

# FIRST ANNUAL ENERGY MANAGEMENT REPORT

TOWN OF LITTLETON, NH  
BUDGET YEAR OF 2014

Compiled by the Energy Conservation Committee

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# OVERVIEW

The energy-related portion of the 2014 approved Town budget was \$250,609. This included expenditures on heating, electricity, transportation, water, and sewer. Using Portfolio Manager, a free on-line EPA software program, baselines were established for energy consumption by several town buildings. From this baseline, goals will be established for immediate and near-term improvements.

# EXPENDITURES BY SECTOR

- Nearly half of the 2014 energy budget went to transportation costs (gasoline and oil for municipal vehicles). The next largest amount of spending went towards electricity, followed by heating fuels (oil, propane, and wood) with relatively small amounts spent on water and sewer.

**See figures 1-5 for details.**

- Electrical sector costs were dominated by streetlights, which accounted for about \$42K out the \$90K total.
- After realizing that the Town spends about twice as much on electricity as on heating, the Committee decided to place more emphasis in this area in the coming year.
- Progress was made overall on reducing greenhouse gas emissions, primarily due to the conversion from oil to wood at the fire station and highway garage.

# ENERGY EXPENDITURE BY SECTOR

(percentage in 2014 budget)

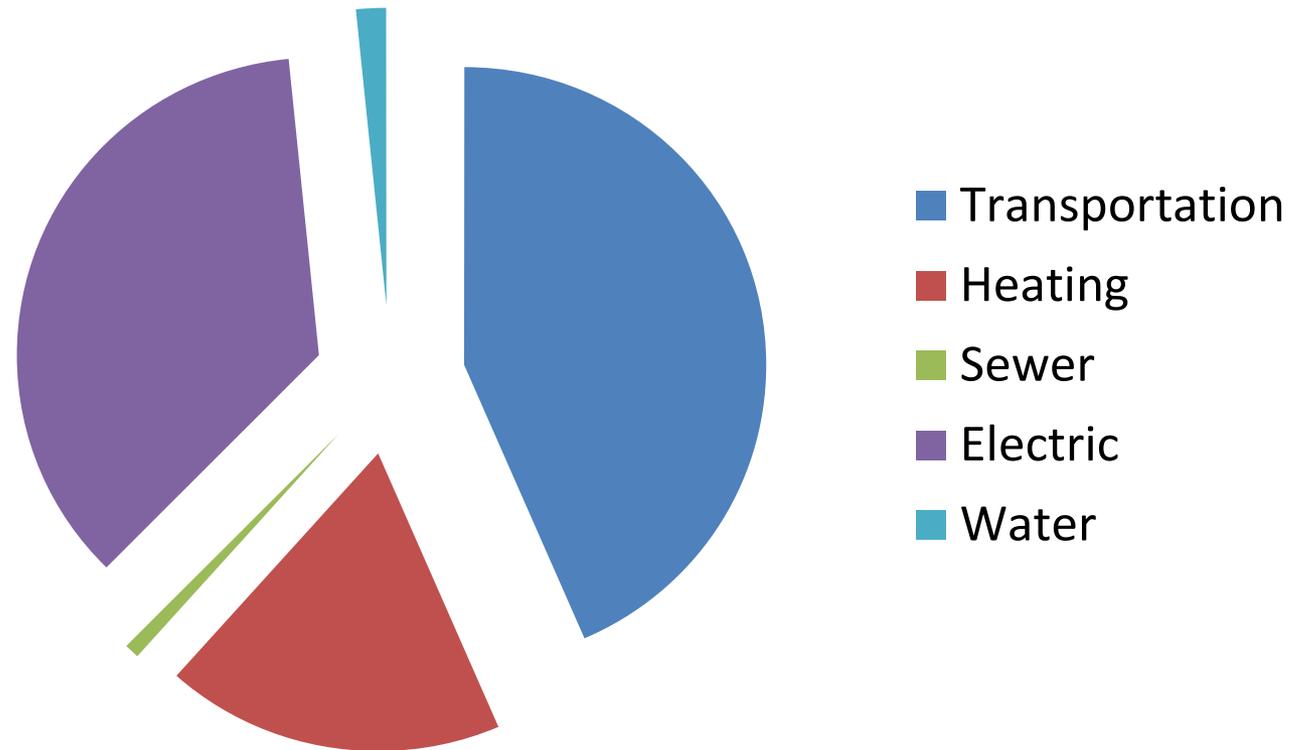


Figure 1

# Transportation Fuel Costs

(Based on 2014 budget projections, in dollars)

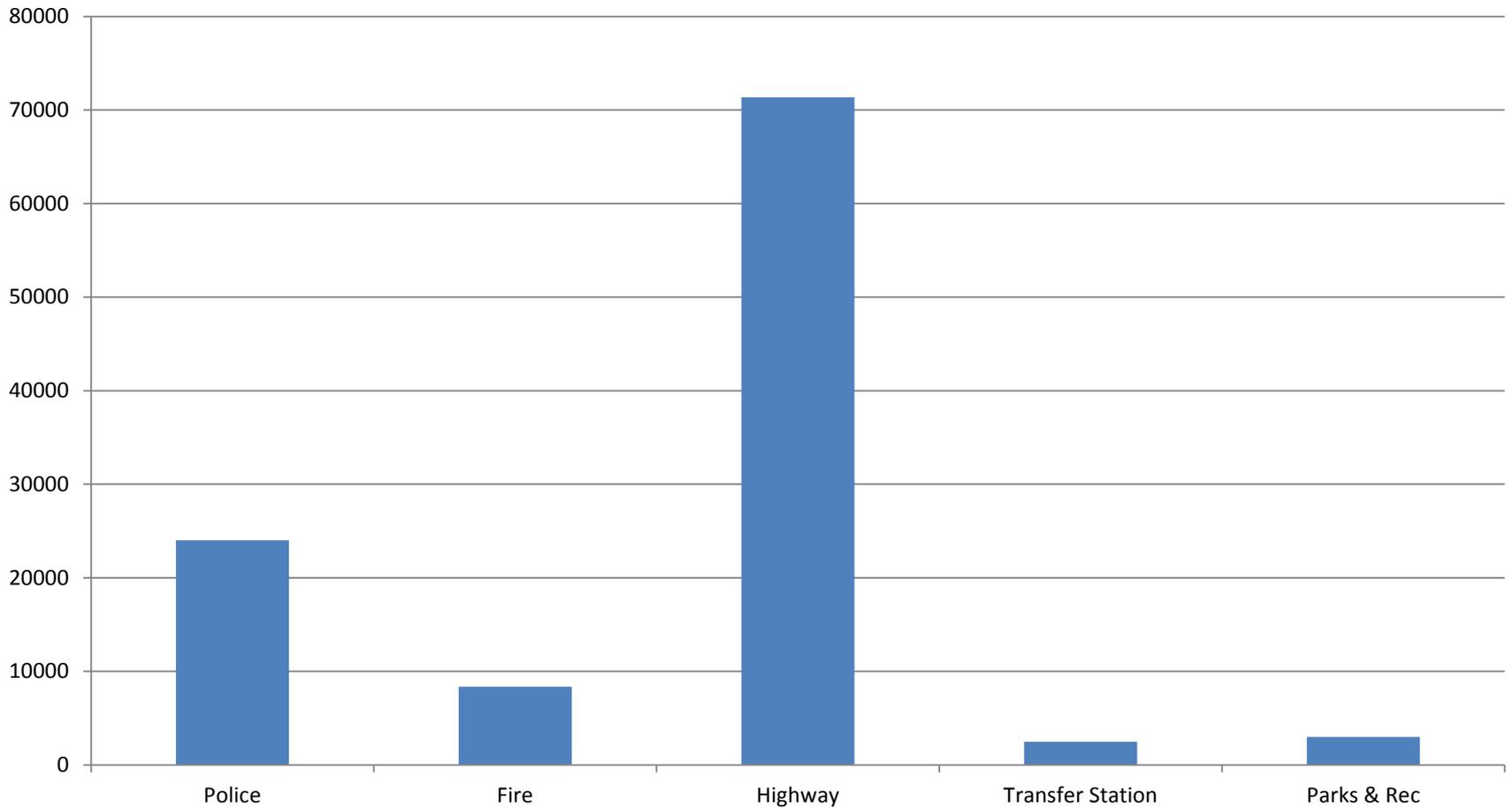


Figure 2

# Cost of Electricity

(Based on 2014 budget projections, in dollars)

