or harvesting) as follows:

- ***2024 Energy Management Plan*** – On July 10, 2024, County Council approved Report PW 2024-25, which outlined the County's updated Energy Management Plan (EMP-2024) for 2024 through to the end of 2028. EMP-2024 is the third iteration of the County's EMP, with the first being enacted in 2014. As required by provincial regulation O. Reg. 25/23, this EMP is required to be updated every five years, with the next update due by July 2029. The focus of this plan is on energy conservation and GHG emission reductions.

- ***2021-2025 Green Fleet Plan*** – On June 9, 2021, County Council adopted Report PW 2021-23, which outlined the County's 2021-2025 Green Fleet Plan (GFP-2021) building off the former *2016 Green Fleet Plan*. This is the second iteration of the GFP and specifically targets the reduction of GHG emissions through progressive transformation of the County's fleet towards lower carbon alternative fuels and energy reduction. The next iteration of this plan will be presented to Council later in 2025 and will outline the County's plan from 2026-2031.

- ***2022-2032 Renewable Energy Action Plan*** – On August 10, 2022, County Council approved Report PW 2022-37, which outlined the County's 10-year Renewable Energy Action Plan (REAP) for 2022 through to 2032. The REAP will expand upon the County's existing renewable energy systems through a proposed multi-year capital implementation plan comprised of an additional solar PV system, geothermal / air source heat pump, heat recovery and wood pellet boiler technology applications. The focus of this plan is on RE generation (harvesting), as well as energy conversion to reduce GHG emissions.

Management of energy and GHG emissions plays an integral role in reducing GHG emissions and energy consumption, improving energy efficiency, establishing financial stability and increasing RE harvesting. Management includes planning, implementing, verifying and reporting. For this reason, the County organization has established and adopted the EMP, GFP, and REAP, each of which plays a role in identifying where the County may reduce energy dependence and resulting GHG emissions in support of the community's 100% RE Plan. These plans provide a roadmap, along with actionable items required to meet the targets. Refer to Table 1 below for a summary of how the County organization is progressing with respect to targets as identified in the 100% RE Plan.

Table 1 – 100% RE Plan Energy and GHG Target Status*

Description	Current 2024	Intermediate Target 2025	Final Target 2050
Total Energy reduction from 2015	**-1.7%**	10.5%	54%
Total GHG emissions reduction from 2015	**7.7%**	11%	47%
Total Renewable Energy Mix	**9.9%**	11.7%	80.3%

* Note: The initial targets approved by Council did not speak to changes related to service growth.

Comments

Oxford County, as an organization, owns, operates and maintains various assets that affect energy consumption and GHG emissions as well as RE utilization (also referred to as harvesting).

To differentiate where energy is consumed, how GHG's are emitted, and where RE is utilized, these assets have been broken down into three main service areas, including Facilities, RE Utilization and Fleet. To come up with cumulative energy consumption, various energy types are quantified into a single metric by converting to ekWh which assists in comparing year-to-year metrics across all commodities (i.e. electricity, natural gas, gasoline, diesel, etc.).

A summary of the County's energy metrics is outlined in Attachment 1.

Facilities

The County operates 278 individual buildings across 256 facility sites that consume energy such as electricity, natural gas or propane. These assets have been organized by operation type to line up in general with *O.Reg. 25/23 Broader Public Sector* reporting requirements and are comprised of 89 facility building locations (i.e. non-process assets including administrative offices, housing, patrol yards, libraries, etc.), 98 plant locations (i.e. treatment plants and pumping stations) and 69 minor asset locations (i.e. street lighting, COIN Towers and stand-alone public Electric Vehicle Chargers).

In 2024, these assets had a total purchased energy consumption of just over 43 million ekWh, which included 27.1 million kWh of electricity, 1.46 million m^3 of natural gas, 47,261 litres of propane and 5,227 litres of diesel. The total utility cost of this purchased energy was $4.7 million, with $4.08 million related to electrical and $662,000 in natural gas (including propane).

For asset comparison purposes, these values can be represented as an EUI, either ekWh per square meter (SM) (non-process assets), or as ekWh per megalitre (ML) of fluid moved (plant process assets). The comparison of net-energy usage intensity per SM and per ML of each individual operation type is summarized in Table 2 below. The RE consumed by buildings and plants are broken out and included as a separate line to show the RE contribution towards total energy consumption requirements. In 2024, the gross consumption of energy by the County was the equivalent of 47.6 million kWh, which is a 2.9% increase from 2015 consumption levels of 46.3 million kWh.

