A Simulation Model with Continuous Variables: Generating Electric Power

NOTE: This example is taken from the following URL:

http://eckstein.rutgers.edu/om/word-problems/powersupply.html

You are operating an electric power utility. You have 10 generators. Turning a generator on for one hour costs $7000. Once a generator is on, it can produce up to 200 megawatts (MW) of electricity at a variable cost of $0.05 per kilowatt-hour (kWh).

You have one industrial customer and thousands of municipal customers. In the upcoming hour, you estimate demand from the industrial customer to be uniformly distributed between 300 and 500 MW. You also estimate that the combined demand from the municipal customers is normally distributed with a mean of 1000 MW and a standard deviation of 200 MW. You charge $0.10 per kWh for all the power that you sell.

If demand exceeds the capacity of the generators currently operating, you must "import" power from the national electric grid to make up the difference, at a cost of $0.12 per kWh.

You must now decide how many generators to turn on for the coming hour. Once you have made your decision, you cannot change it until the following hour. How many generators should you turn on to maximize your average profits?

Simulating 1000 trials, what seems to be the best choice among 3, 4, 5, 6, 7, 8, 9, or 10 generators?