

HARN NESSING

Global Warming. Acid Rain. Arctic ice receding. An enlarging hole in the Ozone layer.

How exactly is man's growing presence on earth impacting the environment? What will be the long-term changes? There is no clear consensus on what is driving the changes we see around us, and while factions argue the importance, cause and potential solutions there is little argument the engines of industry, commerce, and personal leisure should be refined to pursue greater efficiency and less impact to the environment.

That is the lure of hydrogen economy. But as with every siren luring the idealistic or unwary onto their shores, there are hidden shoals, looming rocks, and past shipwrecks of those who sailed too quickly - or, once committed, could never find their way through.

Hydrogen Energy

■ Fuel Cells For The Future

Major technological shifts are never a panacea. They're messy. They're expensive. They litter the corporate playing field with broken joint ventures, scalded shareholders, good - but not good enough inventions. But underneath the pandemonium, hidden among the chaos, are a few good ventures whose ideas and quality and philosophies are strong enough to ride out the storm.

BWXT has sailed safely through two such storms. The first, was at the the turn of the twentieth century when BWXT influenced the wide-scale use of steam as the conduit of power. The second was the advent of nuclear power. In both cases BWXT used its manufacturing skills to sail through uncharted waters, and helped transform and build new industries.

As early as the 19th century attempts were made to develop fuel cells in efforts to harness energy. But not until 1932 was the first fuel cell successfully developed through an application of hydrogen, oxygen, an alkaline electrolyte, and nickel electrodes. The technology advanced little until two decades later when power generated by fuel cells helped NASA pave the way for successful space vehicle missions such as Apollo and Gemini.

Today, with growing concerns over the environment, and with an increasingly capable technology, major research and development efforts are being sponsored by both Government and industry.

BWXT is playing a major role in those efforts. With over \$100 million invested in its advanced fuel cell research and development, and as one of six companies receiving grants under DOE's Solid State Energy Conversion Alliance (SECA) program, BWXT and SOFCo, Alliance, OH, are at the leading edge of developing rugged, efficient, and most important - affordable fuel cells. SOFCo and BWXT are also leading efforts to develop hydrogen fuel reformers and advanced hydrogen generation capabilities in high temperature nuclear reactors.



Solid oxide fuel cells (SOFC) use hard ceramic electrolytes instead of a liquid and operate at high temperatures. Pictured is a 60-cell SOFC stack developed by SOFCo.

Chrispin Debellis, SOFCo Engineer, examines the "hot box" which contains the fuel stacks, manifolding, high-temperature heat exchangers, a combustor, a fuel reformer, and high-temperature insulation.