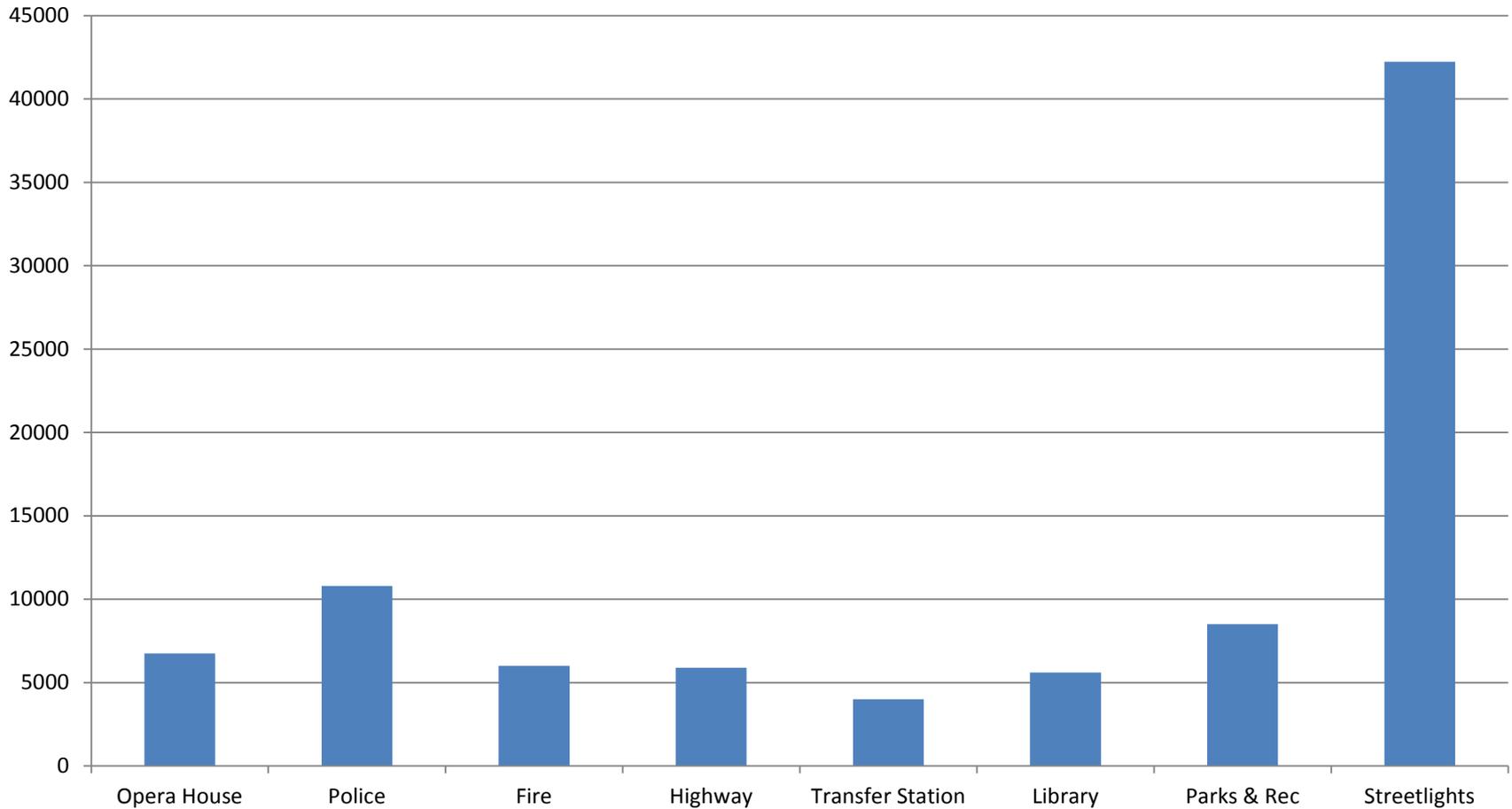


Figure 3

# Cost of Heating (oil, propane, wood)

(Based on 2014 budget projection, in dollars)

