

THIRD ANNUAL ENERGY MANAGEMENT REPORT

TOWN OF LITTLETON, NH
2016-2017

Compiled by the Energy Conservation Committee

Table of Contents

- Overview Page 3
- Expenditure by Sector Pages 4-15
- Expenditure by Department Pages 16-18
- Departmental Reviews Pages 19-37
- Spending Trend Page 38

OVERVIEW

For the second year in a row, actual expenditures on energy line items was \$15K below the comparable figure for the preceding year. The totals for the past three years were:

2014	\$247,408
2015	\$232,814
2016	\$217,421

These totals include spending on heating, electricity, water, sewer, and transportation by the various departments. Major factors contributing to these savings include:

- Lighting retrofits at some municipal buildings
- Lower overall oil/gas prices, and
- Conscientious energy management by the departments

Voters continue to support energy improvements by approving cost-saving appropriation requests. In 2018, the Opera House/Town Hall will be retrofitted with additional insulation and air sealing along some walls and in the attic and storage room.

EXPENDITURES BY SECTOR

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- Over 42% of the 2016 energy expenditures went to electricity costs. The next largest amount of spending (35%) was on transportation (gasoline and oil for municipal vehicles), followed by heating fuels (oil, propane, and wood pellets) at 17%, with comparatively small amounts (6%) spent on water and sewer.

See figures 1-5 for details.

- Electrical sector costs increased by 21% and were again dominated by streetlights, which accounted for about \$45K out the \$92K total (49%).
- Heating sector costs were down about 4% compared to 2015-16
- Transportation costs were down 16% compared to 2015.

ENERGY EXPENDITURE BY SECTOR

(percentages in 2016)

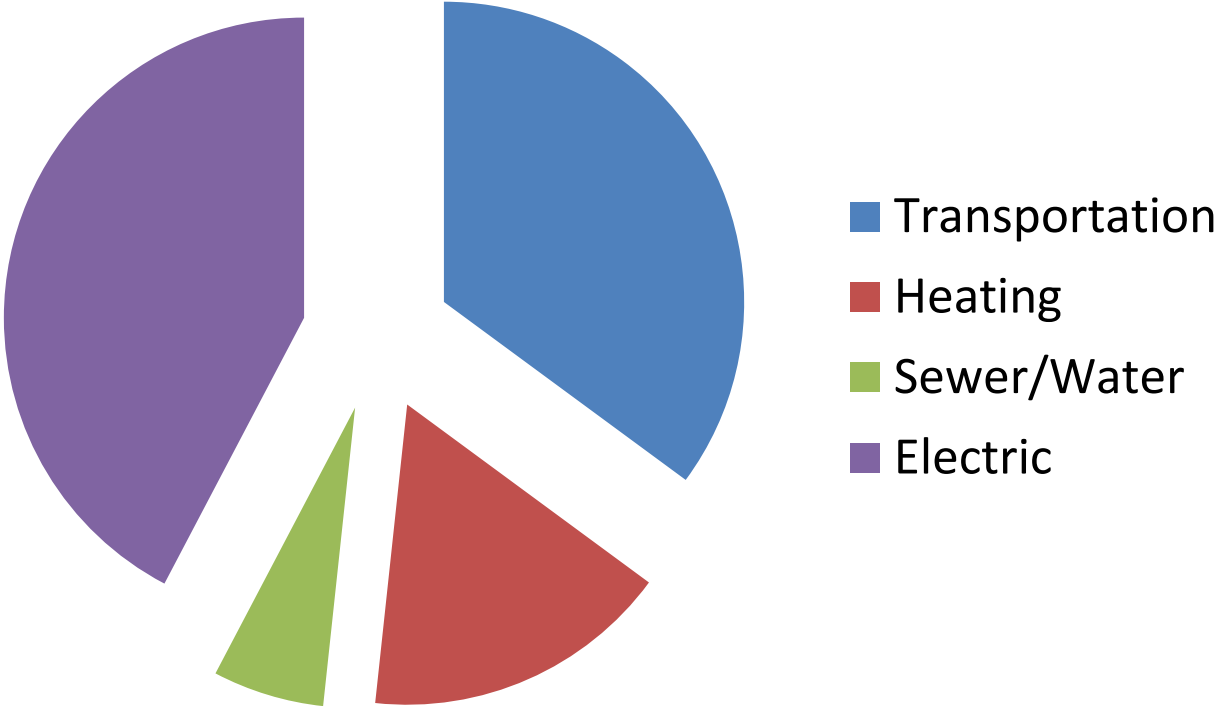


Figure 1

Cost of Electricity

(Based on 2016 expenditures, in dollars)

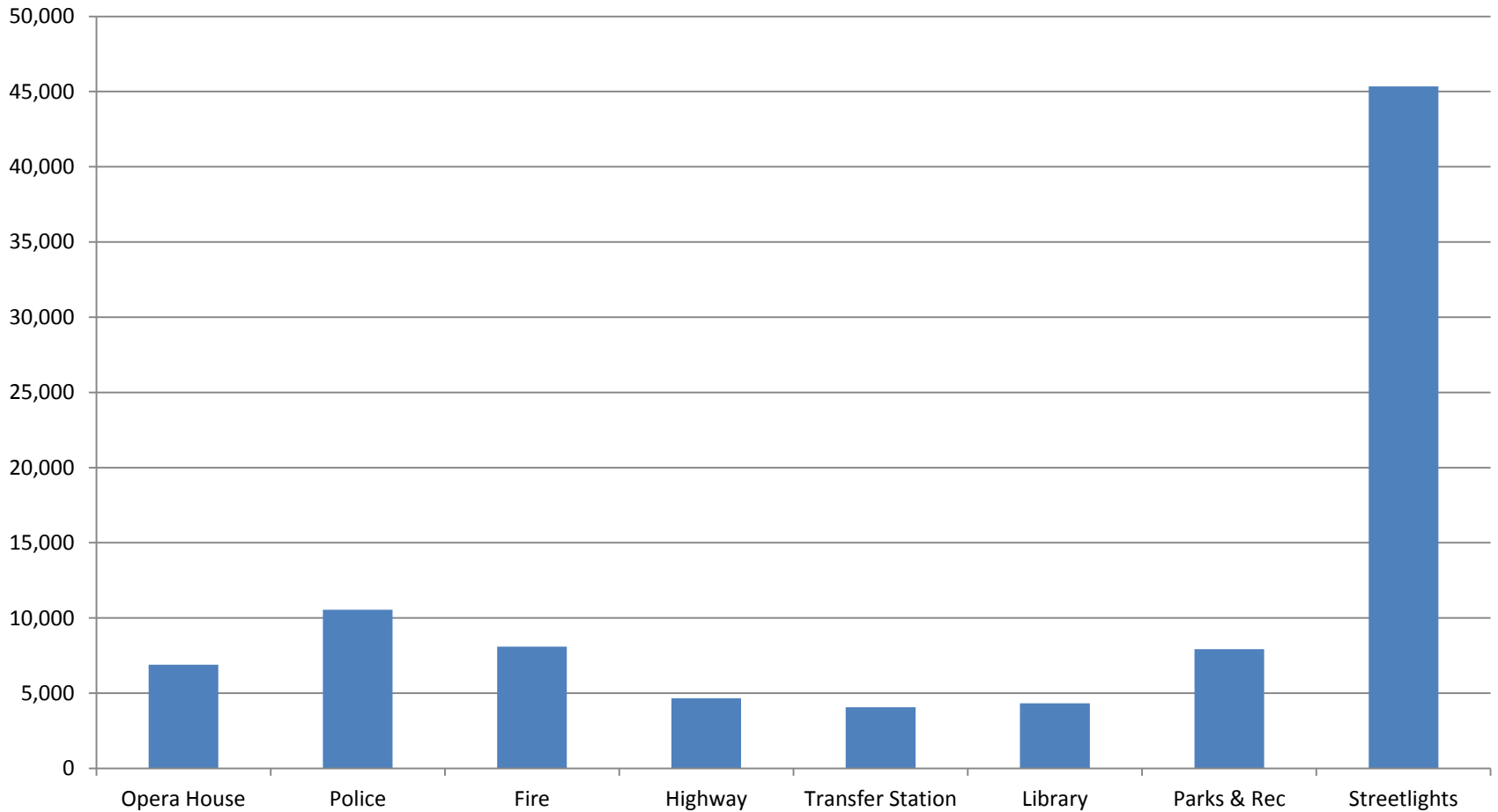


Figure 3

STREETLIGHTS

- Electricity was again the most costly sector, comprising \$92K, or about 42% of the Town's energy expenditures.
- Streetlights constituted the biggest share (49%) of the Town's electricity costs.
- Streetlight consumption in terms of kWh/year are going down (about 11% since 2014) as Littleton Water & Light has been incrementally transitioning to LED lightbulbs.
- However, costs rose significantly in 2016 due to a rate increase that went into effect in April.