Table 2 – 2024 Facilities Consumption by Operation Type

Operation Type	Area (SM)	Flow (ML)	Energy (ekWh)	EUI (ekWh/SM)	EUI (ekWh/ML)
Woodingford Lodge (LTC)	15,664	-	8,076,285	516	-
Human Services (Multi-Unit Housing)	30,117	-	5,945,073	197	-
Public Works (Admin, libraries, EMS stations, childcare, etc.)	21,113	-	3,697,319	175	-
Human Services (Single Family Townhouses)	13,008	-	2,117,665	163	-
Public Works (Patrol Yard Facilities)	8,735	-	923,196	106	-
Public Works (Waste Facilities)	7,167	-	240,794	34	-
Buildings RE Consumption	-	-	891,140	9	
Public Works (Street/Traffic Lighting)	-	-	227,713	0	-
Public Works (COIN Towers/EV chargers)	-	-	90,352	-	-
Public Works (Wastewater Plants)	13,192	18,384	13,653,647	-	743
Public Works (Water Plants)	5,910	10,675	7,646,254	-	716
Plant RE Consumption	-	-	4,124,441	-	142
TOTAL	**114,906**	**29,059**	**47,633,879**	**-**	**-**

While overall energy consumption has risen slightly over 2023, the EUI for both SM (non-process building / minor assets) and ML of flow (plant process – water and wastewater treatment plant assets) has reduced significantly as shown in Table 3, resulting in significant energy consumption avoidance while supporting a growing community. Based on 2015 energy intensities and using updated variables, the 2024 energy consumption would have been projected to be 53.9 million ekWh (increase of 16.4% over 2015 actuals) had no energy conservation measures been in place.

Another factor of influence includes weather temperatures, in which total heating and cooling degree days reduced by 13.6% over 2015 actuals. Due to the complexity of applying this variable to the various facilities, it has not been included in the baseline adjustments as indicated. A further illustration of actual energy consumption, as well as avoidance based on the 2015 EUI baseline is shown in Figure 2.

Table 3: Facilities Energy Intensity Overview

Service Area	2015 EUI	2024 EUI	Reduction
Buildings/Minor Assets	310 ekWh/SM	232 ekWh/SM	**25.2%**
Plants	922 ekWh/ML	875 ekWh/SL	**5.1%**