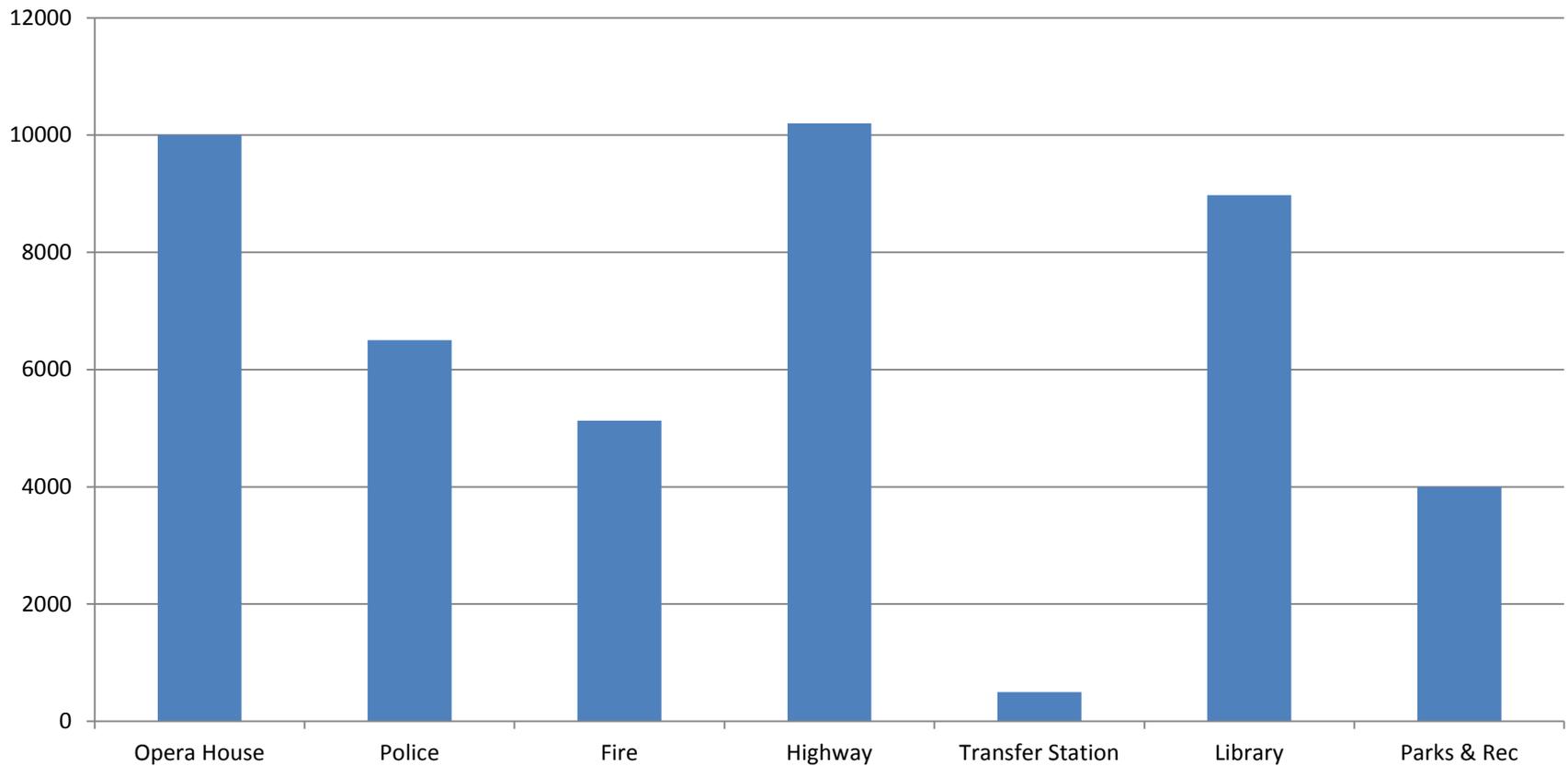


Figure 4

# Cost of Water & Sewer

(Based on 2014 budget projection, in dollars)

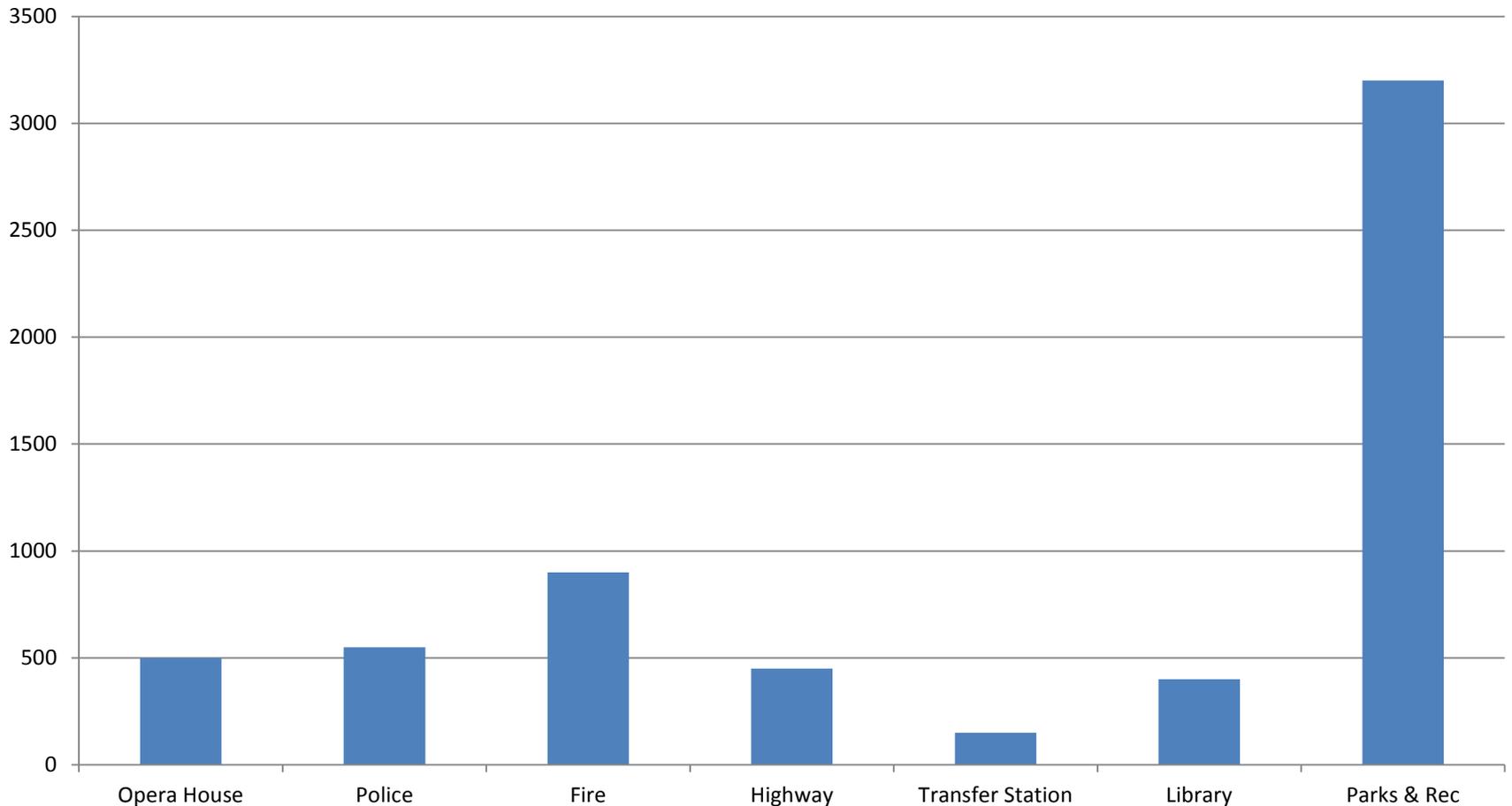


Figure 5

# EXPENDITURES BY DEPARTMENT

(See figure 6)

- By far, the least expensive department regarding energy costs is the Transfer Station, which accounted for only 2.9% of the \$250K budget for 2014.
- The Highway Department was the most energy intensive (35.1% of the budget), primarily because of costs associated with its fleet of vehicles.
- The Fire Department is mid-way through a lighting conversion.
- The public library has made the most progress on reducing energy costs in recent years (**see figures 7 and 8**). This resulted from a number of initiatives approved by the Library Board of Trustees, which included:
  - converting from T-12 to T-8 fluorescent light bulbs
  - replacing individual single-bulb light fixtures with LEDs
  - installing insulated window shades
  - building a new set of inner doors for the front entrance to better control the indoor temperature and lower heat loss.

# COST BY DEPARTMENT

(Based on 2014 budget projection, in dollars)