Transportation Fuel Costs

(Based on 2016 expenditures, in dollars)

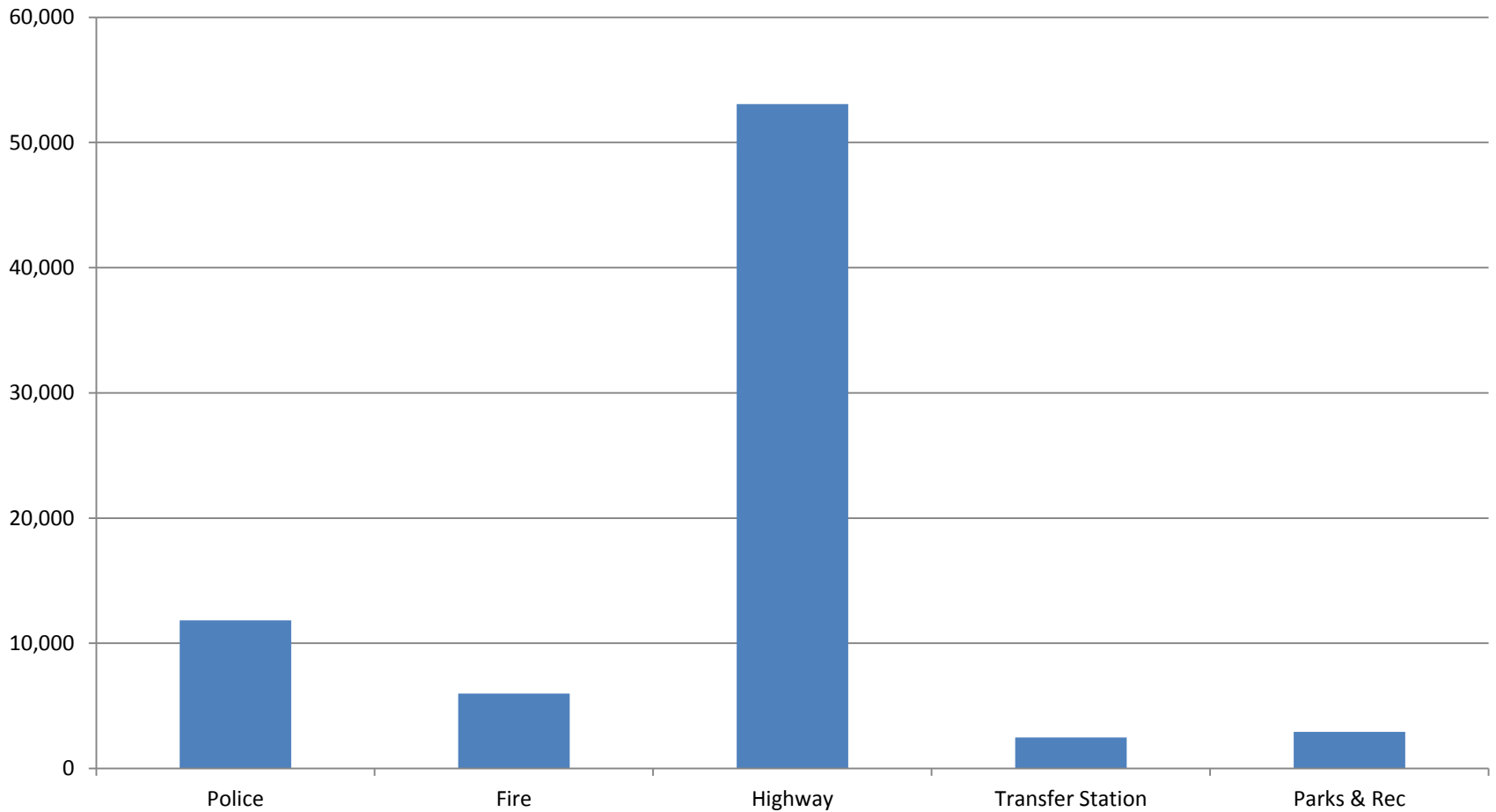


Figure 2

Cost of Heating (oil, propane)

(Based on 2016 expenditures, in dollars)

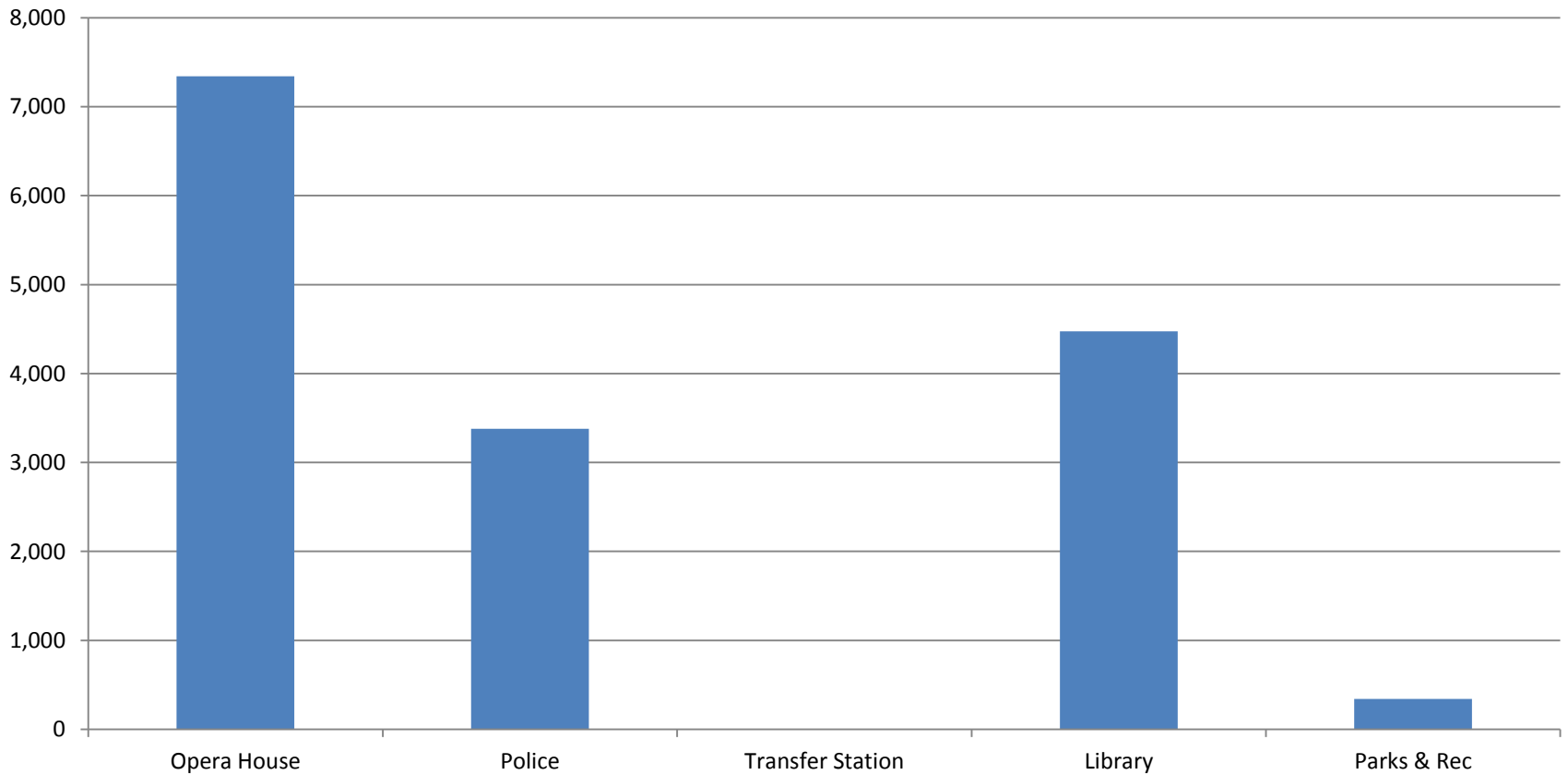


Figure 4

Cost of Heating (wood pellets)

2013/14	57.83 tons	\$12,691
2014/15	63.90 tons	\$14,613
2015/16	50.84 tons	\$12,008
2016/17	43.43 tons	\$10,342

Note: Consumption and costs are approximations as there is no exact measurement of tons of pellets in the silo at the start or end of each heating season. Pellets are the primary heating source for the fire station and highway garage, and both use propane as a supplement/back-up heating source.