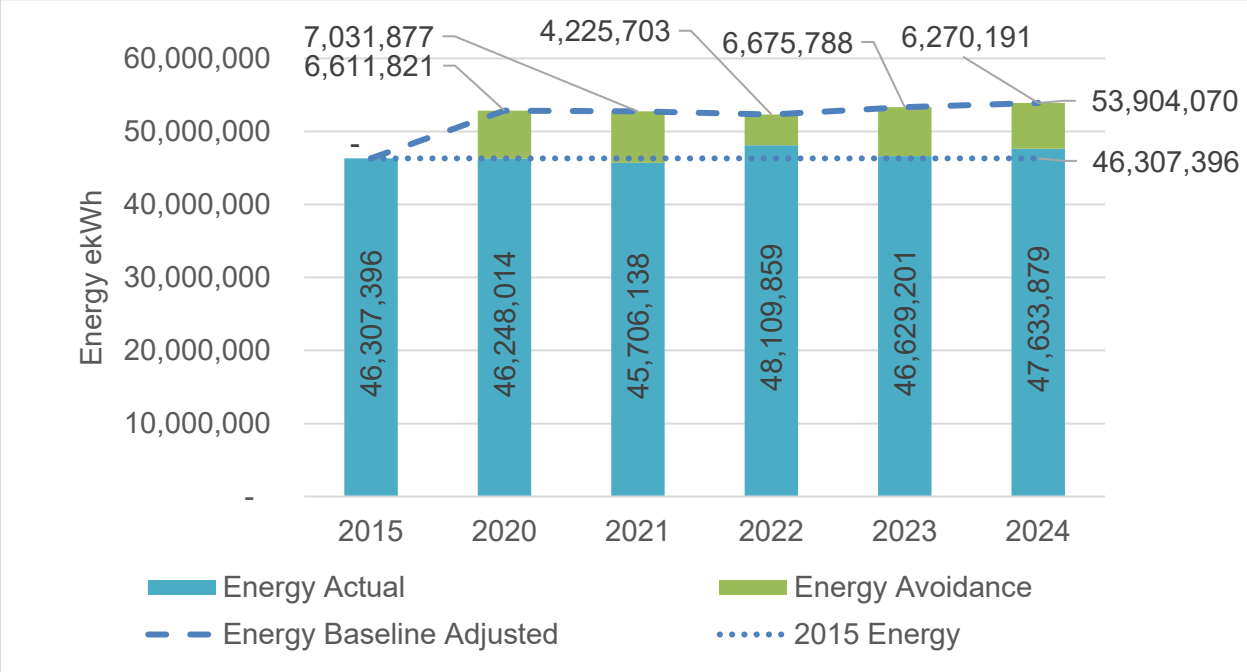


Figure 2 – Facilities Energy Consumption and Avoidance Trending (2015 to 2024)

Renewable Energy Utilization

The County's RE assets are divided into sub-categories based on technology type including biogas boiler, geothermal (ground source and air source), solar PV (feed-in tariff and net-metered) and solar thermal and may expand in the future as new technologies emerge or are implemented (i.e. biomass, air source heat pump, etc.) as per the *REAP*.

These existing assets are summarized in Table 4 below, showing the overall portfolio production for 2024. To assist Council and the public in understanding the financial implications of the RE harvesting, the associated financial benefit has also been included in the table for each system type. Financial benefits from these systems can either come from direct revenue, such as FIT solar contracts with IESO, or through cost avoidance using direct harvesting through County-owned systems, such as solar net-metering, biogas use, geothermal, etc. In total, for 2024, the harvested RE resulted in approximately $444,600 in operational savings, or a cost avoidance equating to 9.4% of the 2024 utility budget.

The majority of the energy that is harvested across the County's RE portfolio is utilized by County assets directly on the site where the system is located, with a smaller percentage of systems (i.e. FIT/micro-FIT systems) fully exporting RE back to the electrical grid generating revenue. In 2024, 5.02 million ekWh were consumed on site, while 546,000 ekWh were exported back to the electrical grid. Overall, all RE produced is considered an offset to the total energy consumption needs of the County.

Table 4: County RE System Performance

RE Harvesting Technology	Asset Count	Utilization Actuals 2024 (ekWh)	Revenue or Avoided Cost	RE Annual Revenue (or Avoided Cost)
Solar PV (Feed-in-Tariff)	13	377,000	Revenue	$144,000
Solar PV (Net-Metered)	9	1,600,000	Avoided Cost	197,000
Biogas (Ingersoll and Woodstock WWTPs)	2	3,427,000	Avoided Cost	99,000
Geothermal (Social Housing - 111 Brock St.)	1	138,000	Avoided Cost	4,000
Solar Thermal (Social Housing - 742 Pavey St.)	1	20,000	Avoided Cost	600
TOTAL	**26**	**5,562,000**		**$444,600**

Since 2015, total annual RE harvesting has gone from 1,843,000 ekWh to 5,562,000 ekWh, representing an increase of 203% (refer to Figure 3). This total RE harvested by the County would be enough to supply the annual energy needs for 115 typical family homes in southwestern Ontario. In 2024, the amount of RE harvested as a percentage of the total energy consumption (considered the RE mix from generation) was 9.9%, which is progressing towards the 2025 target of 11.7% in the 100% RE Plan.

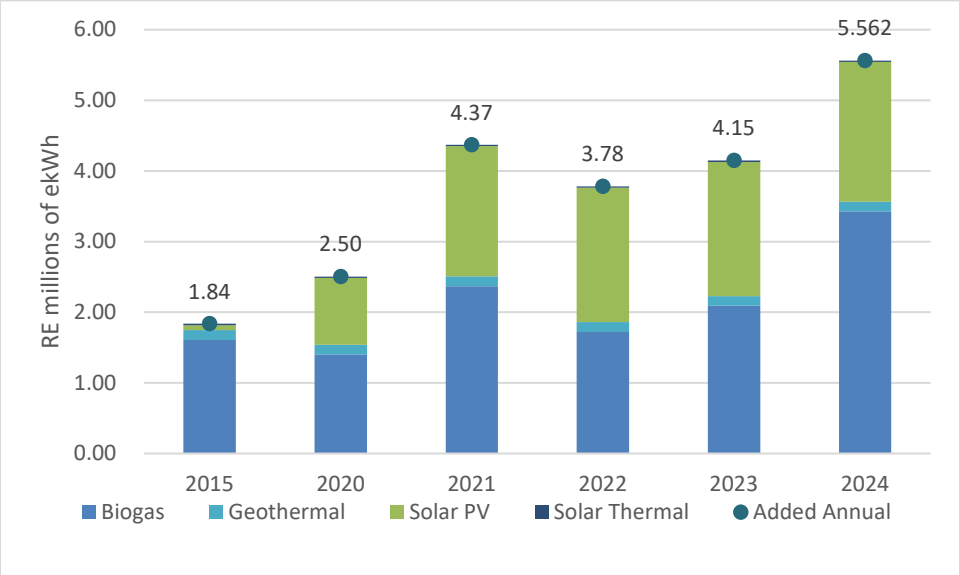


Figure 3 – Annual RE Harvesting Trending (2015 to 2024)