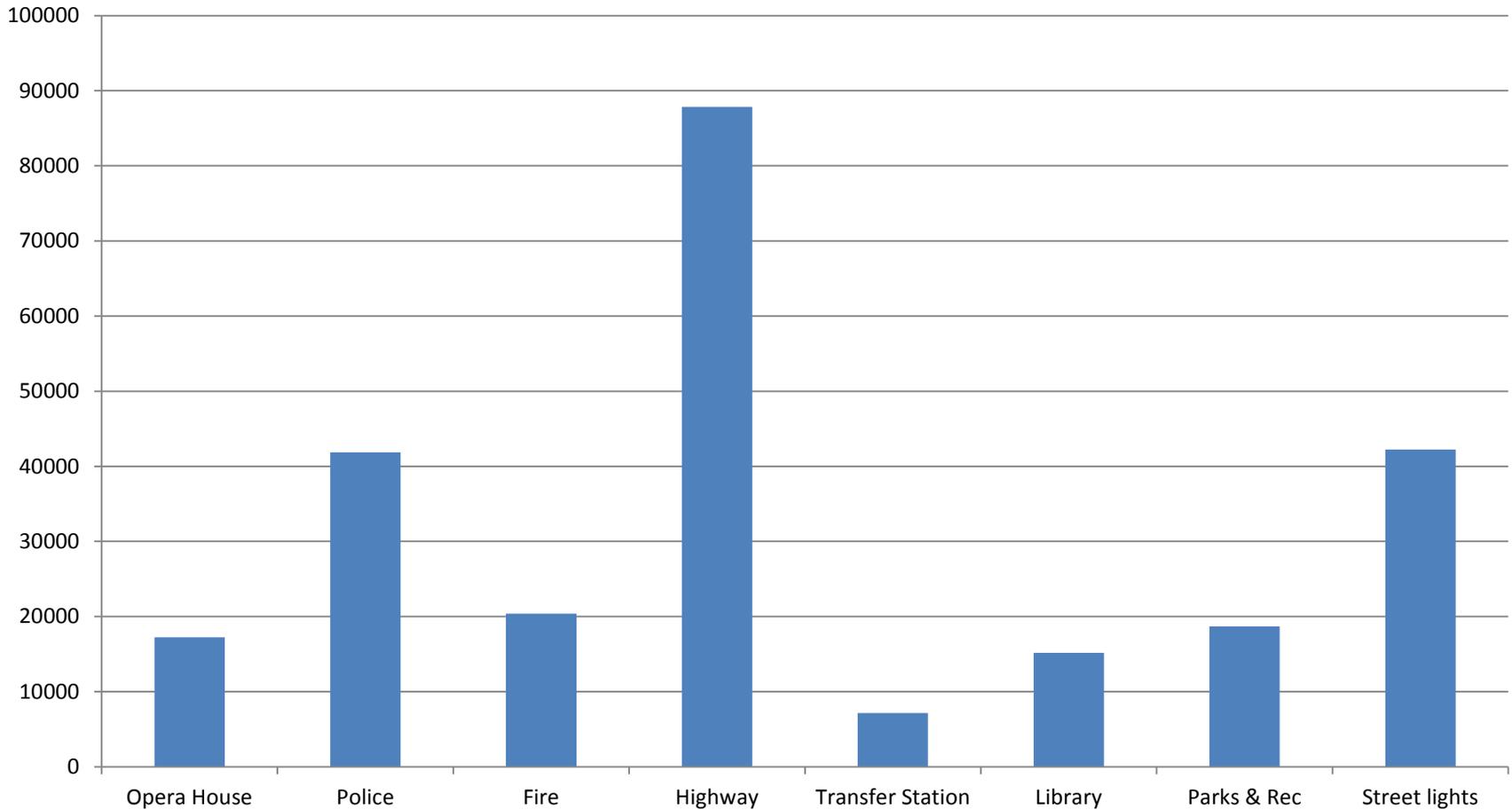
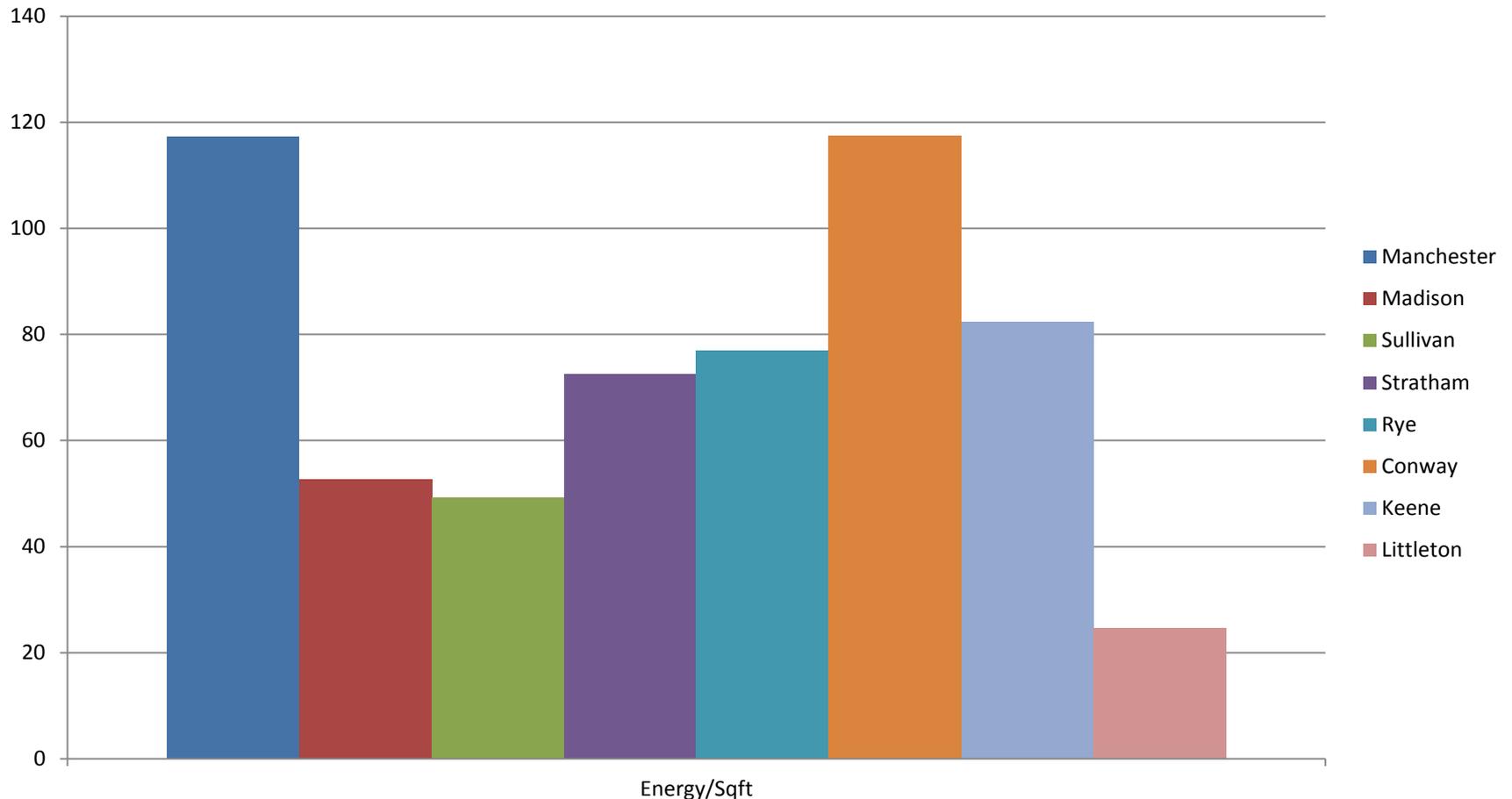


