Energy Efficient Vehicle Project Proposal

The goal of this project is to design a small vehicle that utilizes an energy recovery system that allows it to be more efficient than current small vehicles. This vehicle could be driven around campus for the use of campus safety, mail services, or escorting prospective students. Vehicles used in these applications often stop and start which is an inefficient use of energy. The braking process dissipates energy that is able to be recovered if a regenerative braking system was implemented. This braking system would decrease Calvin’s costs on fuel and, as a result, decrease its carbon footprint. The vehicle will be able to transport at least four people in a variety of weather conditions while keeping safety a priority.

There are many key constraints and concerns with this project. One of them is the uncertainty in the ability to recover enough energy to justify designing and building a regenerative braking system. Another concern is obtaining enough funding to successfully build this scale of project. A third concern is the method of power to drive the vehicle. Exploring these options will include feasibility studies in the first few weeks of class to investigate the effectiveness of such a system. Currently there are three options:

1) A regenerative braking hydraulic system using a motor to ensure the system is pressurized.

2) A gas motor electric directly drives the vehicle with a regenerative hydraulic system to assist in acceleration.

3) An electric motor directly drives the vehicle with a regenerative hydraulic system to assist in acceleration.
Primary Tasks Involved:

1) Efficiency and feasibility calculations
2) Analysis of carbon footprint
3) Calculate stats for existing vehicles
4) Choose motor- electric or gas, determine if it will directly power the vehicle
5) Design pump, drive, and regenerative braking system
6) Chassis/frame of vehicle
7) Vehicle aesthetics: gauges, etc.
8) Interior ergonomics: seating, etc.