It is important to note that the RE industry is rapidly changing, and in order to achieve some of the identified future targets of the 100% RE Plan, regulatory restrictions related to Virtual Net-Metering and other constraints will need to continue to be advocated for in order to expand potential deployment capacity. County staff will continue to look for opportunities to provide feedback and influence regulatory decision-making.

Fleet

The County's fleet travelled just under 3.1 million kms in 2024, up 2.8 million kms from 2023. These assets can be organized into the following sub-categories:

- Commercial (light-duty vehicles, cars, SUVs, etc.)
- Industrial (heavy vehicles, including plows, leachate trucks, vacuum trucks, tractors, etc.)
- Paramedical (ambulances, first response units, etc.)
- Equipment (all unlicensed, off-road vehicles including compactors, forklifts, etc.)

Fleet assets are powered by a variety of fuels, including gasoline, diesel, CNG and battery electric. In 2024, fleet fuel costs across all fuel types were a combined $1.09 million. Overall fleet energy usage increased in 2024 by 14.6% over 2023 in large part due to increased services provided, which are reflected in the increased kilometres travelled. The total fleet grew by eight assets, and there was an increase in winter road operations from the previous year.

Table 5 summarizes the fleet assets, kilometres driven, fuel equivalent consumption and fuel efficiency.

Table 5: 2024 Fleet Asset Utilization Overview

Fuel Type	Fleet Type	Asset Count	Travel Distance (km)	Fuel * (eL unleaded)	Efficiency (eL/100 km)
Fuel Unleaded (Includes HEV)	Commercial	62	1,277,863	186,247	14.57
	Paramedical	26	813,985	145,049	17.82
	Equipment	2	256	108	42.19
Subtotal (L)		**90**	**2,092,104**	**331,405**	**15.84**
Fuel Diesel	Commercial	3	49,393	9,234	18.69
	Industrial	25	436,534	208,464	47.75
	Paramedical	1	27,092	3,936	14.53
	Equipment	30	16,611	240,393	1,447.19
Subtotal (L)		**59**	**529,631**	**462,027**	**87.24**
Fuel CNG (kg)	Industrial	4	83,155	51,901	62.41
Dual Fuel - Unleaded / CNG (eL)	Commercial	13	271,822	38,952	14.33
Fuel Propane (L)	Equipment	3	92	99	107.15
Fuel Electric	Commercial	6	73,300	2,496	3.40
	Equipment	2	74	9	12.65
Subtotal (kWh)		**8**	**73,374**	**2,505**	**3.41**
Dual Fuel - Unleaded / Electric (eL)	Commercial	2	18,518	607	3.28
TOTAL		**179**	**3,068,697**	**887,496**	**28.92**

* Note: Fuel consumption has been converted to equivalent gasoline (eL unleaded or eL) for all fuel types to demonstrate a common “apples to apples” comparison. Using this comparison, the eL is actually more than actual volumes consumed due to conversions (i.e. a litre of diesel has a higher energy content than a litre of unleaded gasoline so when expressed as eL the volume is greater).

As of the end of 2024, 32% of the County’s fleet (57 out of 179 units) have been converted to alternative fuels to reduce GHG emissions. This represents a small percentage decrease from 2023 as the majority of new units added to the fleet in 2024 did not have viable alternate fuel options available on the market. By the end of 2025, it is projected that 34% of the County’s fleet (60 of 179) will have been converted to alternative fuels. With current market conditions, the existing County fleet can attain a maximum of 45% alternate fuel deployment (80 out of 179 units).

Greenhouse Gas Reductions

Reducing the County's overall GHG emissions has been a strong driver for ongoing initiatives, including the REAP and GFP. As the County continues to grow as an organization to support a growing community (i.e. a larger staff complement equating to more space, a larger fleet, etc.), the overarching goal of reducing emissions remains. However, it should be noted that the growth of the organization may translate to an emissions avoidance and is not always a clear reduction simply based on the number of buildings, size of the fleet, etc.