COMPARING HEATING SEASONS

- When comparing fuel consumption, we look from season to season, not at the calendar year.
- One tool available to help make proper comparisons is Heating Degree Days (see technical description at slide 12).
- Based on HDDs (see slide 13), the heating season for 2015-16 was 12.7% warmer than 2014-15; 2016-17 was 8.8% warmer than 2014-15; and, 2016-17 was 4.3% colder than 2015-16.

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.

HEATING DEGREE DAYS

SEASON TO SEASON COMPARISON

	2014-15	2015-16	2016-17
October	489	658	567
November	967	813	869
December	1154	961	1297
January	1658	1384	1258
February	1687	1150	1119
March	1315	962	1295
April	754	795	598
May	286	375	423
June	180	205	185
July	94	98	106
August	97	110	176
September	226	264	231
Total	8907	7775	8124

Cost of Water & Sewer

(Based on 2016 expenditures, in dollars)

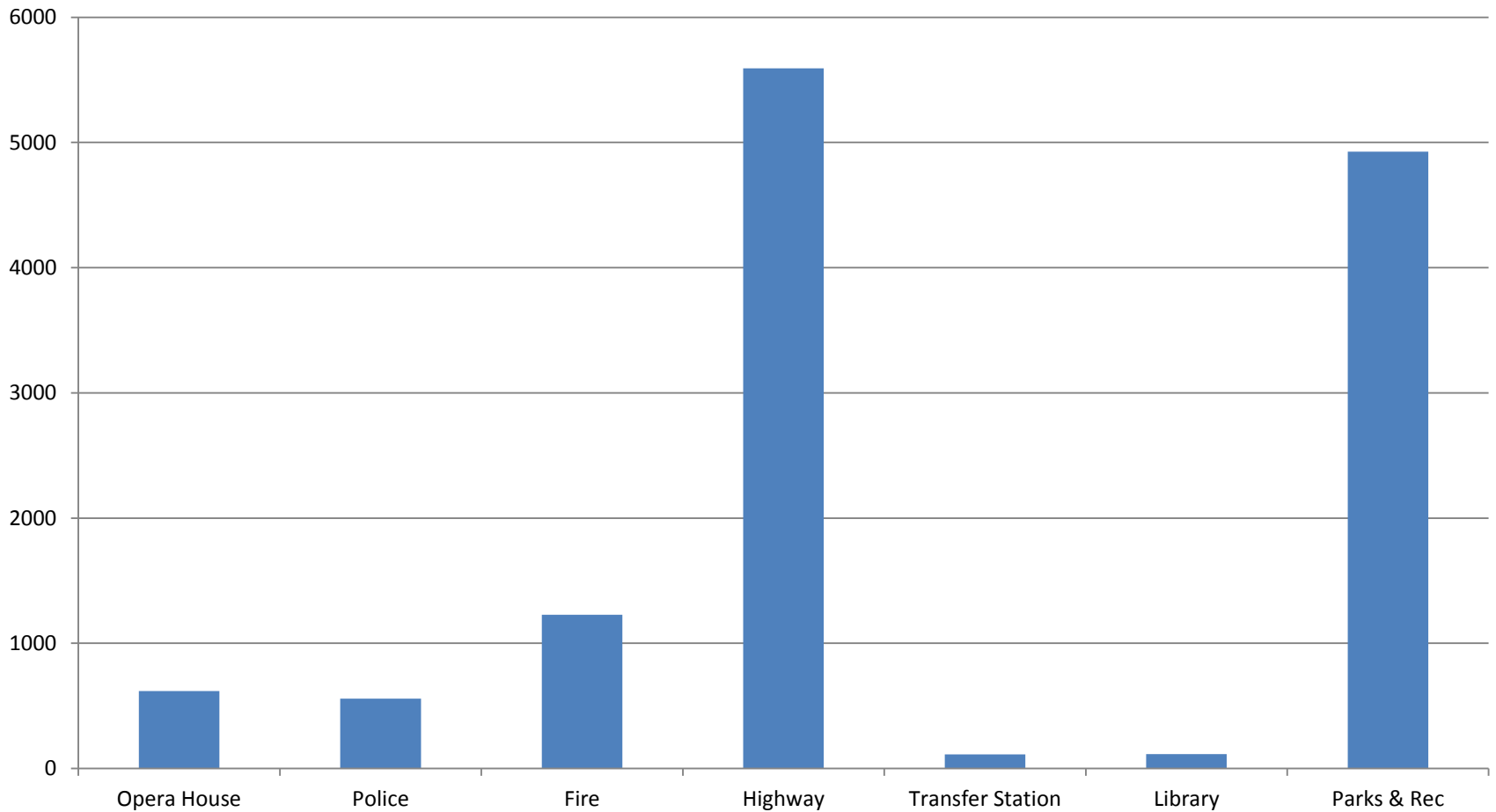


Figure 5

EXPENDITURES BY DEPARTMENT

EXPENDITURES BY DEPARTMENT

(See figure 6)

- By far, the least expensive department regarding energy costs was the Transfer Station, which accounted for only 3.1% of 2016 expenditures.
- The Highway Department was the most energy intensive (36.1% of the 2016 expenditures), primarily because of costs associated with its fleet of vehicles.
- Note: when making comparisons, not all departments have transportation costs (i.e., Opera House & Library). Consumption at each building will be presented later.

ENERGY COSTS BY DEPARTMENT

(Based on 2016 expenditures, in dollars)

