

PEF Water Purifier

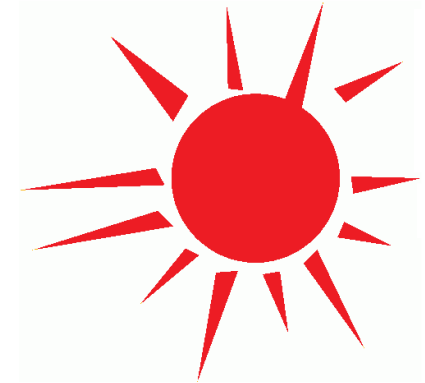


Sketch Model Review

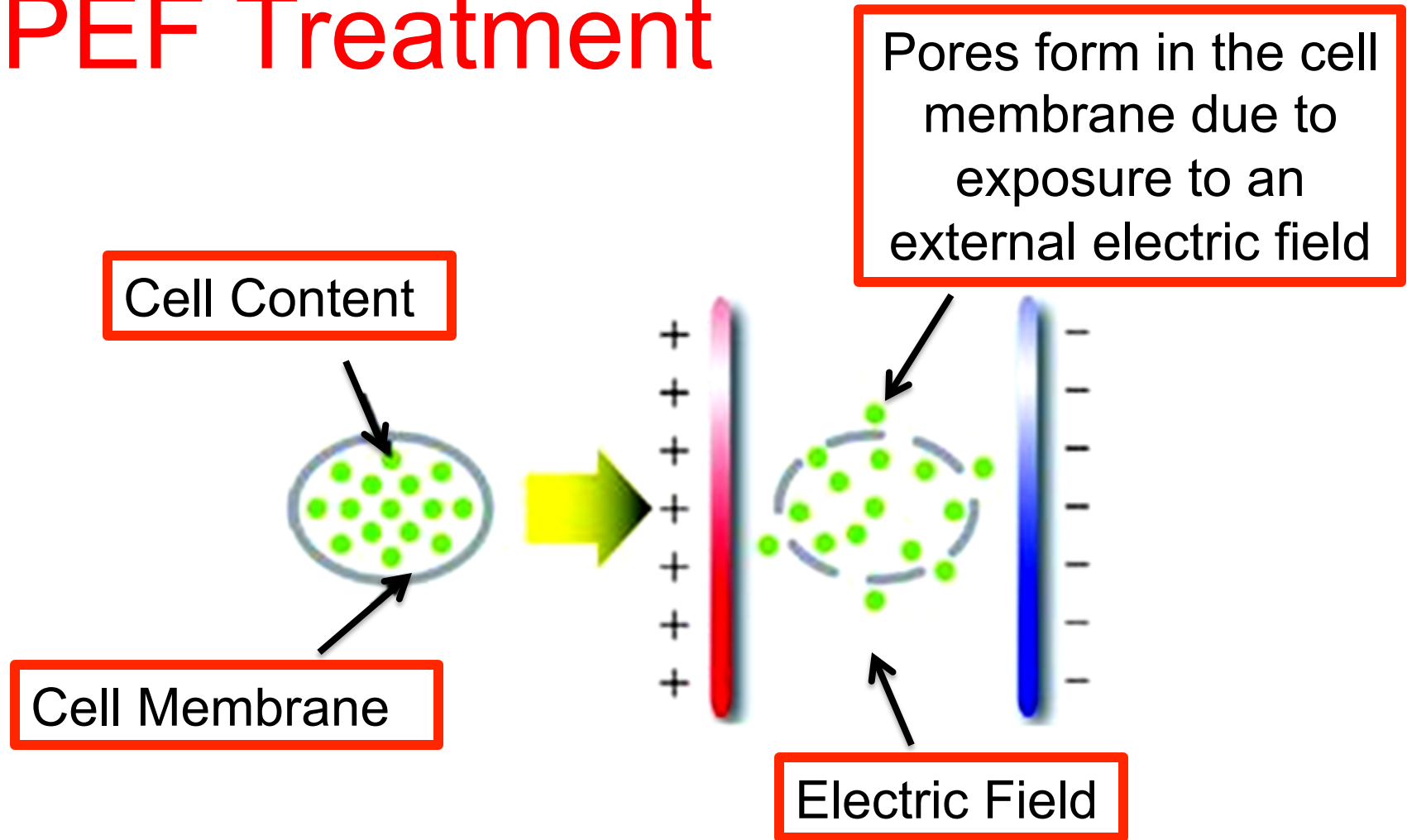
Red-B

Product Concept

- **Purpose:**
 - Water Purification with Pulsed Electric Fields (PEF)
- **Key Features:**
 - Scaled-down PEF technology
 - Fast & Effective
 - Human-Powered
- **Users:**
 - Hikers
 - Campers



