## **A method of transferring power from the Hypertube to a pod**

Most modern day train based methods of transit have some sort of third rail or raised power line as a way to transfer power from the ground to the moving vehicle. What if we didn’t have to worry about batteries on a our Hyperloop pod because we had one **really** long chain of extension cords that would unroll as the pod traveled to its destination and then once there, some poor sap would have to re-roll the cord back up for the next trip?

What would you design to transfer power from the ground to our pod? Some considerations might include:

● You’re crazy this doesn’t make any sense batteries are clearly the right answer.. Here’s why!

● What kind of mechanism would be needed to transfer the power? A third rail? A raised powerline? A dedicated Pikachu per pod? Why?

● What is the efficiency of this system? Is there significant power loss?

● What makes this system safe? How do you prevent someone from accidentally touching something deadly?

**Considerations**

* Efficiency
* Safety
* Cost

**Options**

* Railway electrification system
  + “Third rail”
  + Raised powerline
* Wireless power transfer
* Batteries

### “Third rail”

* High voltage close to ground -- safety hazard
* High current required to transfer enough power, leading to resistive losses
* Risk of electrocution on contact, so insulation required
* Weather effects are a non-issue since the pod is in a tube
* Friction losses?
* Must use dc power because of skin effect -- resistance to ac is higher in conductor
* One method for reducing current losses: use aluminum/steel composite conductor. Aluminum is a better conductor and stainless steel gives better wear.
* Major cost: building and maintaining substations

### Overhead powerline

* Inside a tube, wind and other weather effects do not have a direct effect on the line
* High cost for building and maintaining, especially for long distances

### Wireless power transfer

* High frequency alternating current in the transmitter generates a magnetic field, which induces alternating current in the receiving coil (inductive coupling)
* Other options:
  + Microwave power transmission -- expensive, interference with communication
  + Lasers -- no risk of interference with radio communication, although hazardous radiation, low efficiency
* AC can be converted to DC in the pod.
* Reduced costs due to lack of direct connectors
* Lack of contact means less friction
* How well would it work on a pod moving at a high speed?