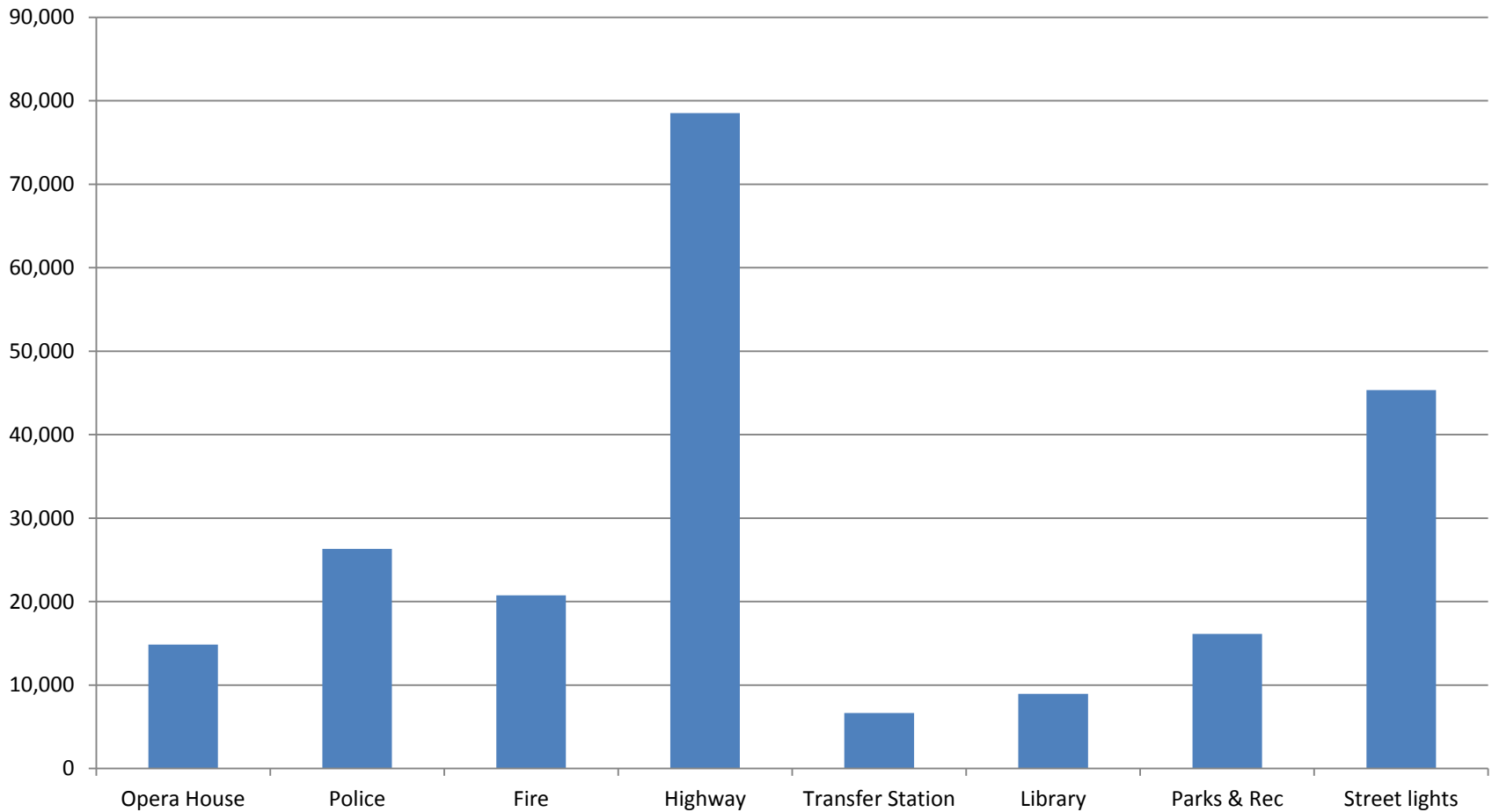


Figure 6

DEPARTMENTAL REVIEWS

Trends at the Opera House

- Energy consumption has been generally trending upwards as building usage has been increasing in recent years. However:
 - > Electric costs have leveled off, due in part to a lighting retrofit, and
 - > Propane consumption dropped in 2016-17 for the second straight heating season. This should continue as more insulation is added.

Propane Usage Trend: Opera House

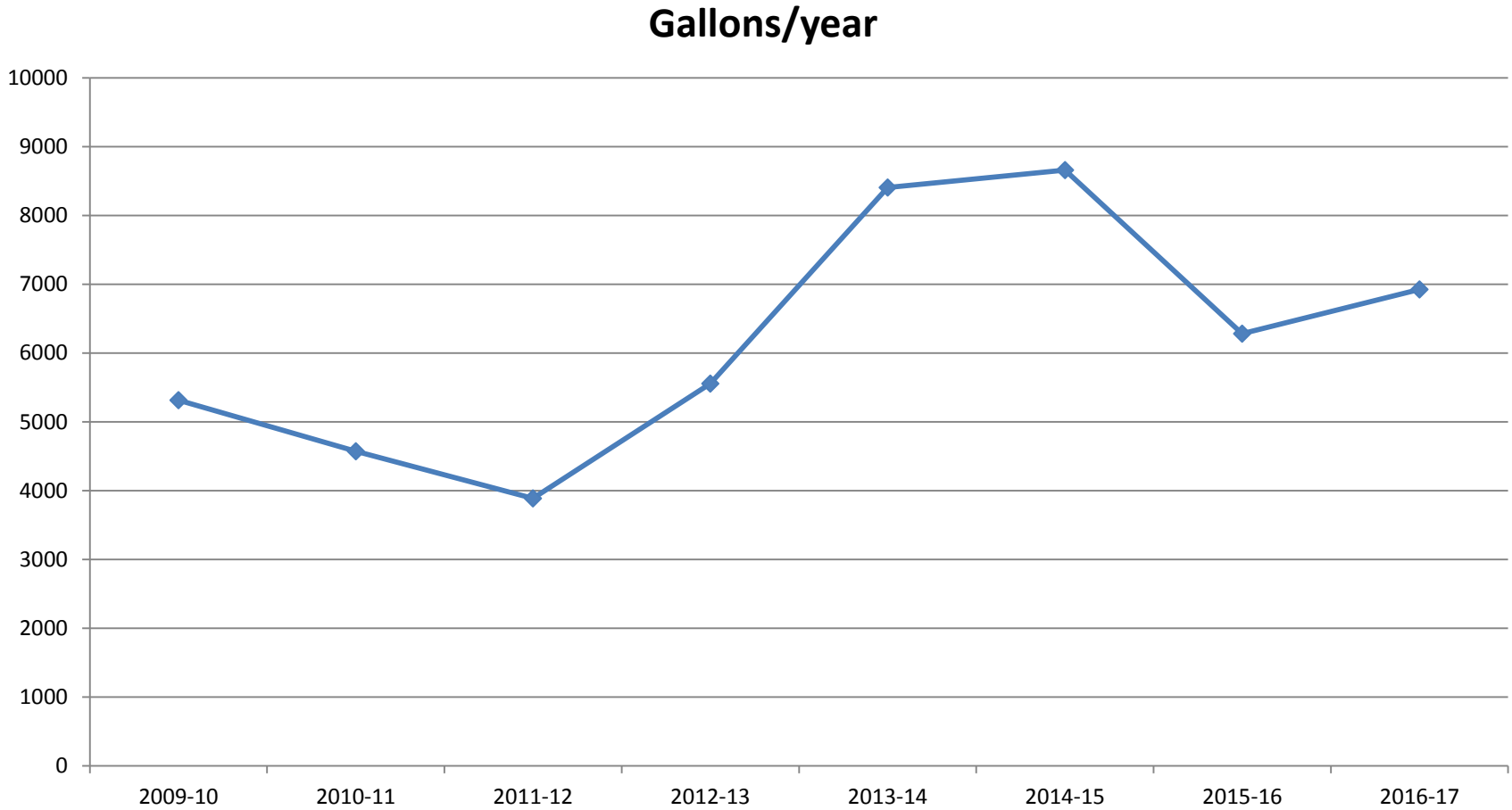


Figure 7

Electrical Usage Trend: Opera House

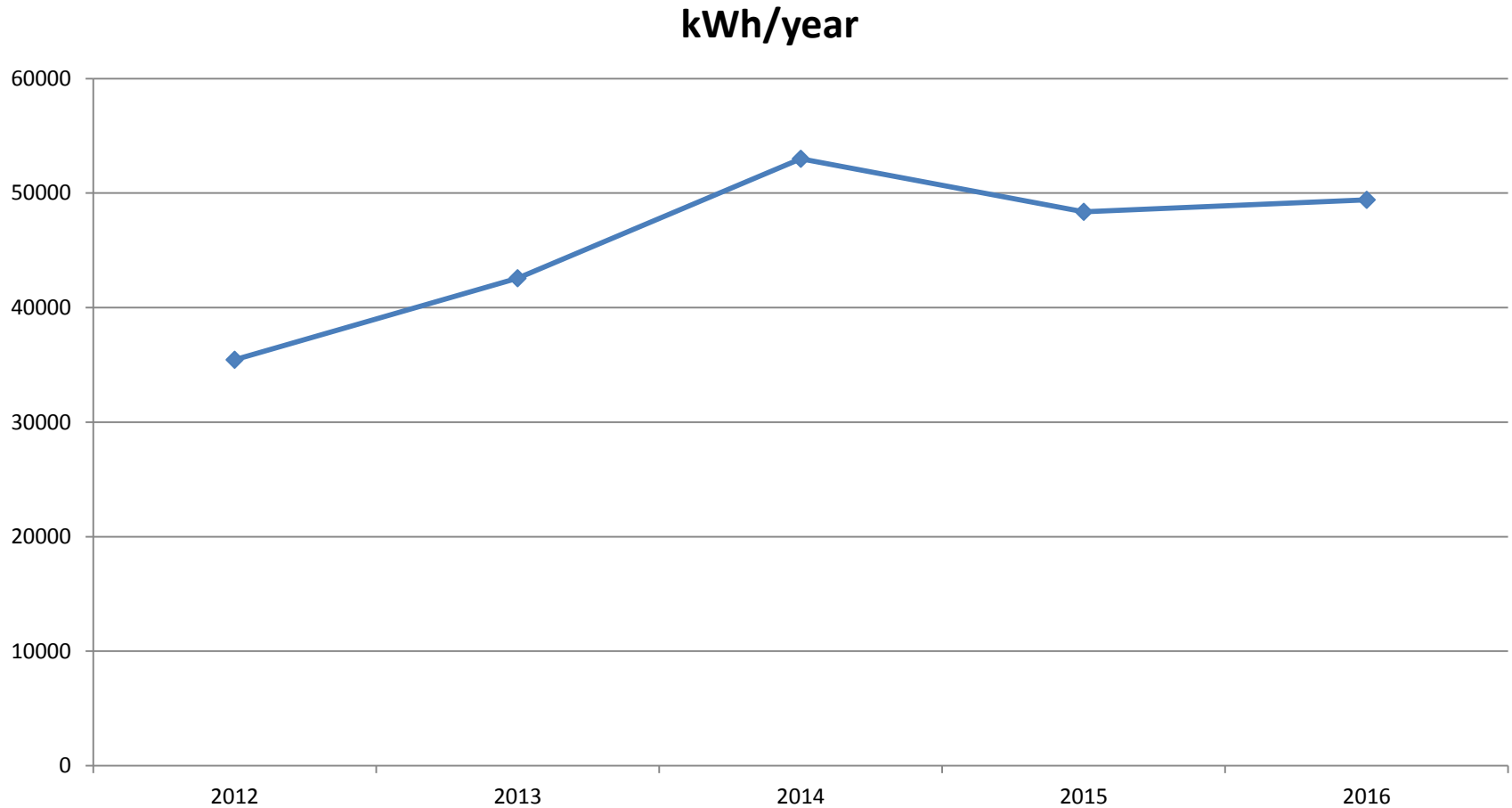


Figure 8

Improvement Opportunities : Opera House

- Various unresolved HVAC issues continue to negatively impact energy efficiency.
- Additional weatherization is needed around the stained glass windows.
- Window treatments and/or air conditioning in the Tower Conference Room would improve energy savings and comfort.
- A more user-friendly thermostat(s) is needed.