PEF Treatment



Critical Question

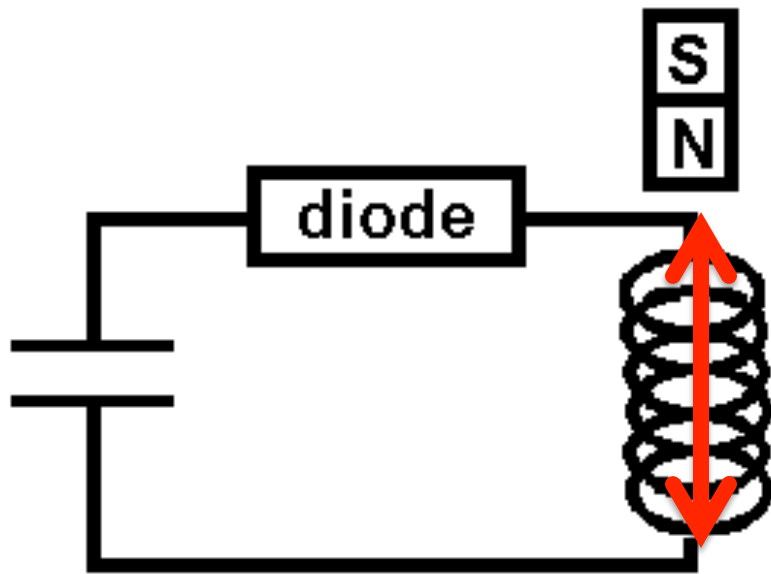
Can we scale down the technology?

- Can we reach the required voltage?
- How much energy does it take?
- Can this be human powered?



Scaling Down & Human Powered

Simplified Model:



Physical Parameters:

$$C = 350 \text{ F}$$

$$V_c = 2.7 \text{ V}$$

$$R = 0.1 \Omega$$

$$B = B_0 \sin(\omega t)$$

$$\Omega = 1 \text{ Hz}$$

$$N = 120 \text{ Turns}$$

$$L = 2 \text{ cm}$$

$$A = \pi(1 \text{ cm})^2$$

Scaling Down & Human Powered

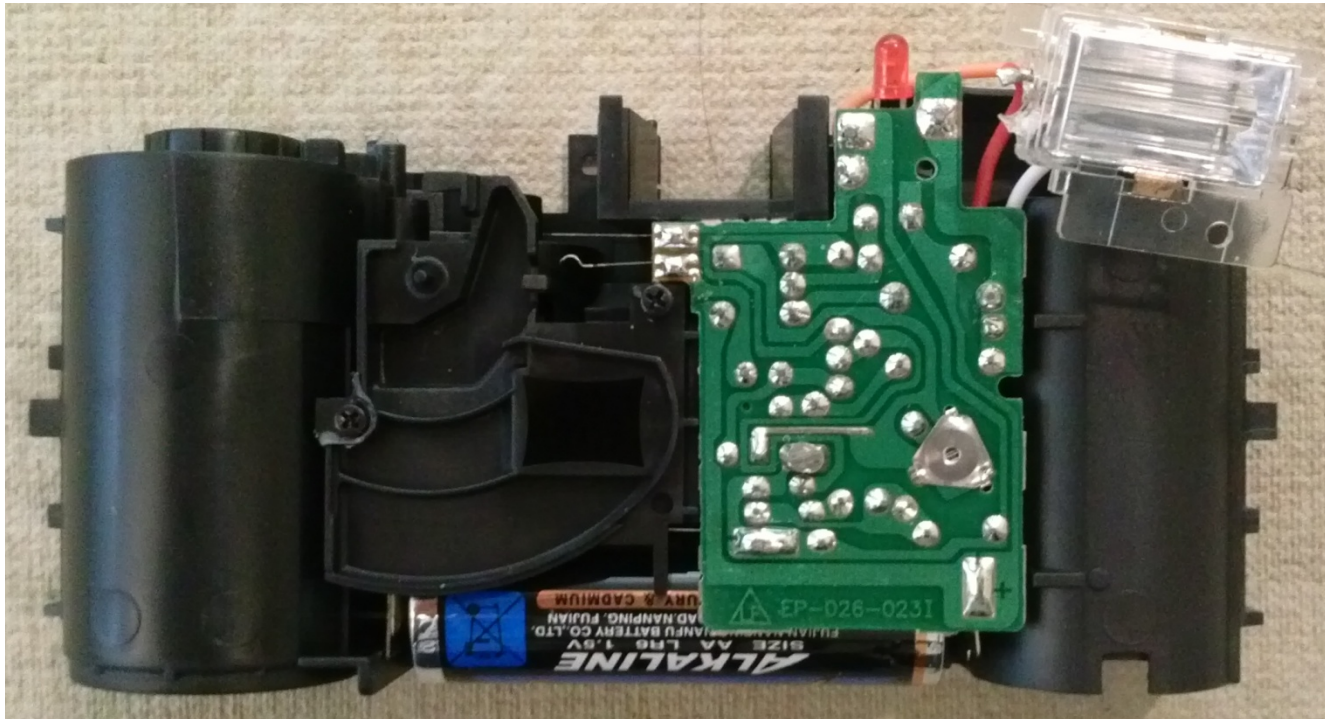
$$0 = \frac{Q}{C} + IR + \frac{LdI}{dt}$$
$$0 = \frac{Q}{C} + \frac{RdQ}{dt} + \frac{Ll}{\mu_0 N} * \frac{dB}{dt}$$
$$Q(t) = A\cos(\omega t) + B\sin(\omega t)$$
$$\Delta Q = \int_0^t \left| \frac{dQ}{dt} \right| dt'$$

