# Cold Fusion And The Future

By Jed Rothwell
LENR-CANR.org

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# Table 1. Comparison chart for different energy sources

| | Pollution free | Very safe | In-exhaustible | Unlimited | Low fuel cost | Low reactor cost | Compact | Locate anywhere | Works 24/7 (4) | Ready now |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fossil fuel** | | | | | | ❄ | ❄ | ❄ | ❄ | ❄ |
| **Hydroelectric** | ❄ | ❄ | ❄ | | ❄ | ❄ | ❄ | | | ❄ |
| **Wind** | ❄ | ❄ | ❄ | | ❄ | | | | | ❄ |
| **Solar** | ❄ | ❄ | ❄ | | ❄ | | | | | ❄ |
| **Uranium fission** | (1) | | ❄ | ❄ | ❄ | | ❄ | (3) | ❄ | ❄ |
| **Plasma fusion** | (2) | | ❄ | ❄ | ❄ | | ❄ | (3) | ❄ | |
| **Cold fusion** | ❄ | ❄ | ❄ | ❄ | ❄ | ❄ | ❄ | ❄ | ❄ | |

(1) Fission reactors produce no pollution during operation, but uranium mining does, and the disposal of radioactive waste (radwaste) and spent fuel are serious and expensive problems. High level radwaste and spent fuel might be used in a terrorist attack.

(2) According to a Los Alamos study, plasma fusion reactors would produce about the same amount of nuclear waste that conventional, present-day fission reactors do, they would not be commercially competitive with advanced fission reactors, and they would not have significant environmental, safety and health (ES&H) advantages over advanced fission.

(3) Fission reactors are located far from cities because there is some risk they will fail catastrophically, and plasma fusion reactors would probably produce large amounts of dangerous radwaste, so it would not be prudent to locate them near population centers.

(4) “Works 24/7” means the energy source is available on demand, and it is available at night, unlike solar energy. Solar or wind energy might converted to hydrogen and stored for times when they are not available, but this would increase cost. Hydroelectric power has to be reduced during droughts. Any energy system must be turned off periodically for maintenance.

Figure 1. NASA Cassini mission Radioisotope Thermoelectric Generator (RTG), powered by 8 kg of Pu-238. Output is 4,480 W thermal, 285 W electric

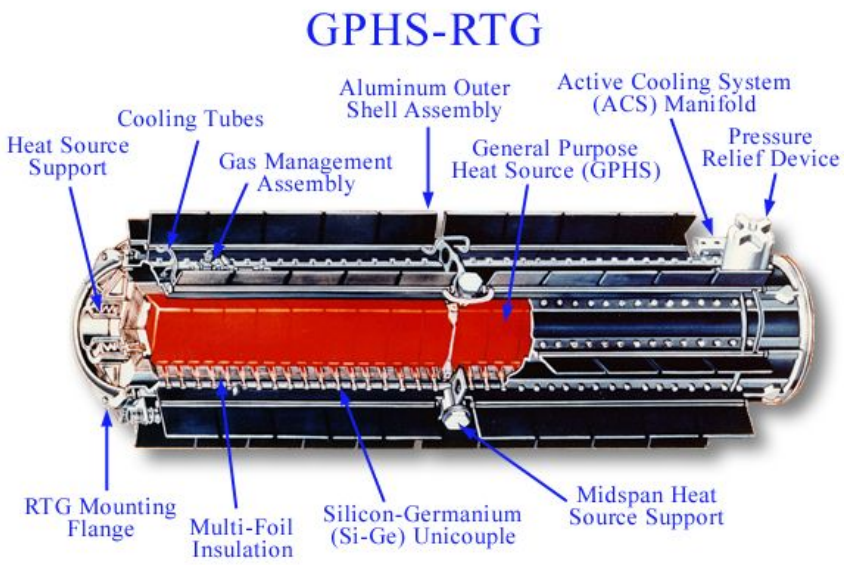



Figure 2. A Pu-238 pacemaker. Hundreds of these were implanted in patients with no ill effects. Cold fusion will also scale down to devices this size or smaller, and it will scale up to any size you like.