In 2024, the County emitted the equivalent of 5,744 tCO2e in GHGs (3,658 tCO2e Facilities and 2,086 tCO2e Fleet), which is a 7.7% decrease from 2015 emissions of 6,223 tCO2e (3,984 tCO2e Facilities and 2,239 tCO2e Fleet). The 100% RE Plan includes a GHG emissions reduction target of 11% by 2025, which works out to a 1.1% year over year GHG reduction from 2015 or target of 5,607 tCO2e in GHGs for the County in 2024.

Despite this decrease, the GHG intensity (GHG per SM, per ML and per km driven) has reduced substantially more compared to the 2015 baseline (refer to Table 6), resulting in significant GHG emissions avoidance while supporting a growing community. Based on 2015 GHG emissions intensities and using updated variables, GHG emissions would have been projected to be 7,247 tCO2e (increase of 16.5% over the 2015 baseline) had no energy conservation measures been in place. A further illustration of actual GHG emissions, as well as avoidance based on the 2015 emission intensity baseline and 100% RE Plan GHG emissions reduction target is shown in Figure 4.

Table 6: GHG Emissions Intensity Overview

Sector	2015 GHGI	2024 GHGI	Reduction
Facility GHG/SM	0.037 tCO2e	0.026 tCO2e	**29.7%**
Facility GHG/ML	0.048 tCO2e	0.039 tCO2e	**18.8%**
Fleet GHG/100 KM	0.082 tCO2e	0.075 tCO2e	**8.5%**

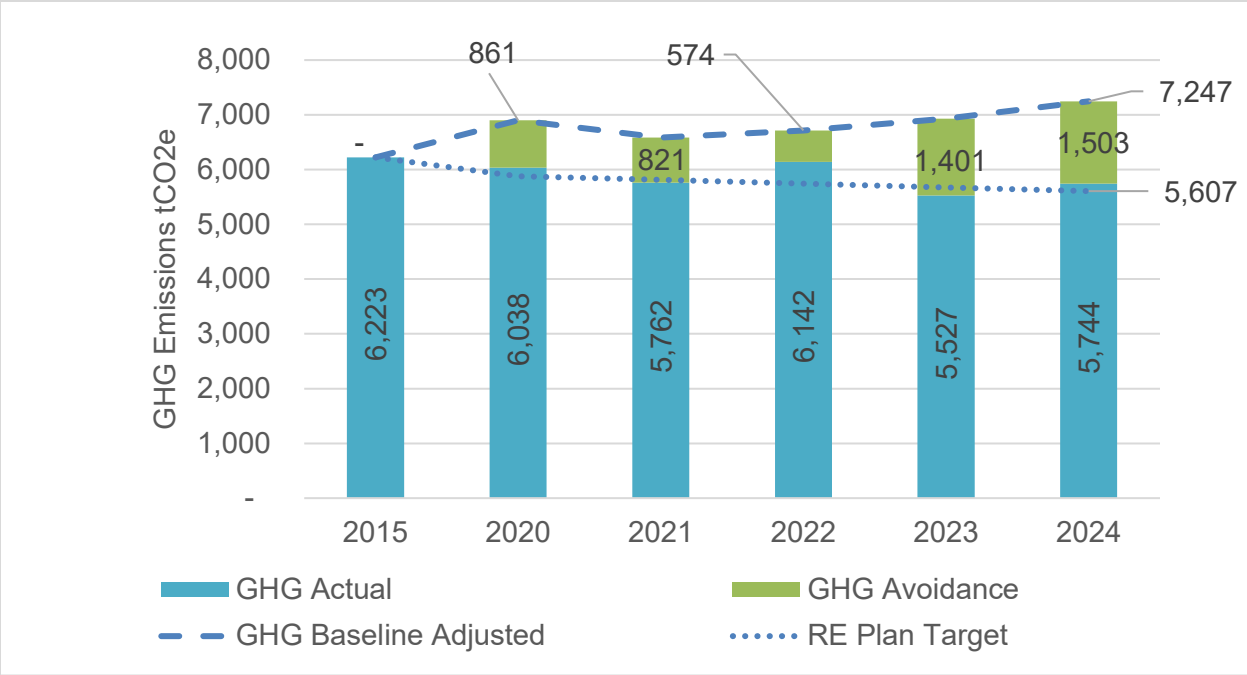


Figure 4 – GHG Emissions and Avoidance Trending (2015 to 2024)

In 2024, the top energy fuel source utilized by County assets was electricity, which makes up over 54% of all energy consumption, but only equates to 14% of all GHG emissions. The top fuel source contributing to GHG emissions is natural gas/CNG, at just over 50% of all GHG emissions, but only makes up just over 30% of all energy consumption. The fuel source with the highest GHG intensity was diesel making up only 9% of energy consumption but contributing 20% of all GHG emissions. Refer to Figure 5 below for a comparison of energy consumption versus GHG emissions by fuel source type.