Reaching Q_{\max} :

$$Q_{\max} = V_c C$$
$$t = 0.542 \text{ hr}$$

with $\omega = 1 \text{ Hz}$

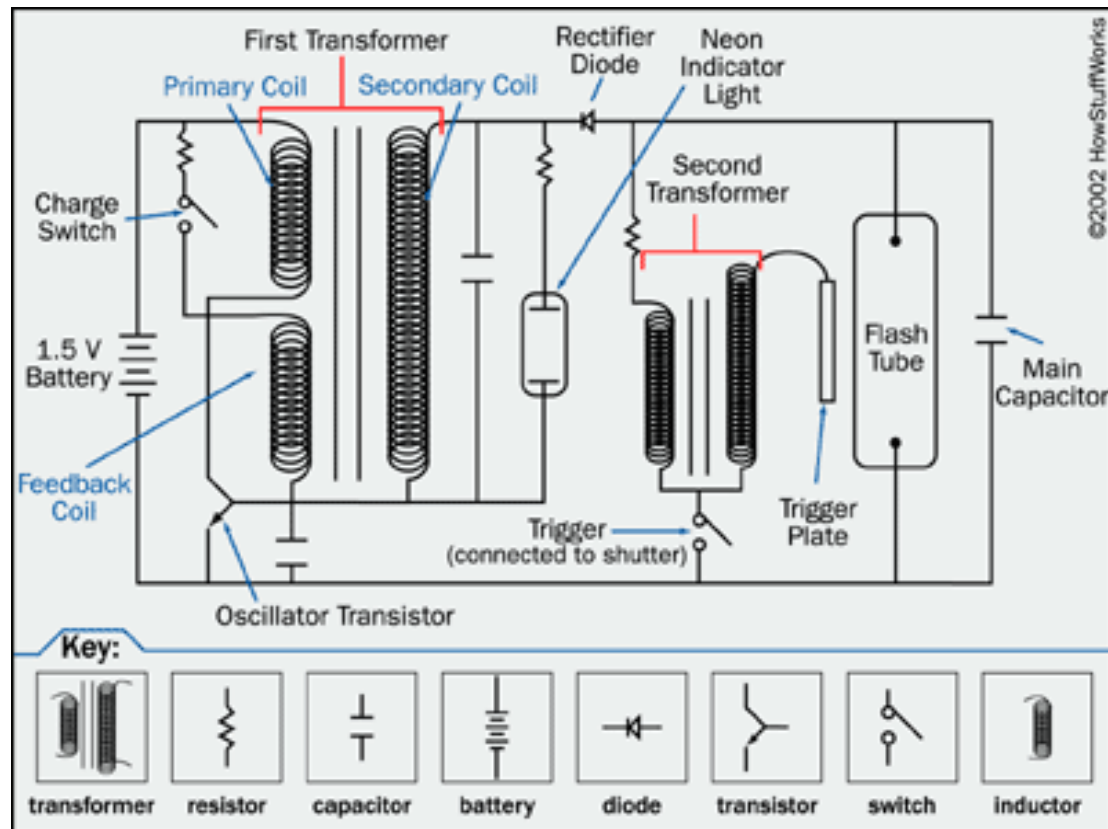
Demonstration



Sketch Model Review

Red-B

Camera Circuitry



Sketch Model Review

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Result



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Customer Needs



- Clean Water
- Portable Device
 - Lightweight
 - Fast & Effective
 - Rechargeable

Competition



Sketch Model Review

Red-B

Market



~9M



~\$850M

Market

Key Competitors:



\$100-150



\$100- 400

Total Addressable Market:

$$\text{\$100} * 9\text{M} = \text{\$90M}$$

Questions?

MagneGlasses



PEF Water Purification