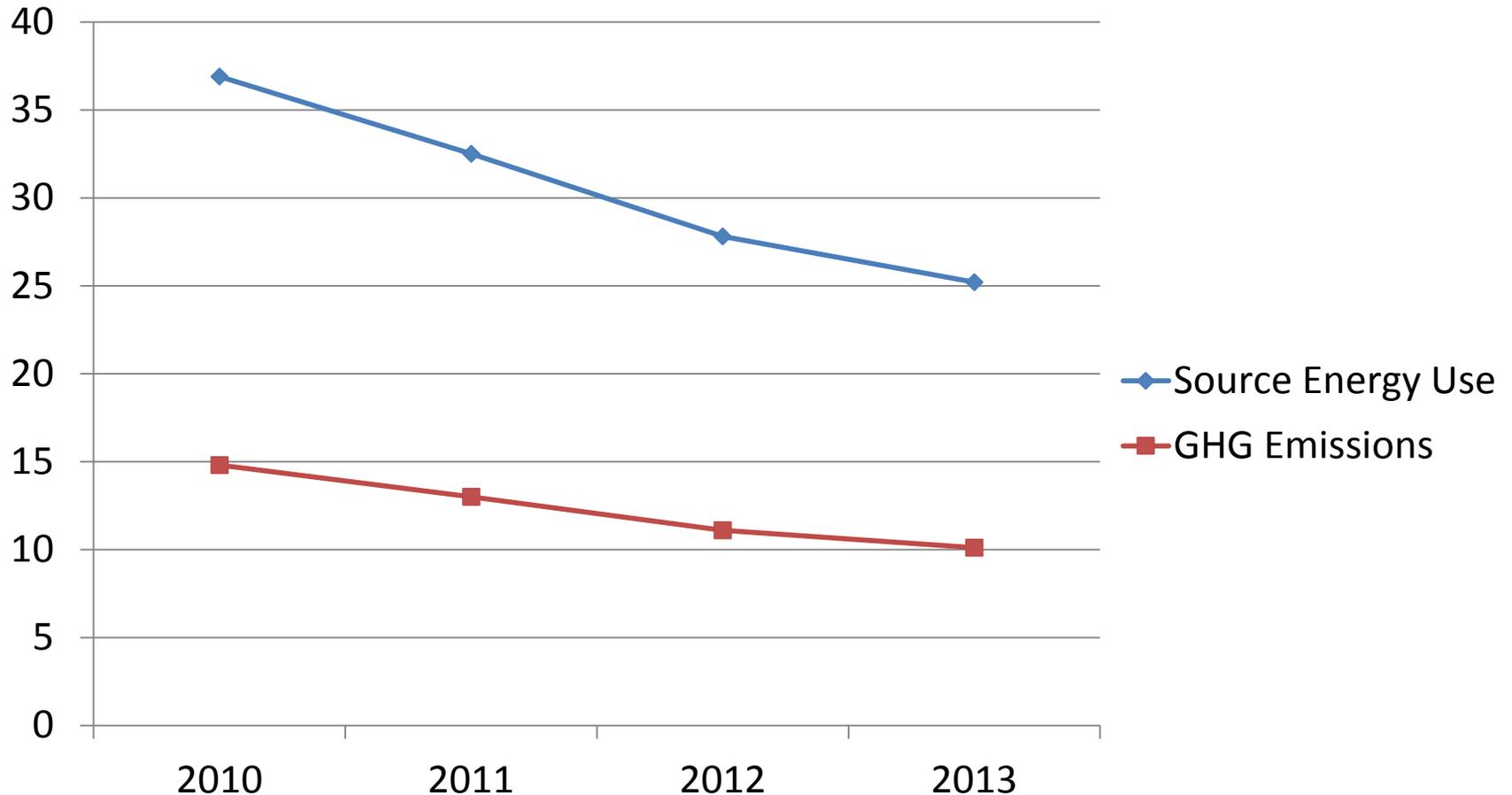
Figure 6

# Figure 7: Comparison of Energy Cost of Some NH Libraries



One way to measure and compare energy efficiency is cost per square foot, which was what is depicted here. Using this measurement, Littleton is by far the most cost effective public library in this comparison. All of these libraries participate in the Portfolio Manager program and have agreed to share their information.

# Figure 8:Trends At the Littleton Library



\* Source Energy Use is the total amount of all raw fuel required to operate a property, including losses that take place during generation, transmission, and distribution of energy.

\* Greenhouse Gas (GHG) Emissions are the carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) gases released into the atmosphere as a results of energy consumption at the property.

# HEATING FUEL CONSUMPTION

- **The period from 1 July to 30 June was used to track fuel usage for ease in comparing one heating season to another. We used units of consumption, not cost, because unit costs are subject to frequent fluctuation.**
- **The cold winter of 2013-14 resulted in a significant increase in units of fuel oil and propane consumed. Compared to the previous year the average increase was about 32%. Increases compared to the 4-year average ranged from 12% at the Police Station to 74% at the Opera House. The Police Station and Opera House use propane. The Library consumption increased by 19% and Parks & Recreation increase by 28%; both of these departments use #2 fuel oil.**
- **Heating degree days in 2013-14 increased by 10.7% compared to 2012-13 (see next two pages).**
- **Exact comparisons to historical averages at the fire house and highway garage were very complicated because of the conversion to wood pellets this past winter. The noticeable drop in fuel oil is directly related to using wood as the primary heat source and oil as the supplement during transitional periods and on the coldest days.**
- **The Transfer Station is not included in this report because of the exceedingly low heating expenses incurred. This building is heated primarily from used motor oil, supplemented with a very small amount of #2 fuel oil, about 100 gallons a year.**

# HEATING DEGREE DAYS

- Heating degree day (HDD) is a measurement designed to reflect the demand for energy needed to heat a building. It is derived from measurements of outside air temperature. The heating requirements for a given structure at a specific location are considered to be directly proportional to the number of HDDs at that location.
- HDDs are defined relative to a base temperature—the outside temperature above which a building needs no heating. The most appropriate base temperature for any particular building depends on the temperature that the building is heated to, and the nature of the building (including the heat-generating occupants and equipment within it). The base temperature is usually an indoor temperature of 18°C or 19°C (~65°F) which is adequate for human comfort.

# HDD Comparison Last Two Years

Heating Degree Days 2012-2013		Heating Degree Days 2013-2014	
<u>Month</u>	<u>HDD</u>	<u>Month</u>	<u>HDD</u>
Oct.	462	Oct.	581
Nov.	1019	Nov.	1007
Dec.	1161	Dec.	1325
Jan.	1496	Jan.	1527
Feb.	1232	Feb.	1366
Mar.	1085	Mar.	1417
April	<u>701</u>	April	<u>699</u>
<b>Total HDD</b>	7156	<b>Total HDD</b>	7922
		% Change	10.7 %

# Heating Fuel Consumption Trends

(measured in gallons delivered from July to June)

