

LEGISLATIVE FISCAL ESTIMATE
ASSEMBLY, No. 258
STATE OF NEW JERSEY
219th LEGISLATURE

DATED: MARCH 25, 2020

SUMMARY

Synopsis: Requires all new State buildings to have solar or geothermal energy systems, where feasible.

Type of Impact: State Expenditure Increase.

Agencies Affected: Department of the Treasury, Division of Property Management and Construction.

Office of Legislative Services Estimate

Fiscal Impact	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
State Expenditure Increase		Indeterminate	

- The Office of Legislative Services (OLS) is not able to provide an estimate for the costs of installing renewable energy systems powered by solar and geothermal energy sources in new State buildings because there are too many unknown variables to do a calculation. Unknown variables include: how many eligible buildings would be built in the future; the size of the buildings being constructed; and the precise costs of the renewable energy systems.

BILL DESCRIPTION

This bill would require that, where feasible, the construction of all new State buildings include the installation of renewable energy systems powered by solar and geothermal energy sources.

FISCAL ANALYSIS

EXECUTIVE BRANCH

The Division of Property Management and Construction in the Department of the Treasury provided comments on this legislation, but did not provide a fiscal note on the bill.

OFFICE OF LEGISLATIVE SERVICES

The OLS is not able to provide an estimate for the costs of installing renewable energy systems powered by solar and geothermal energy sources in new State buildings because there are too many unknown variables to do a calculation. For example, it is not known: how many eligible buildings would be built in the future; the size of the buildings being constructed; and the precise costs of the renewable energy systems.

Geothermal

In order to estimate a cost for a geothermal heating and cooling system the OLS needs to determine the cost for the geothermal heat pump equipment. A cost estimate for a geothermal heating and cooling system would include the geothermal heat pump equipment, and the cost for drilling, excavation, and installation. Furthermore, the size of the State building, its location, available land, the type of soil, local climate, condition and usability of current duct work, and the type of heat pump chosen would impact the overall cost.

In performing the analysis below, the OLS makes the following simplifying assumptions regarding a newly constructed State building: (a) each 2,000 square feet of office space would require a 3-ton system; and (b) the geothermal heat pump costs \$1,500 per ton of capacity. Under these simplifying assumptions, the total cost for the geothermal heating and cooling system equipment in a new 100,000 square feet State building would be \$225,000. As another example, the cost for the geothermal heat pump equipment for a newly constructed 25,000 square feet State building would be \$56,250.

The total cost of a geothermal heating and cooling system would need to factor in the cost for the drilling, excavation, and installation of the geothermal heat pump. Most of this cost is in the installation of the loop system. Geothermal system configurations fall into two categories, which include the open and the closed loop. The type of system that that can be used will depend on available water sources, soil types, and land area. The closed loop is used when there are limited water sources available, or with pond configurations. The open loop uses ground or well water and is 60 percent cheaper than closed loop systems. The open and closed loop systems come in three types of configurations: horizontal, vertical, and pond.

The horizontal loop system has a lower installation cost, but requires a larger plot of land. The horizontal loop costs \$800 per ton, utilizes less land area but needs highly conductive soil. For example, the cost to install a horizontal loop system for a 100,000 square foot building that utilizes 150,000 tons would be approximately \$120,000. Loop systems submerged in a pond or other body of water could also be installed, at comparable costs to the horizontal loop system. The vertical loop system is used when the land area is insufficient. Instead of digging trenches, vertical loops run a few hundred feet straight down into the earth. The vertical loop system costs approximately \$1,500 per ton. As an example, the cost to install a vertical loop system in a 100,000 square foot building that utilizes 150,000 tons would be approximately \$225,000.

The tables below reflect the cost for a 100,000, 50,000, and 25,000 square foot building using a vertical or horizontal loop system, under the following assumptions: (a) each 2,000 square feet of office space would require a 3-ton system; (b) the geothermal heat pump costs \$1,500 per ton of capacity; (c) the horizontal loop costs \$800 per ton; (d) the vertical loop system costs \$1,500 per ton; and (e) there are no additional costs.

Vertical Loop System			
Building Size (square feet)	Geothermal heat pump equipment	Vertical loop system	Total Cost
100,000	\$225,000	\$225,000	\$450,000
50,000	\$112,500	\$112,500	\$225,000
25,000	\$56,250	\$56,250	\$112,500

Horizontal Loop System			
Building Size (square feet)	Geothermal heat pump equipment	Horizontal loop system	Total Cost
100,000	\$225,000	\$120,000	\$345,000
50,000	\$112,500	\$60,000	\$172,500
25,000	\$56,250	\$30,000	\$86,250

The upfront cost of a geothermal heating and cooling system is nearly double that of conventional HVAC systems. However, the increased efficiency of a geothermal heating and cooling system can significantly lower utility bills, with up to 60 percent in monthly savings. This ranges based on location and the efficiency of the system, but geothermal systems consistently outperform other HVAC systems for lower energy bills that will eventually pay for the cost of installation within five to 10 years. Furthermore, a geothermal heating system has significantly lower maintenance costs and has a shelf life of 50 years. However, ground loop repairs, though rare, can be costly, especially for vertical loop systems as any repairs require more expensive excavation.

Solar

The cost estimate for a solar panel system would include the solar panels, labor costs, solar mounds, solar inverters, and other costs such as local permit fees, inspection fees, and taxes on solar panels. The average price per watt for solar panels in New Jersey is \$2.88. The cost per watt including solar panels, parts, labor costs, permits, and overhead is between \$6 a watt and \$8 a watt.

There are wide variations in the quality and efficiency of solar panels. Therefore, it is difficult to make generalizations about which solar panels are right for a particular building or how many a building will need due to size and kilowatts used. The more efficient the panels are, the more wattage they can produce, and the fewer you will need to get the same energy output. Peak sunlight hours for the particular location will have a direct impact on the energy the solar system will produce. The size and shape of the building’s roof also plays a role in the cost. With a large usable roof area, it would be possible to sacrifice some efficiency and buy larger panels, at a lower cost per panel, to achieve a target energy output. But if the usable roof area is limited, or partially shaded, being able to use fewer smaller high efficiency panels may be a better way to make the most possible power over the long term.

The OLS notes that the money saved on electricity bills through the installation of a solar panel system in a new State building could potentially earn back the initial solar panel system and installation costs in seven to 20 years.

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This legislative fiscal estimate has been produced by the Office of Legislative Services due to the failure of the Executive Branch to respond to our request for a fiscal note.

This fiscal estimate has been prepared pursuant to P.L.1980, c.67 (C.52:13B-6 et seq.).