The Telemetric Egg, designed and constructed by George Stetten, was one of four Runners-Up in the 1992 Discover Award for Technological Innovation in the category of the Environment. The award was presented to Christine Sheppard, Curator of Ornithology at the Bronx Zoo.

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1992 Discover Awards: Environment

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Odds are that people who separate plastic soda bottles from their household trash for recycling are under the impression that they're helping to reduce the amount of garbage destined for the local landfill. But while consumers recycle almost 25 percent of all plastic soft-drink bottles (that's more than 285 million pounds' worth), the soft-drink makers have not used them to make new soft-drink bottles. Instead, the raw plastic from bottles is made into such materials as mattress filler, jacket liners, and plastic pipes--items that eventually wind up in the landfill anyway.

While it's better than no effort at all, the traditional method of recycling soft-drink bottles worked only to delay the plastic's ultimate trashing by three to ten years.

In early 1991, however, the Coca-Cola Company, Hoechst Celanese Corporation, and Cape Industries (a Hoechst Celanese subsidiary) joined forces to create and implement a process by which plastic soft-drink containers can, for the first time, be recycled into new plastic soft-drink containers. The process effectively closes the recycling loop for soft- drink bottles, theoretically making it possible to keep them in circulation--and out of landfills--forever.

According to Vernon Barham, director of recycling services for Hoechst Celanese's Fibers and Film Group, the new technology adds an important arrow to the use quiver of recycled plastics. We expect this will help bring the percentage of bottles recycled to more than half.

Nearly all plastic soft-drink containers are made of a polyester called polyethylene terephthalate, or PET. This type of plastic generally can't be recycled into new food containers because it does not meet the federal government's strict purity guidelines. Used plastic soft-drink containers are an especially attractive breeding ground for germs: the bottles can get contaminated after use from the residue of decomposed soda syrup, and they often make contact with other wastes, such as household trash or food, or with substances such as gasoline, kerosene, and motor oil, which some thrifty consumers store in the bottles before deciding to recycle them.

Hoechst Celanese's new recycling process is actually an old process applied in an innovative fashion. The technology is called methanolysis, and it's been honed and improved upon since the 1950s. Barham's team, however, was the first to apply it to the recycling of soft- drink containers.

Initiating the recycling process, consumers return bottles through curbside, drop-off, or buy-back programs. Processors collect the bottles, remove the labels, and grind the plastic down to polyester chips, which serve as the feedstock for the recycling process.

Methanolysis then works to break down the polyester into its constituent molecules--dimethylterephthalate and ethylene glycol--by heating the plastic chips in the presence of methanol. The dimethylterephthalate is given a long spin in an industrial centrifuge, which separates out all impurities. To rid the ethylene glycol of foreign matter, the Hoechst engineers boil it in large vats. The added methanol is also recovered for future use.

The pure dimethylterephthalate is shipped out to bottling plants, where manufacturers once again bathe it with ethylene glycol to create new PET plastic. According to Bruce Bennett, president and CEO of Cape Industries, such a closed loop makes our process the highest form of recycling.

While the chemistry is actually quite simple, the economic and environmental implications are enormous. In the past, the biggest hurdle to effective recycling was developing a steady, stable market for recycled materials. Coca-Cola's commitment to using soft-drink containers made with recycled PET should, for the first time, guarantee a reliable market for such containers in the beverage industry.

And for those of us concerned about the rising tide of trash, that's good news. The plastics industry recycling trade group, the National Association for Plastic Container Recovery, forecasts that the use of PET plastic containers will increase about 10 percent annually from current levels of 1.2 billion pounds a year. In addition to its positive effect on recycling in the United States, Barham expects the process to be a catalyst for the growth of curbside collection in Europe. It will foster the growth of what's now an embryonic recycling infrastructure.

Although no one expects the recycling of plastic soft-drink containers ever to reach 100 percent, Barham would like to see consumers return 65 percent of PET bottles for recycling--a rate similar to that at which consumers recycle aluminum cans.

Doug Dichting, director of packaging at Coca-Cola USA, knew from the beginning that purifying PET plastics for reuse would involve high set- up costs. Using recycled PET would initially be more expensive than starting from scratch with virgin materials because of the labor, equipment, and processing needed to collect, prepare, and purify used bottles. But both Dichting and his management thought the development of this new technology was worth it. Luckily for the thirsty public, Coke decided not to pass on the extra cost to consumers.

As more PET bottles enter the recycling stream, increasing the amount of feedstock for the process, and as more companies join in the recycling effort, costs should go down. It's an expensive process, but one whose time has come, says Barham. Even though it's expensive for now, this country really needed a breakthrough in this area. Rarely in my 20- plus-year career have I felt such satisfaction as with this project, he reflects. It has to do with having made a small step in the ethical and moral mission to help solve Earth's material solid-waste problem.

Franz Hiebert, director of geoscience programs at Alpha Environmental in Austin, Texas, for the development of the Alpha BioSea bioremediation process to clean up oil spills. This system accelerates natural cleansing processes by applying oil-eating microbes at the site of a spill. The naturally occurring microorganisms are combined with a soup of special nutrients called biocatalysts, resulting in a population explosion of the hungriest, most efficient oil-eating microorganisms. These transform hazardous oil into harmless, nontoxic components. The technology was tested successfully after the Gulf War to clean Saudi Arabian wetlands and beaches.

Takinori Minami, general manager of technical research at Mazda in Hiroshima, for the development of the hydrogen-powered Mazda HR-X concept vehicle. One of the most abundant elements on Earth, hydrogen is an ideal fuel alternative. Its primary emission when burned is water vapor. Hydrogen's main drawback is its extreme flammability (remember the Hindenburg). Styled in the shape of a water drop, the HR-X features several engineering advances that promise to make hydrogen a safe and viable energy alternative by the end of the decade. Minami's innovative design features a metal-hydride storage tank placed under the passenger compartment and a rotary power plant that transports and burns hydrogen in separate chambers.

Ronald Poole, research as-sociate at Mobil Oil in Paulsboro, New Jersey, for the development of an organic vegetable-based hydraulic oil. Mobil EAL 224H is readily biodegradable and virtually nontoxic. Ideal for operating equipment around sensitive areas such as farms, drinking reservoirs, forests, and ocean platforms, the new oil can replace the standard, toxic oils most often used inside heavy machinery. Derived from com-mon plant seeds, the oil performs as well as traditional hydrocarbon- based oils in all measures of lubrication, wear protection, and overall strength.

Christine Sheppard, curator of ornithology at the New York Zoological Society in the Bronx, for the development of the Telemetric Egg, a clever system that monitors the incubation of endangered-bird eggs. Consisting of battery-powered sensors and a transmitter, the apparatus is housed within a plastic shell designed and colored to look like a particular bird species' egg. By replacing one of the eggs in a bird's clutch with a tele-metric egg, researchers are now able to gather important information about nesting behavior (how often a mother turns the eggs, for example), as well as nest temperature and humidity data. This information helps researchers identify the nesting requirements of each endangered species so they can create conditions to assure the survival of the greatest number of eggs.