SKOL: There's some hope on the energy front

By DAVE SKOLODA

When I spoke with Derek Lovley recently, he gave me a vision of brighter prospects amid the gloom of the oil spill. It was like the first ray of sunlight that finally broke through an opening in our recent weeklong siege of clouds.

Lovley spoke with me by telephone from Amherst, Mass., where he is distinguished university professor in the Department of Microbiology at the University of Massachusetts. I had read a report of his research to produce fuel and other chemicals from solar-generated electricity, bacteria and carbon dioxide.

It is such a bold concept that I decided to use it as an example of the work that's being done on clean energy development. Lovley's work is one of 37 "green energy" projects at U.S. research institutions that have received $106.4 million in Recovery Act funds from the U.S. Department of Energy.

I asked Lovley for his reaction to President Obama's speech last week and to cite other projects he found promising in our search for alternative energy.

He paused a moment and said he is so focused on the possibility of his work to be "transformative" that "that's all I'm thinking about."

That's transformative as in getting off the petroleum with which we are poisoning our planet.

The same day I talked with Lovley, The New York Times ran a story about Nigerians who understand well the travails of our BP spill; they've been living with spills equivalent to the Exxon Valdez spill every year for 50 years, a condition they say has received little attention from the rest of the world. It has taken disaster in our own back yard to wake us up to the scourge that has plagued others for many years.

Lovley's alternative looks like this: It's based on the discovery that some bacteria can feed on electrons. According to a UMass news release, "This is basically a new form of photosynthesis, in which carbon dioxide and water are combined to produce organic compounds, and oxygen is released as a byproduct."

According to Lovley, "electric energy powers the microbes to 'breathe in' carbon dioxide and 'exhale' fuels and chemicals. … A notable advantage to this new method is that the photovoltaics, or solar panels, can harvest solar energy 100 times more effectively than plants."

The system overcomes the solar energy storage problem by converting sunshine directly into chemicals that can be stored and distributed by conventional infrastructure. And the take-up of carbon dioxide by the system can be used to reduce the carbon footprints of carbon dioxide emitters, according to Lovley.

The concept has been proven in the lab and the grant will be used to develop larger-scale production, a process that might take five years or so. It's hard to predict, Lovley said.

He acknowledges that the time it takes for engineering the scale-up is frustrating, but the potential payback is enormous.

Microbial electrosynthesis, as the process is called, "requires no biomass feedstock or arable land, uses far less

water and requires no elaborate post-production fermentation, for example. And, once established, the microbial cells and electrode food sources don't get used up, so they are more than 90 percent efficient at turning electrons into fuel without further processing.

"One reason this process is so exciting is that we go directly from carbon dioxide to fuel, bypassing all kinds of difficulties encountered in producing fuels from biomass. We're very excited about the high efficiencies and the promise of extremely high payback for the investment in this new alternative energy process," Lovley said.