Police Department

- A modest decrease in heating consumption was noted in 2016-17, continuing a trend since 2014-15. There was an uptick in electrical consumption.
- A long term goal would be to convert to a renewable energy source.
- The department should complete the project to install motion activated sensors.

Propane Usage Trend: PD

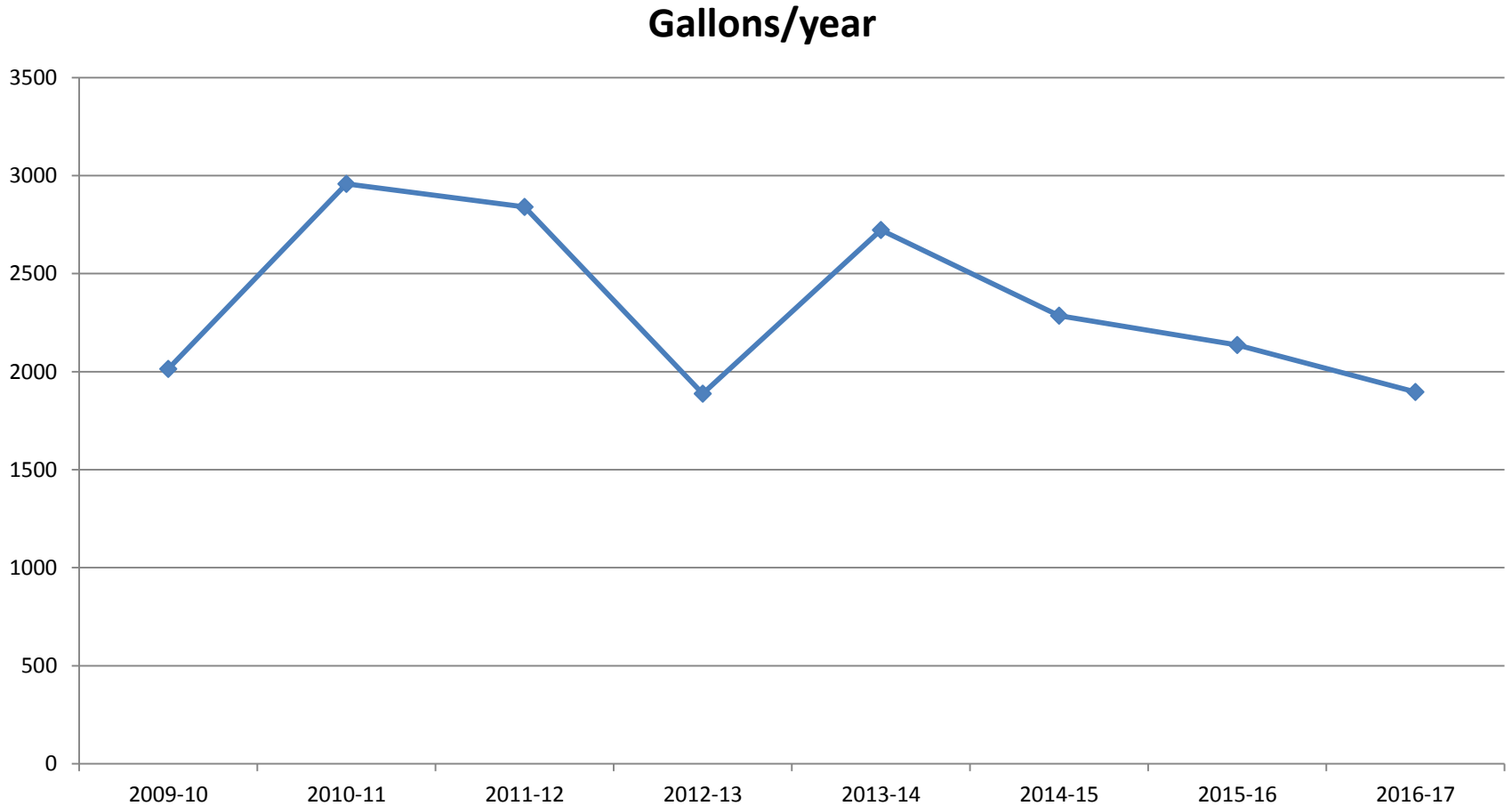


Figure 9

Electrical Usage Trend: PD

kWh/year

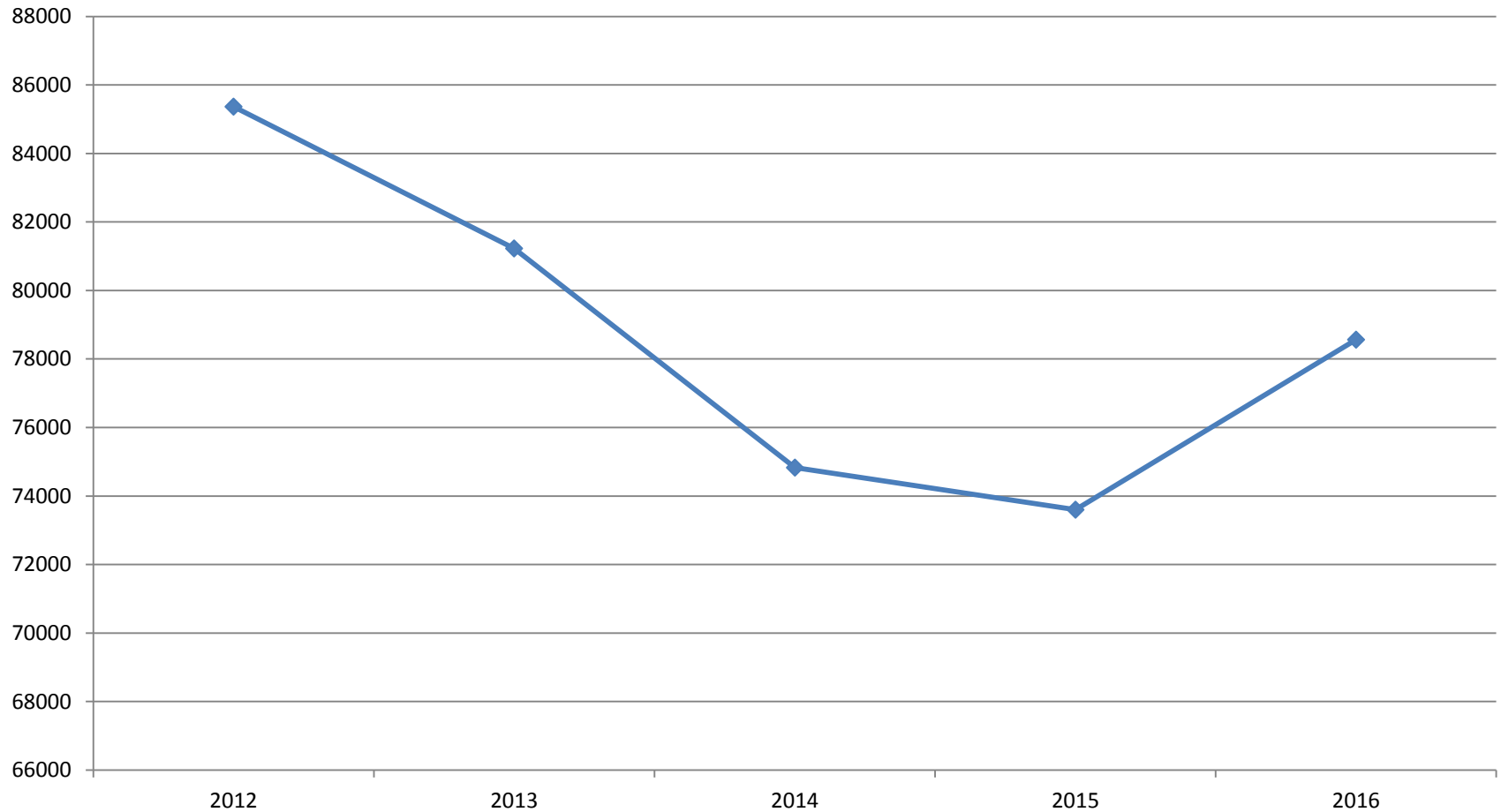


Figure 10

Transfer Station

- The Transfer Station continues to operate in a highly efficient manner.
- There was an increase in electrical consumption in 2016 due to higher operational tempo.
- There were no expenditures on fuel in 2016.
- New thermostat(s) should be installed.

