Consumer Batteries and Battery Technology You've Never Heard of

By Kelton Stefan
Battery Q&A

- Why does my digital camera eat batteries like candy?
- Why have I had a bad experience with rechargeable batteries in the past?
- Do rapid chargers shorten the life of rechargeable batteries?
- What batteries should I be purchasing?
Battery Terms

- **Internal Resistance:** The electrical resistance innate to a battery due to the electrolyte and electrode material properties.

- **Energy Density:** Energy measured in watt-hours divided by weight in kg. (Wh/kg)

- **Power Density:** Power measured in watts divided by weight in kg. (W/kg)

- **Self-Discharge:** The tendency for batteries to slowly lose their charge due to imperfect insulation etc. Measured in % of charge per day.
Initial Cost

$2 - $3 each + $0 - $40

~$0.55 each
Cost Over Life

~$0.55 per Use

~$0.04 per Use

"Average Retail Price of Electricity to Ultimate Customers by End-Use Sector."
Energy Information Administration. 22 Oct. 2007
Total Cost

\[ \text{Energizer AA20 X 100} = \text{HYBRID} + \text{Electricity} \]

\[ \approx \$1,100 \]

\[ \approx \$80 \]
Questions ?
ZEBRA Battery

- Environmentally friendly
- Potentially low cost
- High capacity
- Long life

but...

- Operates @ 250 °C
Radioisotope Thermoelectric Generator

- High capacity
- Long life

Need I mention the problems?

Plutonium RTG pellet glowing red hot.
Ultra-Capacitor

- High power density
- Long life
- Low energy density but promising future
- High cost, but economical
Questions ?