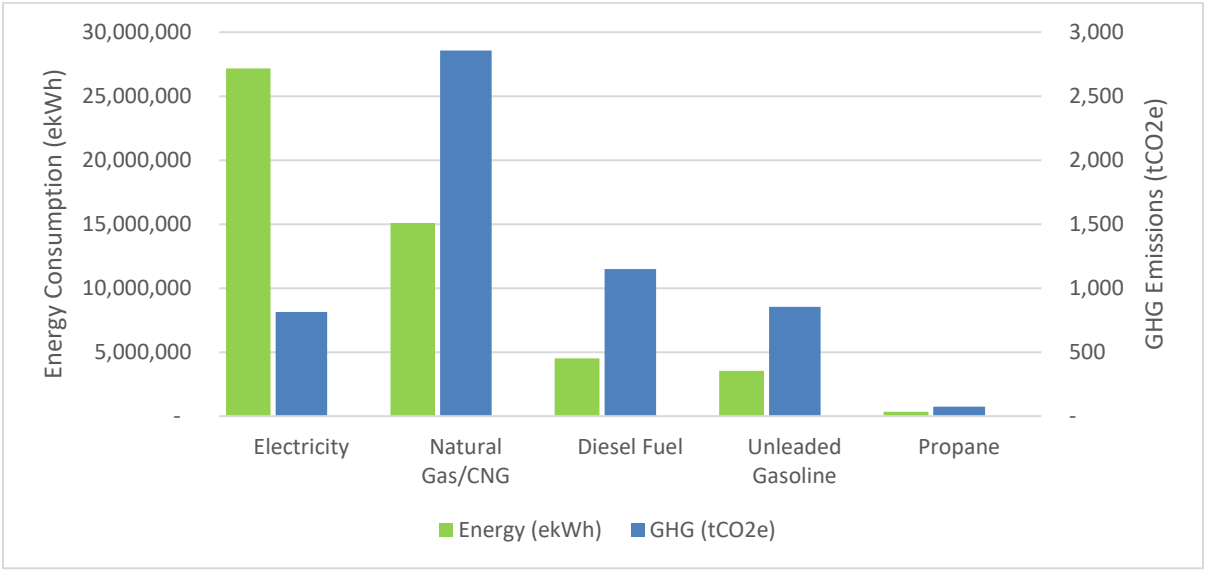


Figure 5 – 2024 Energy Fuel Source Type and GHG Emissions

To provide further clarity, Table 7 below outlines the GHG emissions per 1 million ekWh consumption for each fuel type. These numbers help to illustrate the importance of the REAP and GFP initiatives to implement alternative fuel sources where appropriate, as well as the EMP for overall conservation and energy demand reduction. The Government of Canada's latest GHG emissions factor for Ontario's electricity that was used for 2024 rose by 18%, which has negatively impacted the County's emissions reduction. The increase in the amount of GHG produced by the Ontario electricity grid is a result of additional gas plant generation and nuclear plant downtime. Where possible, the County will continue to advocate for a cleaner provincial electricity grid to positively impact the County's GHG performance through electrification.

Table 7: GHG Emission Rates

Energy Type	GHG/1 million ekWh (tCO_2e)
Diesel Fuel	254.8
Unleaded Gasoline	241.6
Propane	219.2
Natural Gas/CNG	182.6
Electricity	30.0

2024 Plan Updates

In 2024, the County completed several initiatives identified in the EMP-2024, GFP-2021 and REAP-2022. Key changes to the plans, which will affect targets, included the removal of the Wood Pellet Boiler pilot project that was planned to be constructed at the Water Operations facility at 59 Goerge Johnson Blvd in Ingersoll. This project was planned for construction in 2024; however, upon completing the tendering process, the low bid was significantly over budget making the project no longer feasible. Upon review, staff determined it was best to not request additional funding to award the contract and proceeded with cancelling the project. Removal of this project will eliminate 174,000 ekWh of anticipated RE harvesting that was included in the plan.