Electrical Usage Trend: Transfer Station

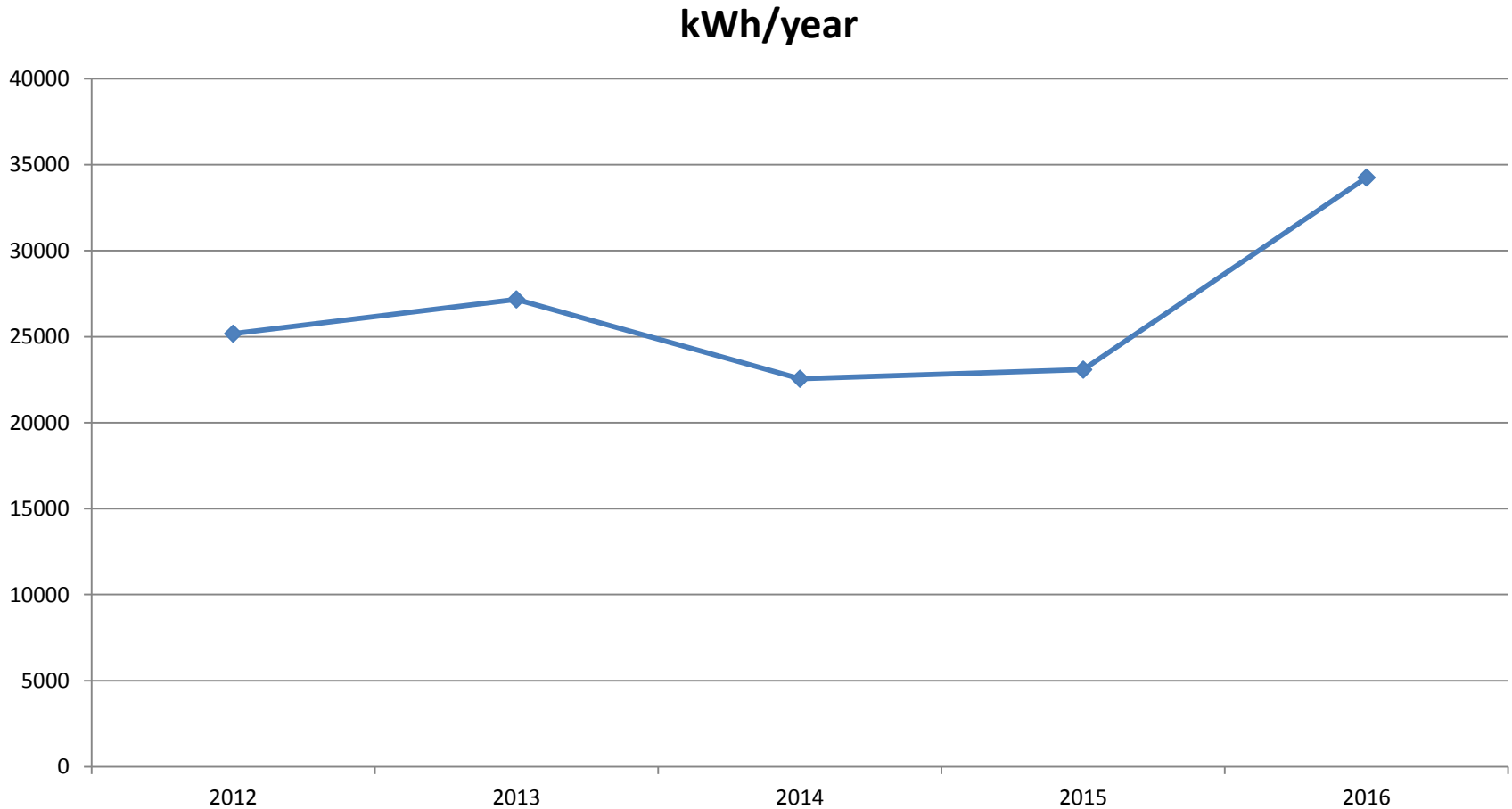


Figure 11

Public Library

- There were slight increases in both electric and fuel consumption in 2016.
- Unresolved problem areas are:
 - Heat distribution within the building; probably too expensive to remedy at this time
 - Air loss around the windows; replacement with wall-mounted heat pumps should be considered