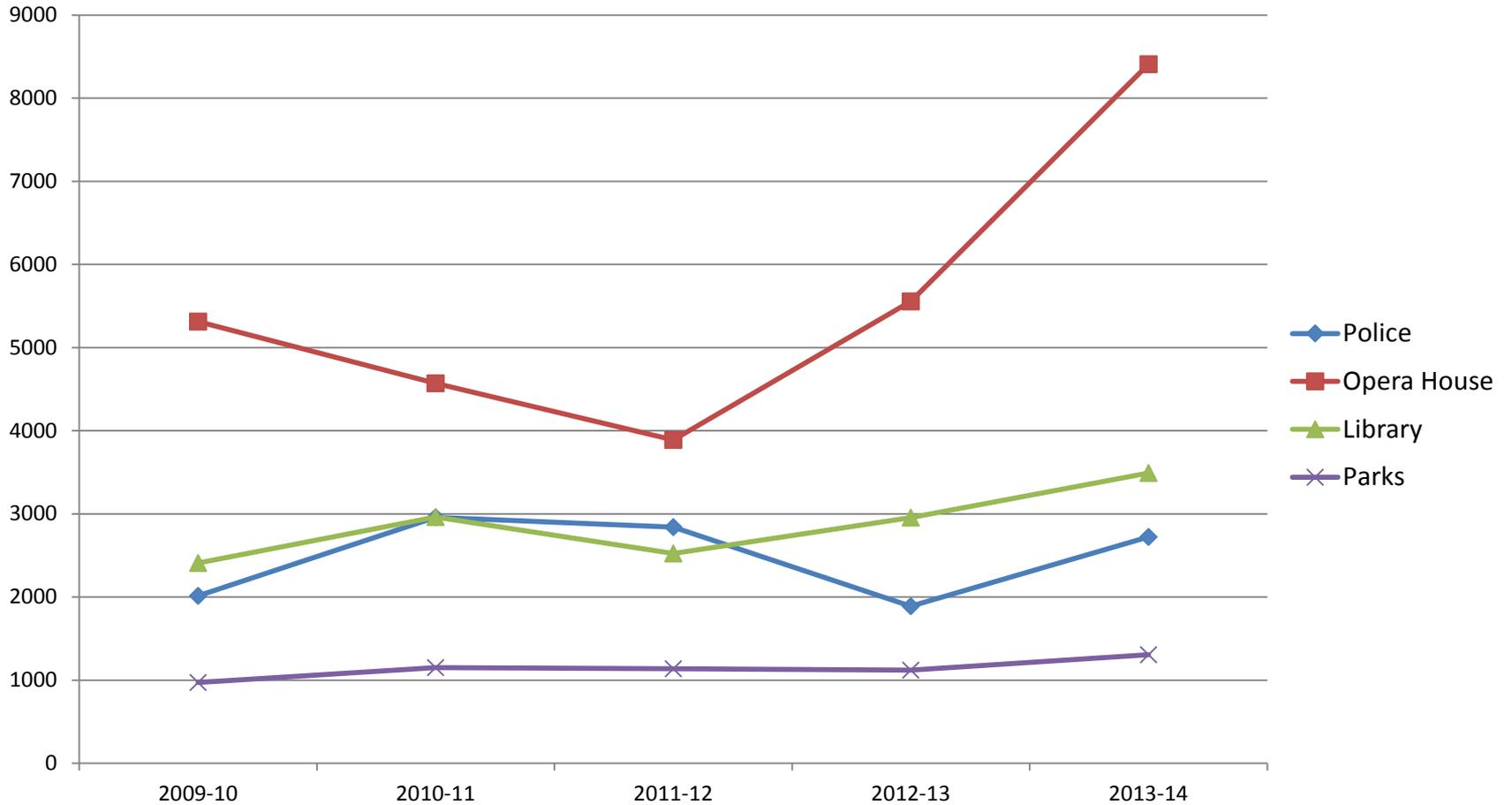


Figure 9

# Propane Consumption Trends

## Police Department and Opera House

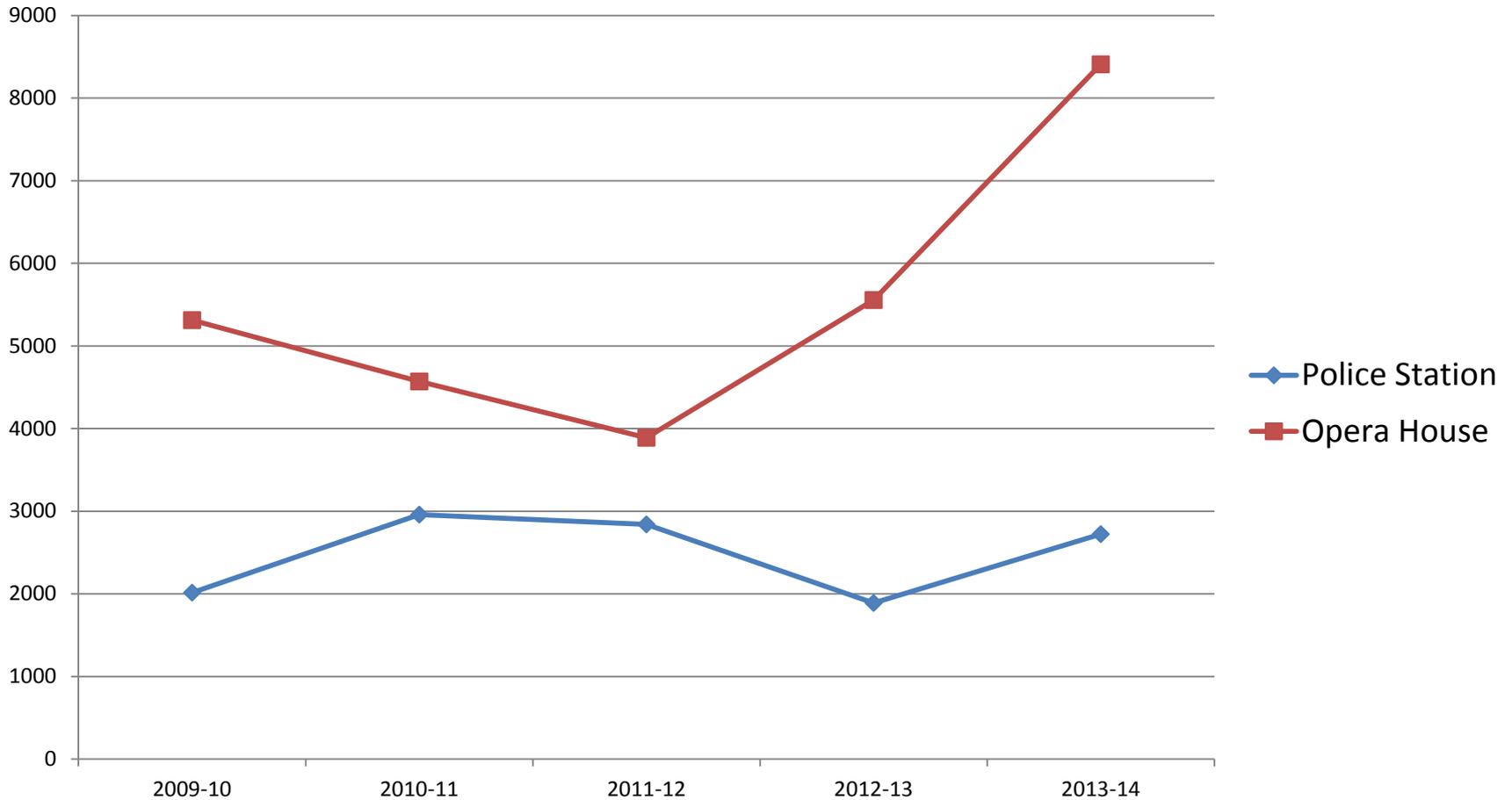


Figure 10

# Fuel Oil Consumption Trends

## Library and Parks & Recreation

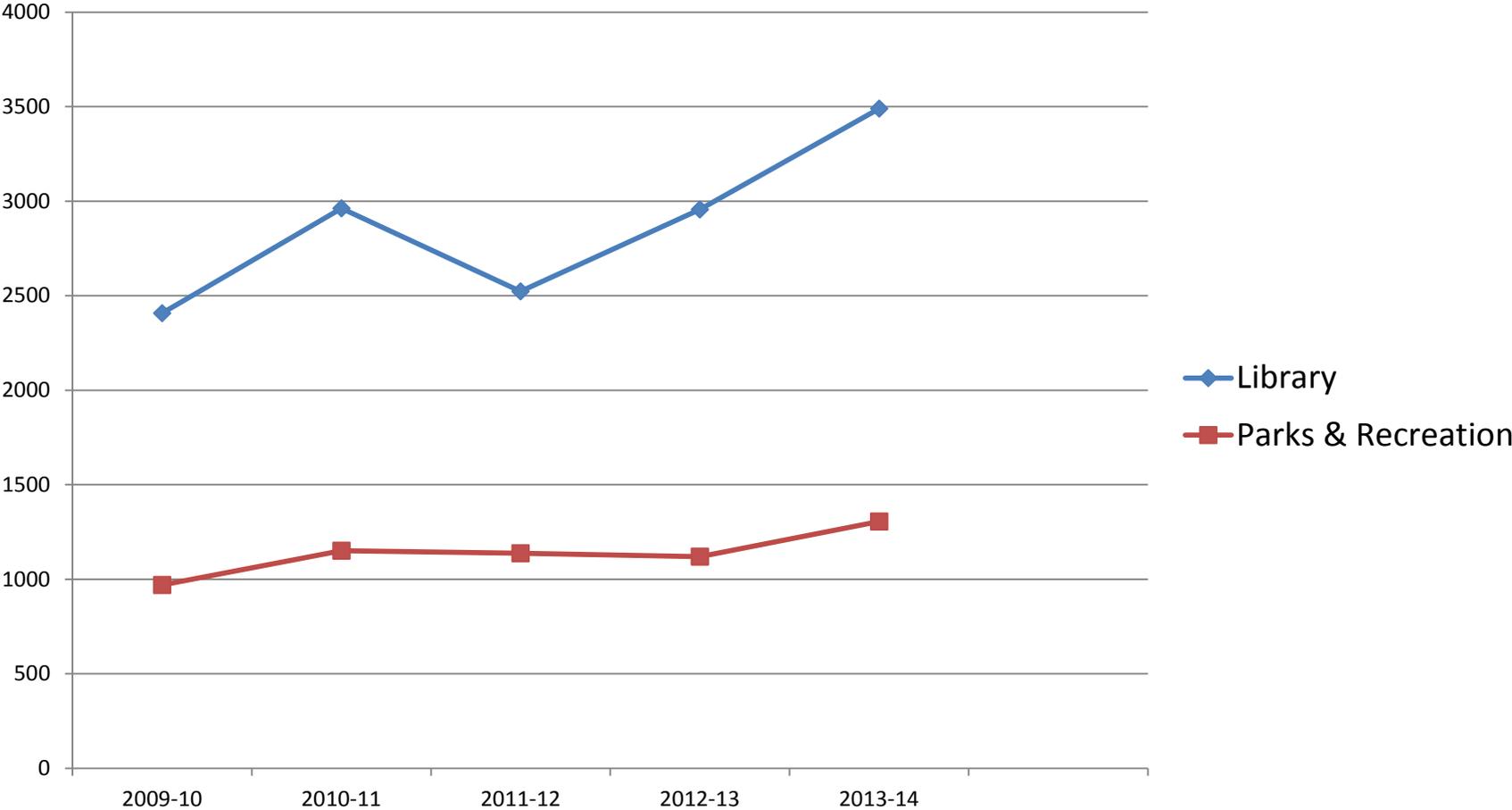


Figure 11

# Fuel Oil Consumption Trends

## Fire House and Highway Garage

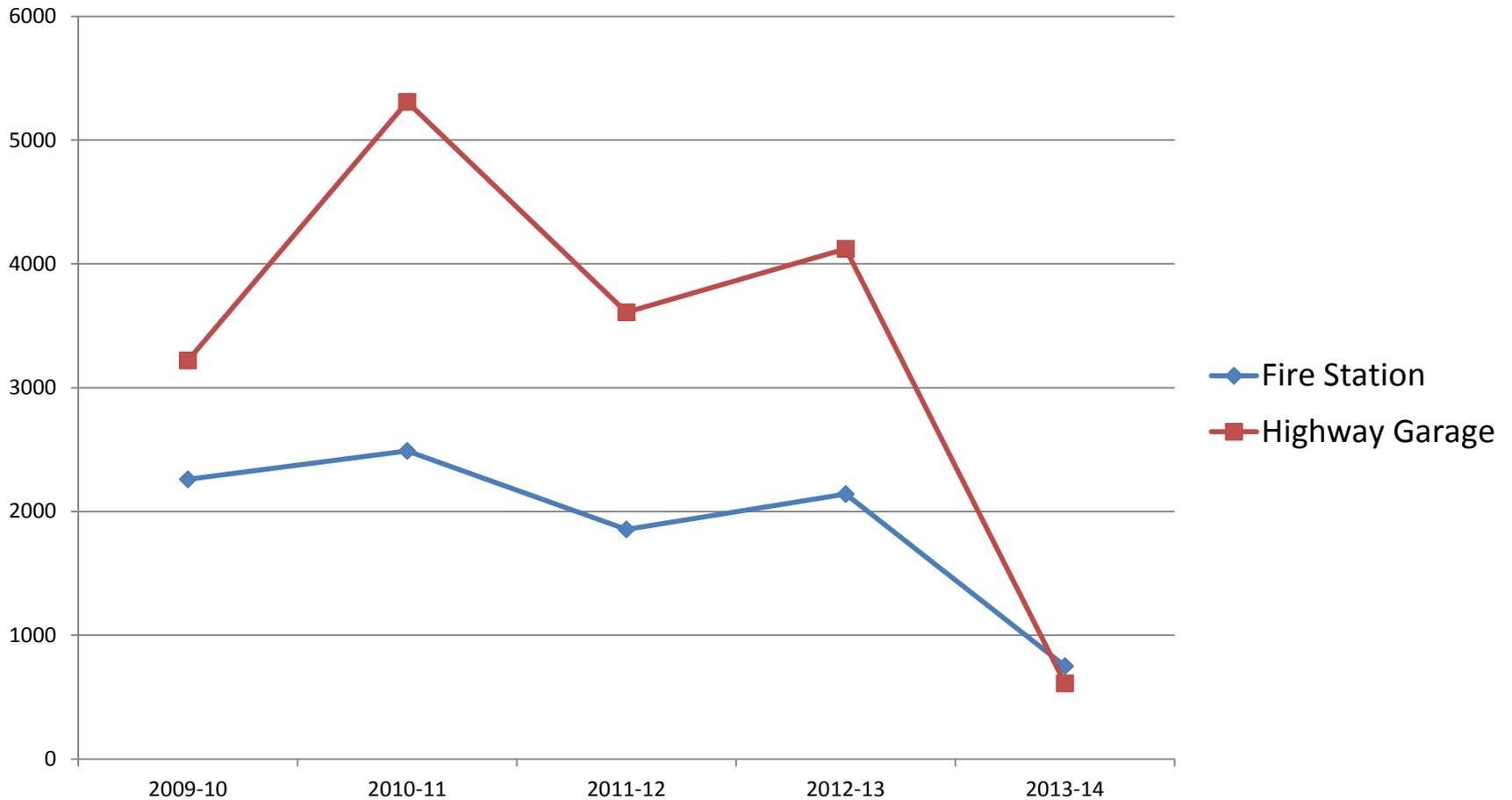


Figure 12

# Consumption Increase in 2013-14

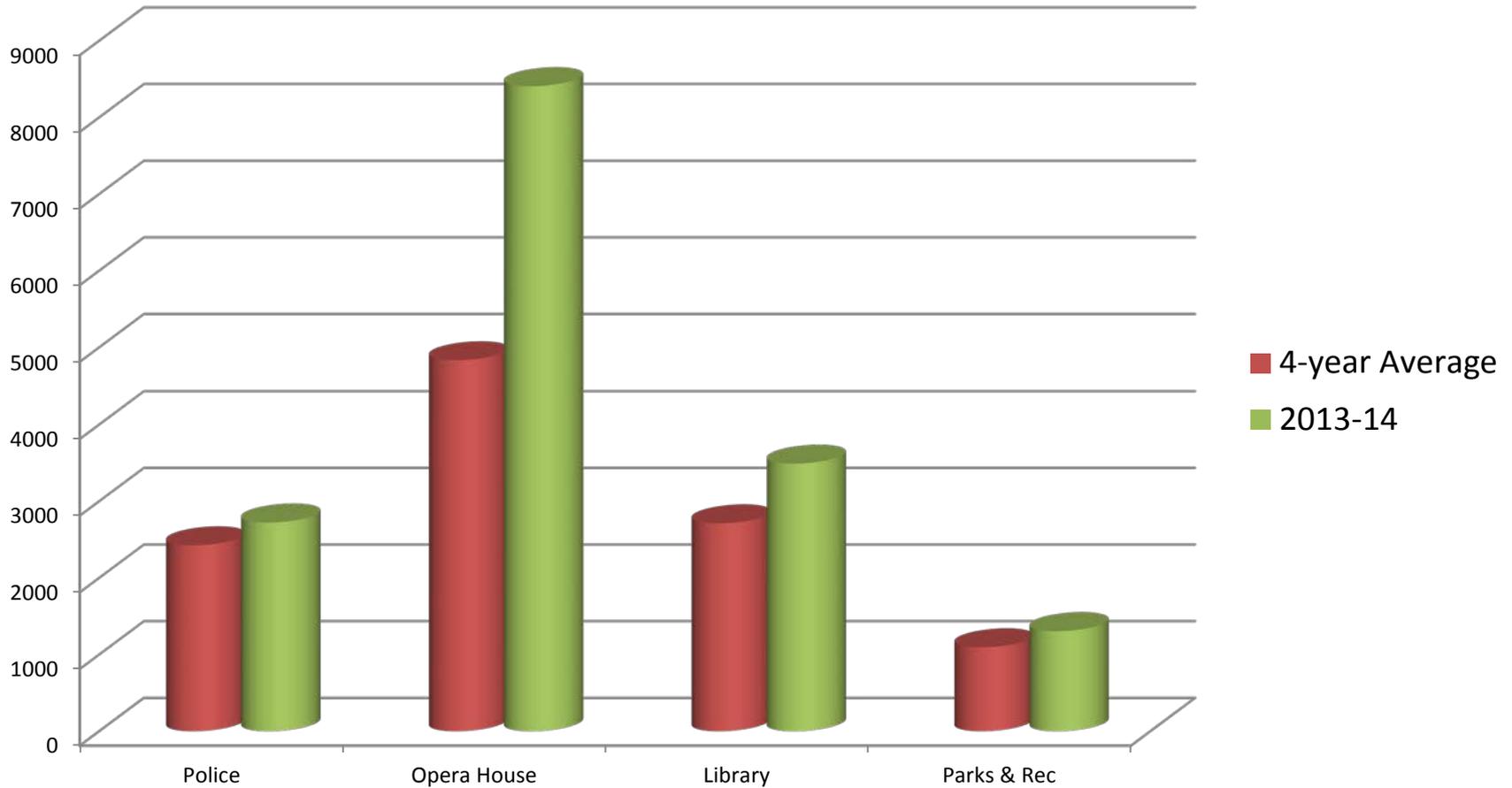


Figure 13

# Composite Year-to-Year Comparison

- Figure 14 depicts changes in total energy consumption (heating and electricity) from 2012-2013 to 2013-2014 at five buildings.
- Improvements were noted in 2013-2014 at the library and police station.
