**Global Challenges/Chemistry Solutions  
Our Sustainable Future: Rivers flowing into the sea offer vast potential as electricity source**

Combating disease . . .  promoting public health … providing clean water and safe food . . . developing new sources of energy . . . confronting climate change. Hello, from the American Chemical Society — the ACS. Our more than 164,000 members make up the world’s largest scientific society. This is “Global Challenges/Chemistry Solutions: New Solutions 2012.” Global Challenges 2012 updates the ACS’ award-winning podcast series.

Today’s solution is a new genre of electric power-generating stations that could supply electricity for more than a half billion people by tapping just one-tenth of the global potential of a little-known energy source that exists where rivers flow into the ocean. The process — which requires no fuel, is sustainable and releases no carbon dioxide (the main greenhouse gas).

The study’s authors explain that the process, called pressure-retarded osmosis (PRO), exploits the so-called salinity gradient — or difference in saltiness — between freshwater and seawater. Their report appears in the ACS’ journal *Environmental Science & Technology*.

Here’s lead author Menachem Elimelech, Ph.D., a professor of environmental and chemical engineering at Yale University:

*“In PRO, freshwater flows naturally by osmosis through a special membrane to dilute seawater on the other side. The pressure from the flow spins a turbine generator and produces electricity.”*

The world’s first PRO prototype power plant was inaugurated in Norway in 2009. With PRO appearing to have great potential, the scientists set out to make better calculations on how much it actually could contribute to future energy needs under real-world conditions.

*“PRO power-generating stations using just one-tenth of the global river water flow into the oceans could generate enough power to meet the electricity needs of 520 million people, without emitting carbon dioxide. The same amount of electricity, if produced by a coal-fired power plant, would release over one billion metric tons of greenhouse gases each year.”*

**Smart Chemists/Innovative Thinking**

Smart chemists. Innovative thinking. That’s the key to solving global challenges of the 21st century. Please check out more of our full-length podcasts on wide-ranging issues facing chemistry and science, such as promoting public health, developing new fuels and confronting climate change, at [www.acs.org/GlobalChallenges](http://www.acs.org/GlobalChallenges). Today’s podcast was written by Sam Lemonick. I’m Adam Dylewski at the American Chemical Society in Washington.