49. (a) With the potential difference equal to 600 V, a capacitance of 2.5×10^{-10} F can only store energy equal to $U = \frac{1}{2}CV^2 = 4.5 \times 10^{-5}$ J.

(b) No, our result from part (a) is only about 20% of that needed to produce a spark.

(c) Considering the charge as a constant, then voltage should be inversely proportional to the capacitance. Therefore, if the capacitance drops by a factor of ten, then we expect the voltage to increase by that same factor: $V_f = 6000$ V.

(d) Now the energy stored is $U' = \frac{1}{2}C_f V_f^2 = 4.5 \times 10^{-4}$ J, a factor of ten greater than the value we obtained in part (a).

(e) Yes, this new value of energy is nearly double that needed for a spark.