Fuel Usage Trend: Library

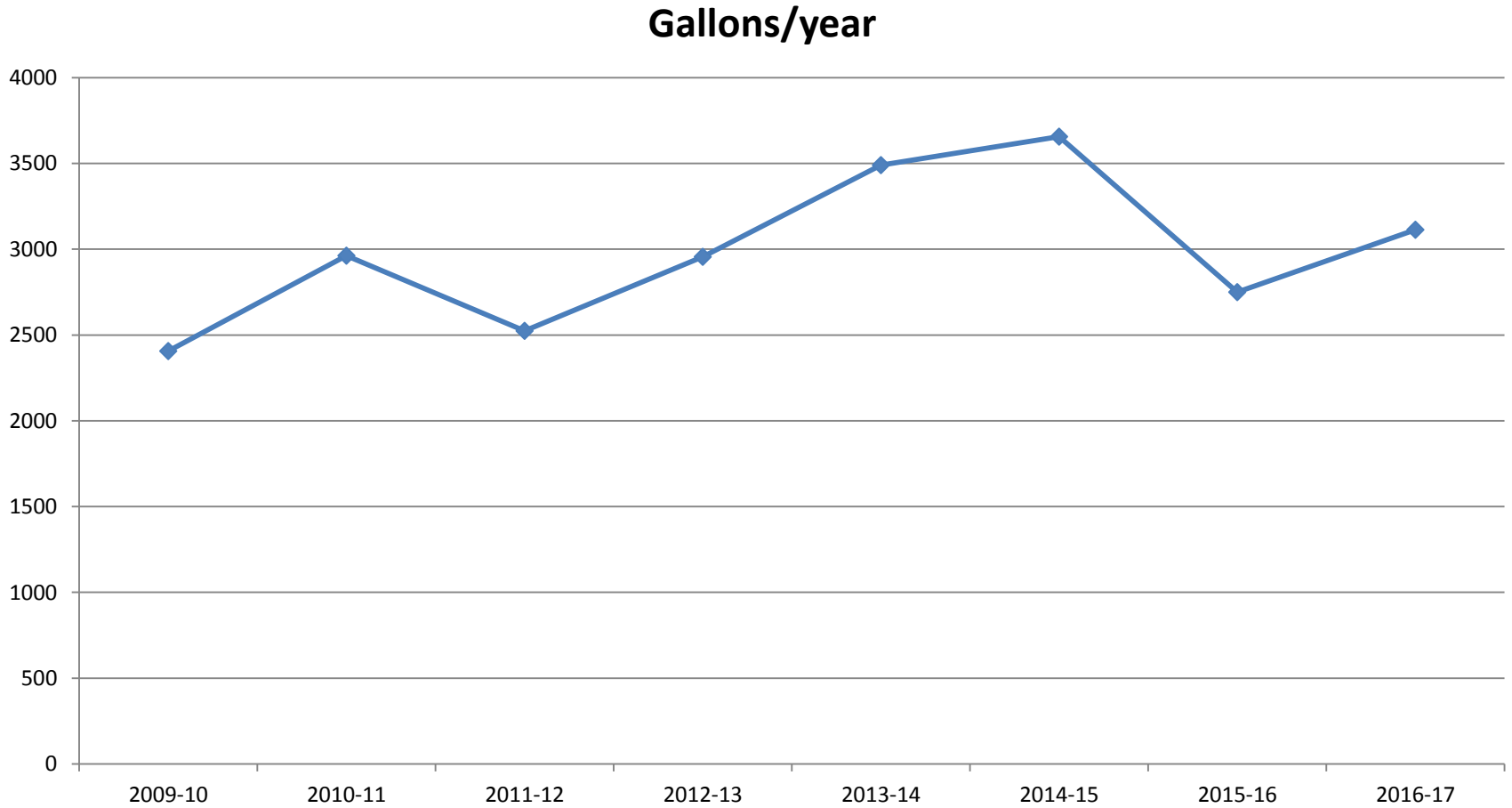


Figure 12

Electrical Usage Trend: Library

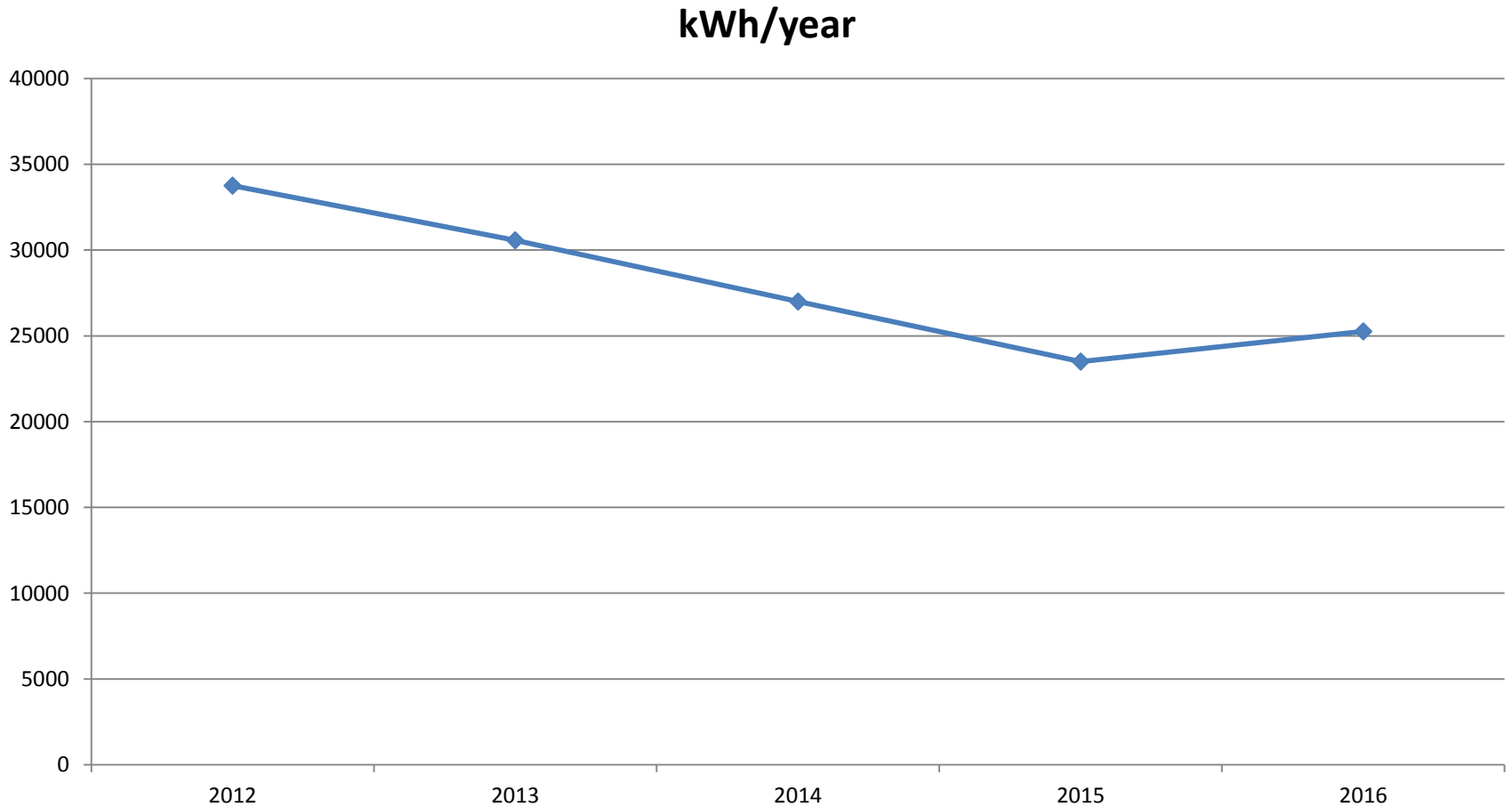


Figure 13

Parks and Recreation

- Reduced fuel and electricity use at the Main building have occurred ever since the office functions were moved to Daisy Bronson.
- No actions are recommended until a decision is made regarding the future of the various facilities.

