

## Energy Amplifier – Talking Points

- Developed in the 1990's by a team led by Carlo Rubbia, winner of Nobel Prize in Physics, who was director general of CERN from 1989-1993.
- The primary component technologies were proven at CERN. Some technical aspects of the system still have to be dealt with.
- The technology has never been developed in a full-scale plant anywhere in the world.
- There is a group based in Brattleboro working to develop this technology as a replacement for conventional nuclear power, but especially in order to remediate and transform high-level nuclear waste.
- The funds necessary to fully develop the EA technology are estimated at >\$1 billion.
- It is a sub-critical nuclear technology, i.e. an Energy Amplifier system would not have the risk of undergoing a Chernobyl style accident.
- The system is powered by a beam of high-energy protons, and can be shut down quickly and effectively by simply turning this beam off.
- An EA system can be fueled by the element thorium, which is much more abundant than uranium, much easier to refine for use, does not need to be enriched, and is safer to use. America has abundant reserves of thorium.
- An EA system can use as its fuel high-level nuclear waste, and transform it into the element lead, Pb-208, with trace amounts of some radioactive elements mixed in. This end product would have a radioactivity comparable to that of coal ash after roughly 500 years.
- For all practical purposes, the EA technology cannot be used to produce weapons grade radioactive materials.
- EA technology produces huge amounts of heat, which can be used to generate electricity. The ratio of the energy required to power the proton beam to the energy produced by the EA reactor is estimated to be ~ 1:20.
- With an EA system being used to generate electricity there would still be a tremendous amount of waste heat, which could be incorporated into a district heating system for nearby towns or a city.
- It is estimated that the cost to develop this technology for use could be over \$1 billion, and take over 10 years of concerted research and development.
- At present Norway is making a concerted effort to develop this technology through the Norwegian company Kvaerner.
- This technology is so different from current nuclear reactor technologies that there may be substantial resistance to its development from the conventional nuclear industry, as well as from the coal, oil and natural gas industries.
- An EA project was commenced in Italy in the late 1990's that was designed to produce 1.5 GWatts of power and cost roughly \$700,000,000. This cost is comparable to, or less than, the cost of a comparably sized coal-fired power plant. The project was undertaken by the Italian company Ansaldo, but was cancelled because of a dispute between Italy and the European Union.