Figure 2. Mizuno's 100 g cathode produced 84 MJ of heat after death, enough to drive a car 80 km.

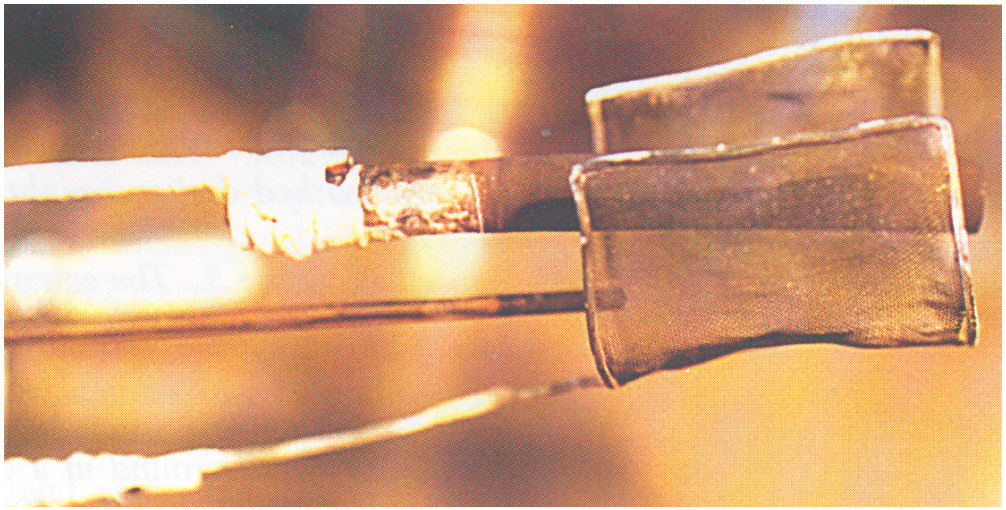


Figure 3. Cold fusion cell production will not be especially demanding or expensive; thousands of companies will capable of it

Cold fusion will need roughly as much capital, equipment and expertise as it takes to manufacture batteries. United Power Enterprises Co., Ltd., Hong Kong, sells this alkaline battery production line on the Internet. In the not too distant future I hope this company and hundreds of others will be selling cold fusion cell production lines.

# Irrigation Megaproject

Table 2. Major deserts compared to U.S. agricultural land

| | Million square kilometers | Million square miles |
|---|---|---|
| Sahara | 9.0 | 3.5 |
| Gobi | 3.4 | 1.3 |
| U.S. agricultural land | 3.9 | 1.5 |

Goals:

- Convert one-third of the world's two largest deserts into farm and forest, to undo the damage caused by previous generations and create as much agricultural land as there is in the U.S.
- Eradicate food and water shortages in the poorest parts of the world.
- Reverse global warming.
- Pollution free extraction of magnesium, sulfur and iodine.
- Make a large profit

# Table 3. Elements in 1000 cubic kilometers of seawater – about half of the irrigation project

| Element or compound | Present world consumption (metric tons) | Amount dissolved in seawater (metric tons) | Multiple of consumption |
|---|---|---|---|
| Salt (NaCl) | 210,000,000 | 30,215,827,338 | 144 |
| Magnesium (Mg) | 3,360,000 | 1,280,000,000 | 381 |
| Sulfur (S) | 59,000,000 | 898,000,000 | 15 |
| Potassium (K) * | 23,000,000 | 399,000,000 | 17 |
| Bromine (Br) | 570,000 | 67,000,000 | 118 |
| Iodine (I) | 21,400 | 58,000 | 3 |
| Molybdenum (Mo) | 127,000 | 10,000 | 0 |
| Vanadium (V) | 60,000 | 2,000 | 0 |
| Palladium (Pd) | 171 | 0.06 | 0 |

Sources
Consumption: U.S. Geological Survey http://minerals.usgs.gov/minerals.
Elements in seawater: Y. Nozaki, *A Fresh Look at Element Distribution in the North Pacific*, Ocean Research Institute, University of Tokyo, http://www.agu.org/eos_elec/97025e-table.html

Figure 4. An invasive Asian longhorned beetle, from the USDA web site. Small, autonomous cold fusion powered robots can help eradicate invasive species.