Staff are mitigating this capacity loss by bringing additional opportunities forward through the annual Business Plan and Budget process. The REAP includes exploration of newer technologies, with the intention that projects may be added or removed based on economic circumstances. Staff will continue to evaluate and propose implementation recommendations for Council's consideration to further the County's strategic goals.

CONCLUSIONS

The 2024 Annual Energy Report demonstrates Public Works' continued administration of the County's comprehensive energy portfolio to effectively manage operational costs while striving to contribute to the 100% RE goal.

Through future years' budgets, the County organization will continue to work to reduce energy consumption and GHG emissions further below the 2015 baseline in the coming years through planned ongoing implementation of the EMP, the REAP and the GFP.

SIGNATURES

Report author:

Original signed by

Nathan E. Gerber, A.Sc.T., CEM, CMVP
Coordinator of Energy Management

Departmental approval:

Original signed by

Melissa Abercrombie, P.Eng., PMP
Director of Public Works

Approved for submission:

Original signed by

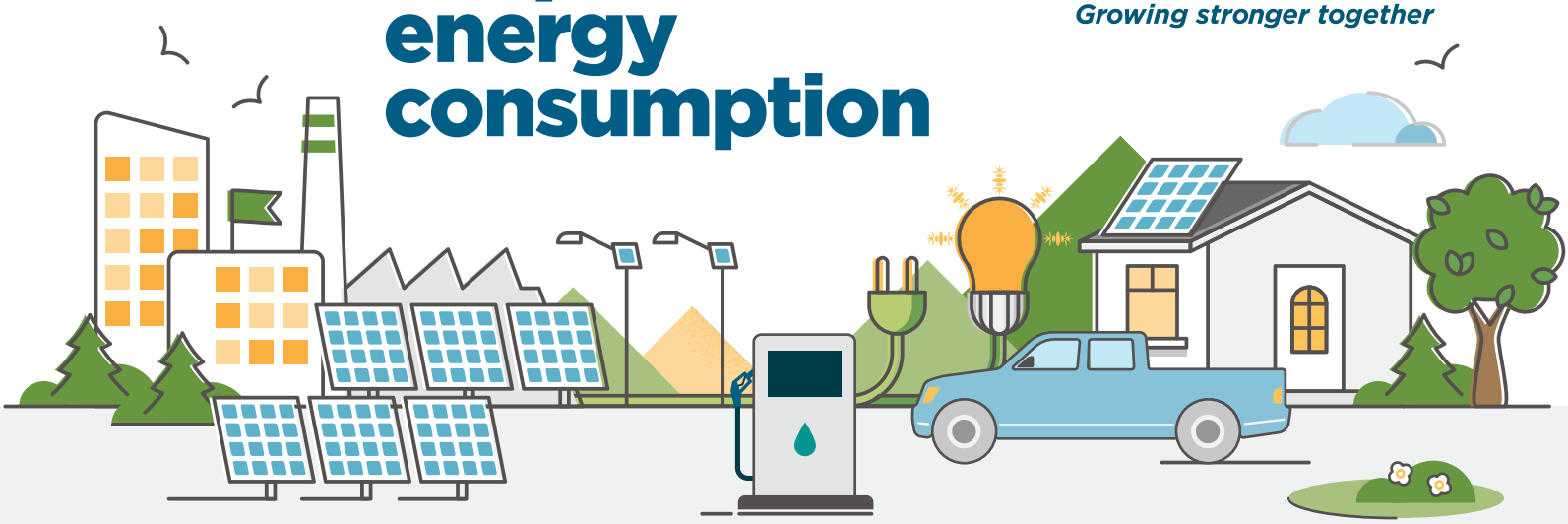
Benjamin R. Addley
Chief Administrative Officer

ATTACHMENT

Attachment 1 – Overview of 2024 Corporate Energy Consumption

2024 Corporate energy consumption

Oxford County
Growing stronger together



56.18 million ekWh
Total energy consumed
(facilities and fleet)
3.9% from 2023

887 thousand equivalent gas litres
Fleet fuel consumed
(unleaded, diesel, CNG, electric, propane)
14.5% from 2023