Fuel Usage Trend: Parks & Rec

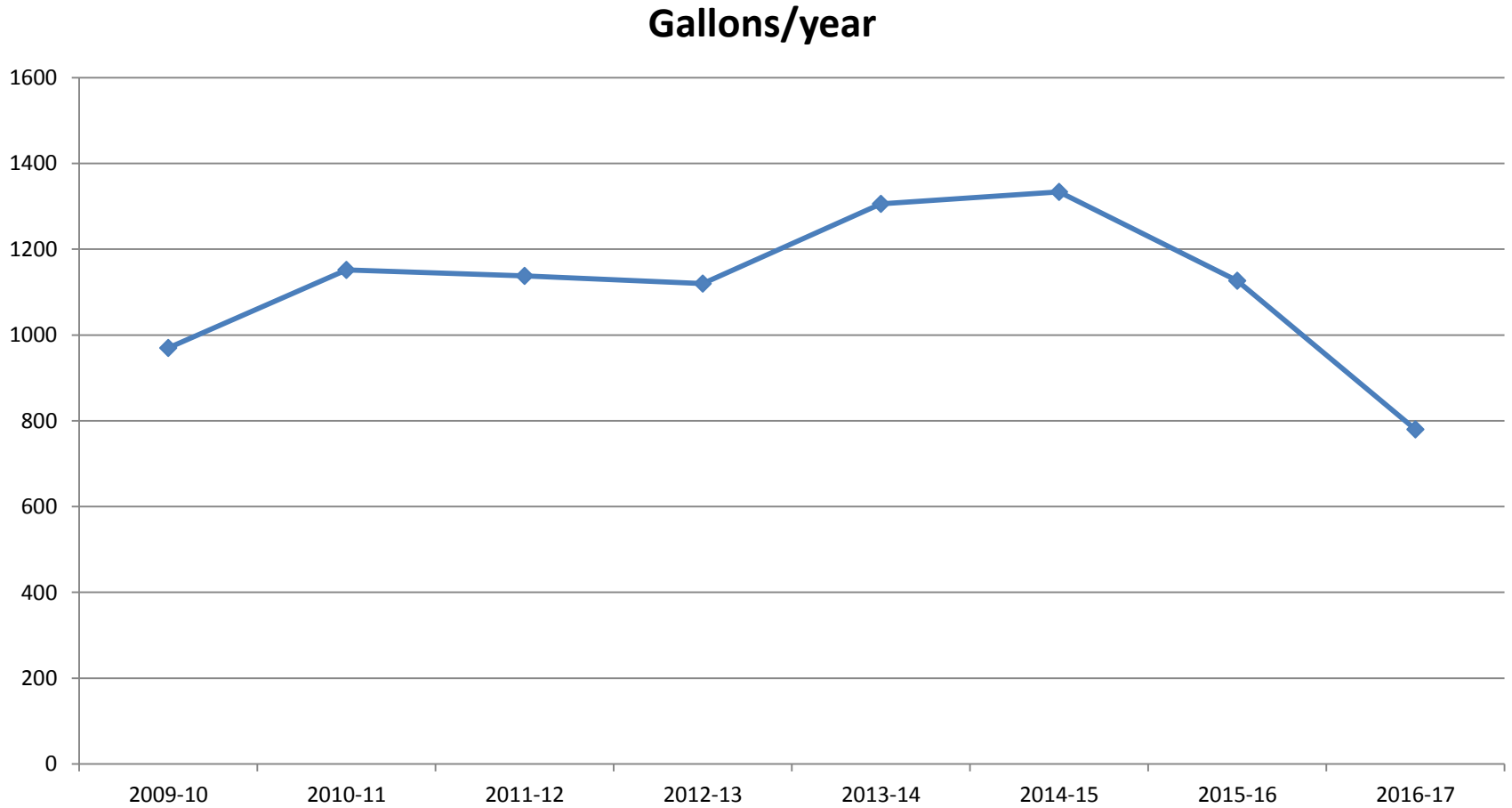


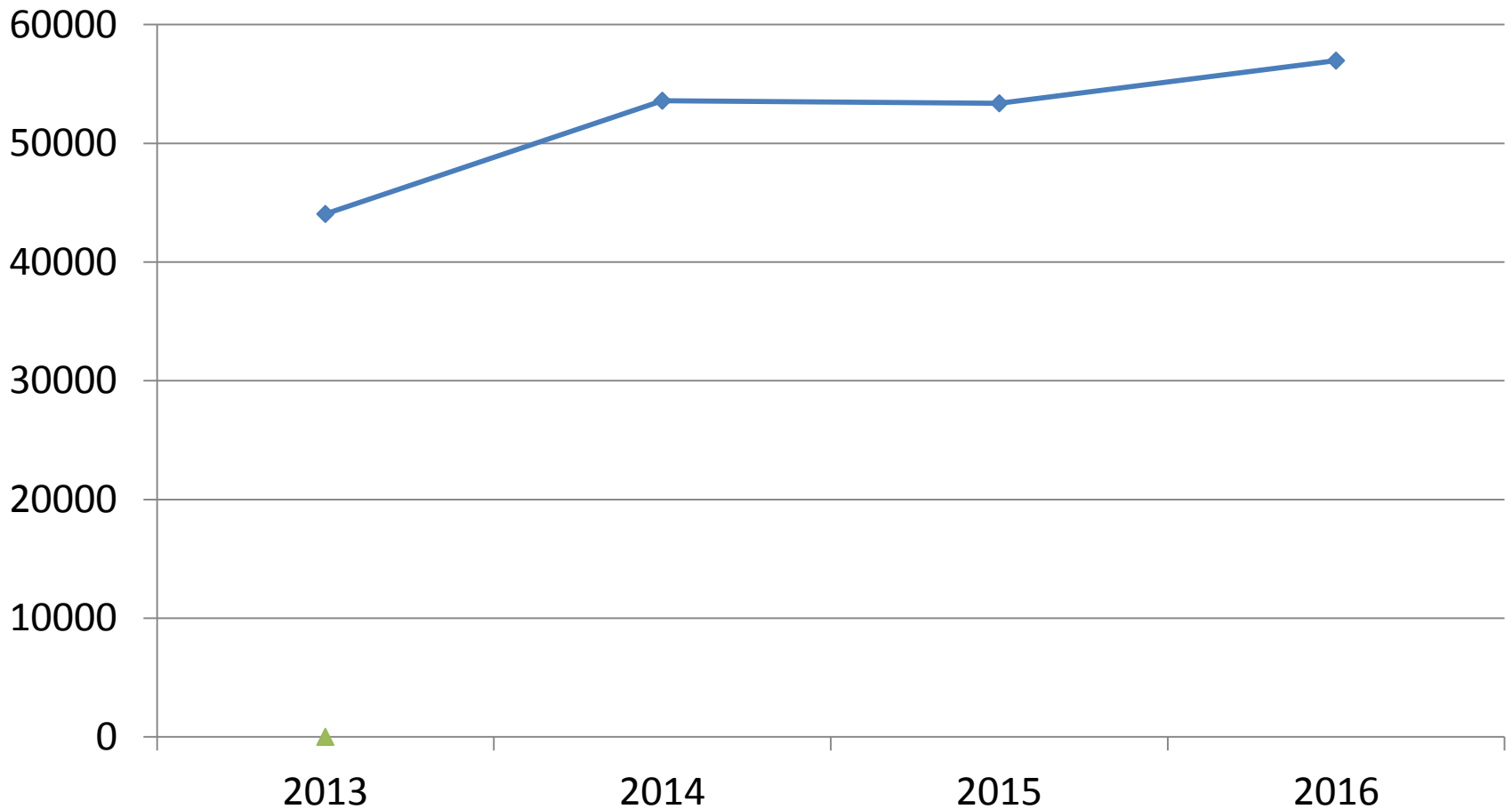
Figure 14

Fire Department

- The heat distribution problem has been addressed with a new engineering design.
- The supplemental/back-up heating system has been converted from fuel oil to propane.
- Some leaky or broken windows should be replaced, and the dryer should be vented to the outside.
- Wall-mounted heat pumps should be installed.
- The front and back doors should be replaced.

Electrical Usage at Fire Station

kWh/year

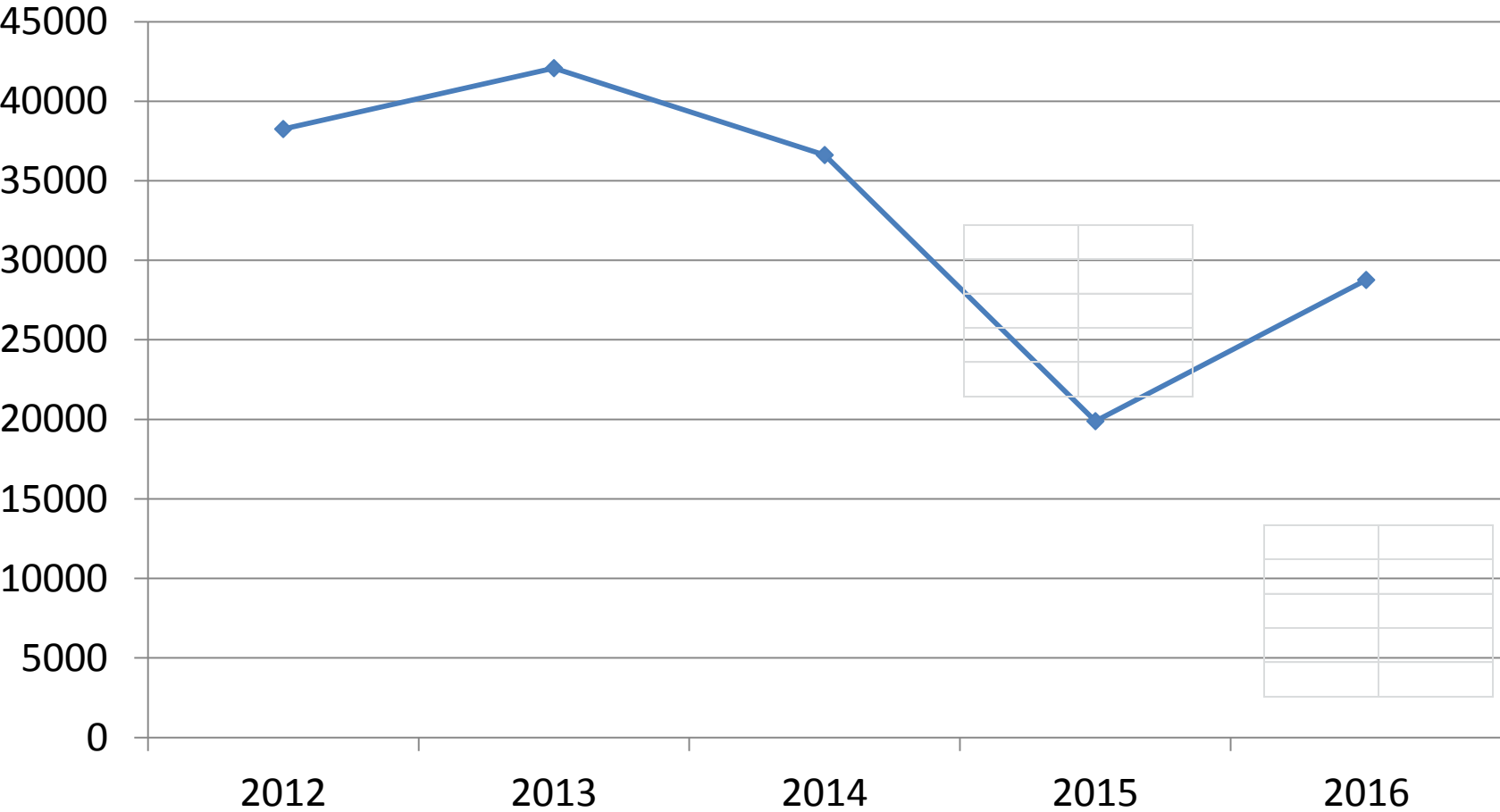


Department of Public Works

- Electrical consumption at the new garage is about 25% lower than the old garage.
- The recent installation of a BTU meter will enable wood pellet usage measurement.
- The ECC is attempting to determine the overall energy efficiency of the new v. old garage.

Electrical Usage at the Highway Garage

kWh/year



HEADING IN THE RIGHT DIRECTION

Energy spending in dollars

