Energy Conversion Worksheet

A capacitor's stored energy can be determined by it's capacitance C in Farads and its voltage V by the equation:

$$E = 1/2\ C\ V^2$$

We can use this to quantify the end-to-end power of our kinetic energy converters.

1. Measure the open circuit voltage and short circuit current of your converter.
2. Use your converter, plus any rectification, to charge a capacitor form one voltage to another. Measure the time it takes to affect this change.
3. Calculate the energy stored in the capacitor before (if any, e.g.V!=0) and after charging.
4. The difference in energy, divided by time, is the real-world power of our converter. How does this compare with the outside power limit given by SCC*OCV?

Energy Converter (eg "small stepper"):	
Measured Open Circuit Voltage (V) - use the oscilloscope	
Measured Short Circuit Current (mA) - use a meter	
Test Capacitor Capacitance (Farads)	
Target Capacitor Voltage (Volts) - starting, ending	
Target Capacitor Change in Energy (Joules) $E = 1/2\ C * V^2$	
Time to Charge (seconds)	
Observed Power (Watts) - Energy / Time	