5.80 million dollars
Total energy cost
(facilities and fleet)
1.1% from 2023

Energy use by service area

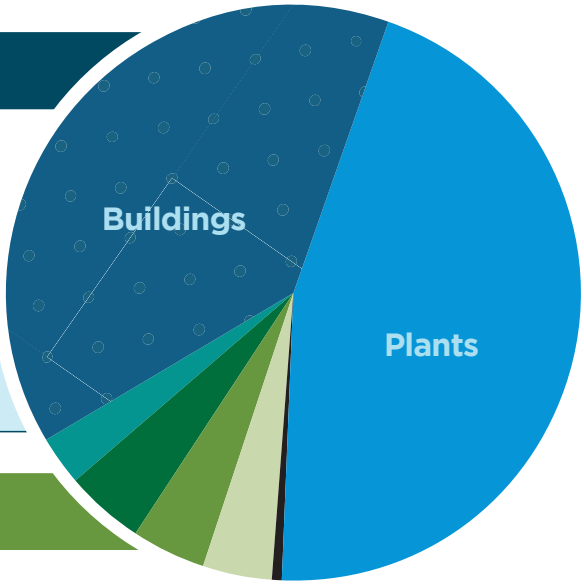
CORPORATE FACILITIES (47,634 eMWh) | 2.2%/2023

Buildings
21,891 eMWh

Plants
25,424 eMWh

Minor Assets*
318 eMWh

TOTAL COST: $4.70 MILLION | 3.4%/2023



CORPORATE FLEET (8,545 eMWh) | 14.6%/2023

Commercial
2,287 eMWh

Equipment
2,317 eMWh

Industrial
2,507 eMWh

Paramedical
1,434 eMWh

TOTAL COST: $1.09 MILLION | 9.0%/2023

* **Minor assets include:** street lighting, communication towers, etc.

Facilities area (square metres)

114,906 SM

1.4% from 2023

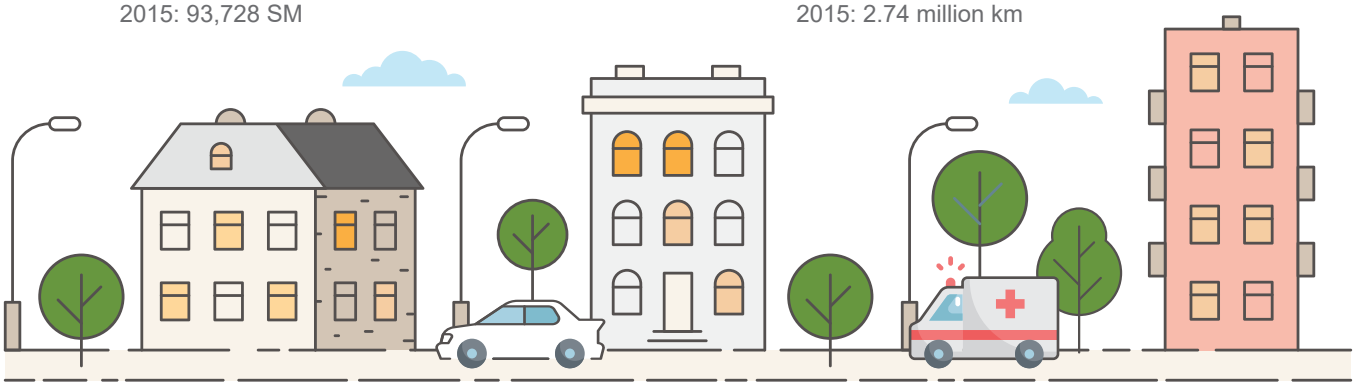
2015: 93,728 SM

Fleet travel (kilometres)

3.1 million

9.6% from 2023

2015: 2.74 million km

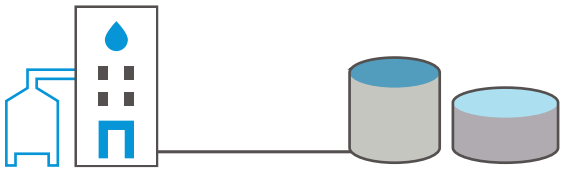


Water & Wastewater treatment and distribution (megalitres)

29,059 ML

2.9% from 2023

2015: 24,948 ML



Total greenhouse gas emissions (facilities and fleet)

5,744 tCO2e

3.9% from 2023

2015: 6,223 tCO2e

natural gas

1,459,000 m³

5.1% from 2023

2015: 1,414,000 m³

purchased electricity

27,156,600 kWh

1.8% from 2023

2015: 29,379,600 kWh

renewable energy generated

5,562,000 ekWh

34.1% from 2023

2015: 1,843,131 ekWh

$ revenue from renewable energy

$444,600

www.oxfordcounty.ca

Oxford County

Growing stronger together