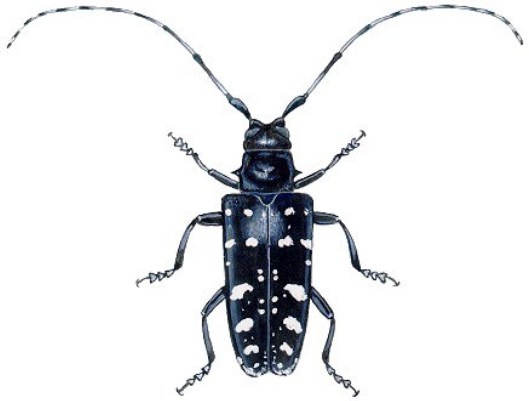


Figure 5. Robot chickens in a park, climbing an infested tree, flying.

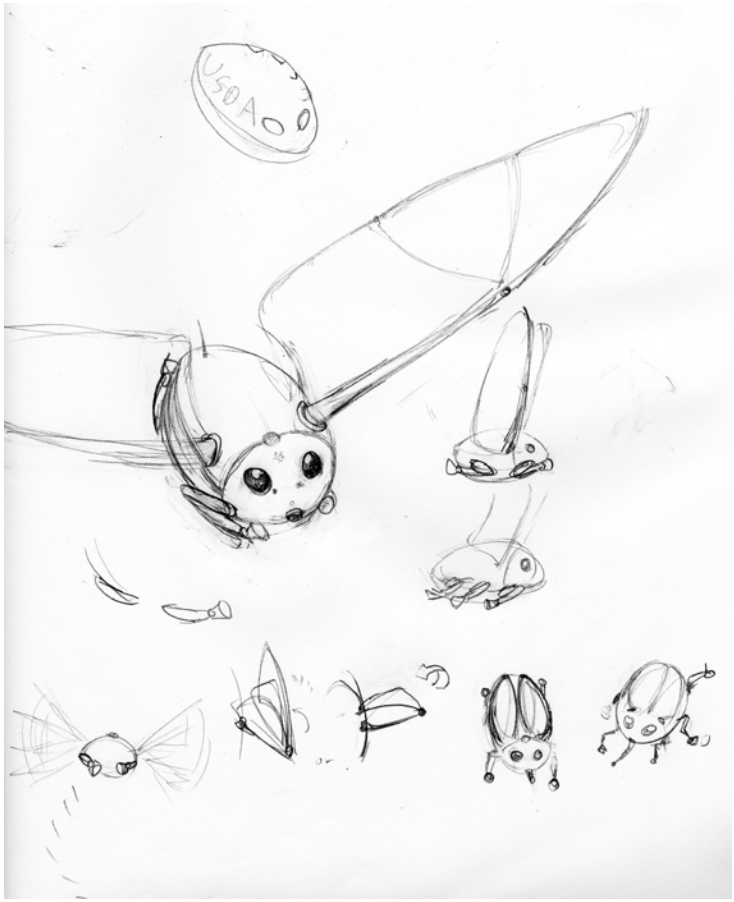
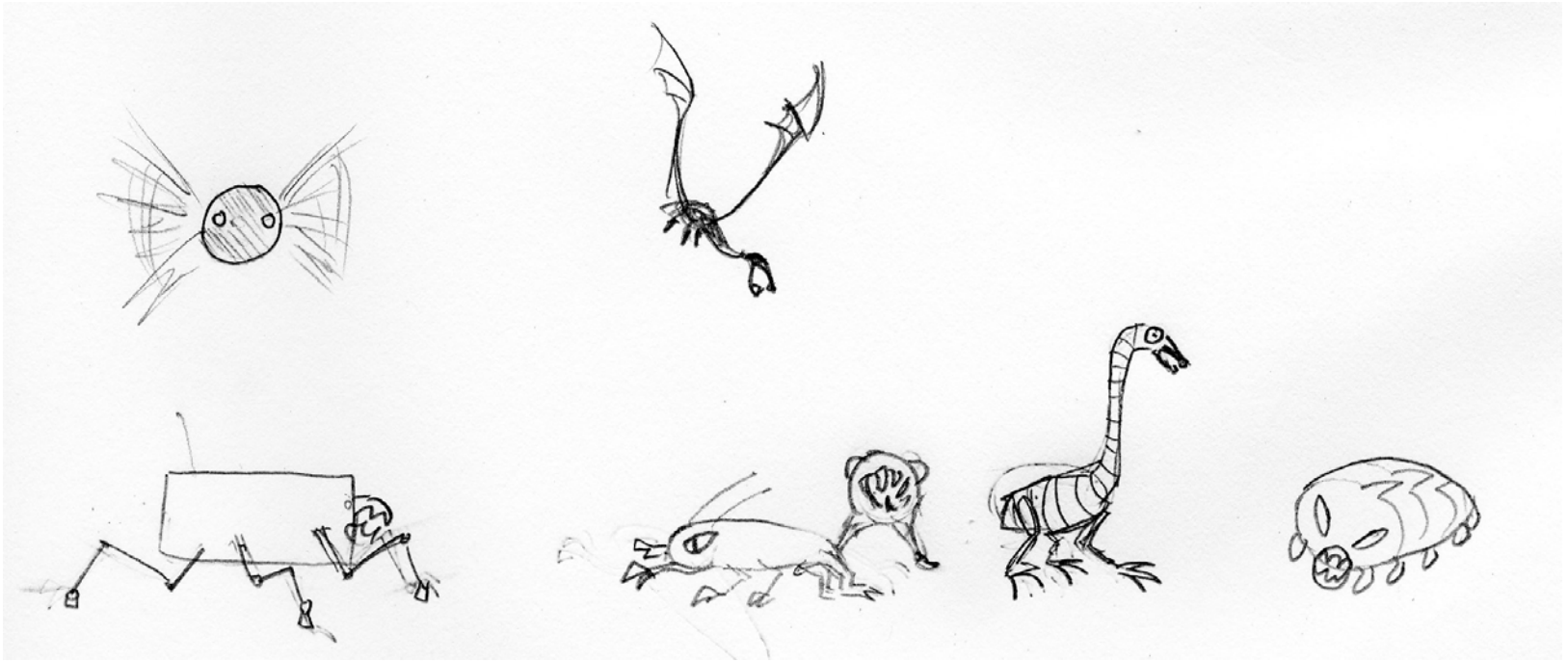




Figure 6. Chickens can identify individual people

A girl and her pet chicken. This chicken recognized the little girl and other members of the family. Chickens understand people's basic emotions and intentions, such as when you are upset and determined to shoo the chicken out of the house.

Figure 6. Robot chicken designs we thought might frighten the public



Sir Hugh E. C. Beaver, addressing the First International Congress on Air Pollution in 1955, traced the seven hundred year long campaign against air pollution in England. Complaint after complaint, committee after committee, report after report—all were ineffectual . . . Finally the London Smog of 1952, with its horrendous 4,000 deaths, set the scene for a new investigating committee, which was chaired by Sir Hugh. The committee's report was well received, said Beaver, and led to effective action, not because the report was exceptional in any way, but because the public was, at long last, receptive. The lesson to be learned, according to Beaver, is that "**on public opinion, and on it alone, finally rests the issue**."

- S. Florman, *The Existential Pleasures of Engineering*. 1996: St. Martin's Griffin.