



# Energy Downer

## STEM Sims

### Lesson 2: Gravity Battles

Elevators “battle” with gravity as they lift and lower people safely between building floors. Energy is obviously required to lift people from a lower height up to higher positions. However, energy is also needed to control the descent of people in an elevator at a safe and reasonable speed. Do you think it’s possible to “capture” energy used in an elevator’s operation and turn it into useful work?

### Doing the Science

1. Start the Energy Downer Simulation by clicking on the “Sim” tab.
2. Click on the “RegenDrive” icon under Elevator Type.
3. Note and record all of the relevant information about the elevator in Table 1.
4. Click on the “Maximum Load” button located at the bottom of the screen. Note and record the new Elevator Load in Table 2.
5. Click the “Up” arrow on the elevator. Note and record the “Motor/Generator Energy” in Table 2.
6. Click the “Down” arrow on the elevator. Note and record the “Elevator Load” and “Motor/Generator Energy” in Table 2. Repeat this process until all people are moved up and the Time of Day changes to evening.
7. Repeat the investigation to collect data for moving the people in the evening from the upper floors back down to the first floor. Note and record this information in Table 2.

**Table 1. Empty RegenDrive Elevator**

| Empty Elevator Load (N) | Counter-weight Load (N) | Starting Motor/Generator Energy (J) |
|-------------------------|-------------------------|-------------------------------------|
|                         |                         |                                     |

**Table 2. Loaded RegenDrive Elevator**

| Time of Day | Elevator Moving | Elevator Load (N) | Motor/Generator Energy (J) |
|-------------|-----------------|-------------------|----------------------------|
| Morning     | Up              |                   |                            |
| Morning     | Down            |                   |                            |
| Evening     | Up              |                   |                            |
| Evening     | Down            |                   |                            |

### Do You Understand?

1. Were there any times or conditions when electrical energy was *not* needed to move the elevator? Please explain your response.
2. Describe and discuss the physics associated with how a RegenDrive elevator “recaptures” wasted energy.