- The significant change noted at the Opera House is attributable mainly to increased use of the performance venue. Other factors included faulty equipment and some maintenance issues.
- Source Energy Use is the total amount of raw fuel that is required to operate a property. In addition to what the property consumes on-site, source energy includes losses that take place during generation, transmission, and distribution of the energy, thereby enabling a complete assessment of energy consumption resulting from building operations.
- The measurement used in Figure 14, Source Energy Use Intensity (EUI), is the Source Energy Use divided by the property square foot.

# Composite Year-to-Year Comparison, Cont.

- The presence of too many variables made it nearly impossible to compare 2012-2013 to 2013-14 energy consumption at the fire station and highway garage. Some of the variables included increased use of the fire house and start-up glitches with the new equipment
- In the fall of 2013, these buildings converted to wood as the primary source of heating, although fuel oil was used as a supplement.
- Our best estimate on cost savings realized by the conversion ranged somewhere between \$7K and \$12K.
- A better, apples-to-apples comparison will be made in next year's Energy Management Report.

# Composite Energy Consumption Trend

[Measured in terms of Source EUI]

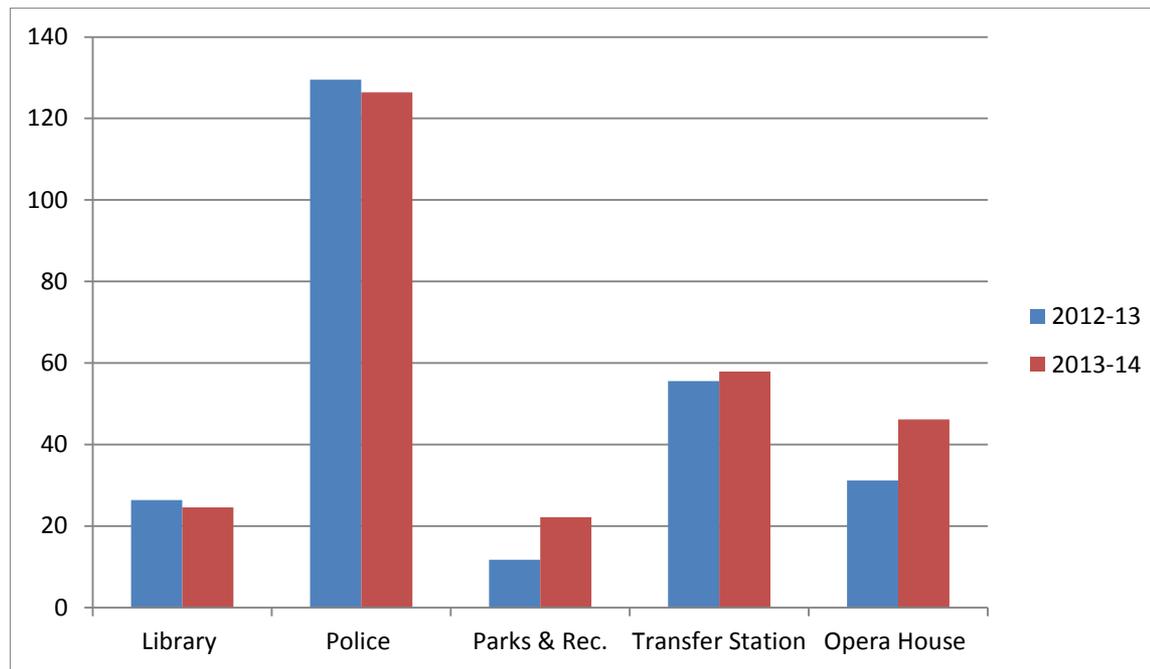


Figure 14