

TAKING THE NANOPULSE

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Put a Nano in Your Tank

Nanotechnology is the innovation driver for energy policy

BY SCOTT E. RICKERT

Since Model Ts started rolling off Henry Ford's assembly line, we've been fueling our cars with gasoline. Then it looked like America had more than enough oil to keep the tanks full. But times change. Now we find ourselves forced to buy our oil elsewhere, paying higher prices in the competitive market of a global economy.

There are new transportation solutions in the pipeline that help us shift away from oil-based vehicles. I've written about them here on many occasions because nanotech will assuredly be built into them. But like so many challenges, we need to look at near-term and long-term solutions. The bad news? We're not going to put electric cars in every garage in the next decade. The good news? There are enabling nanotechnologies in the works right now that can help us have more conventional fuel now, for less money, with less impact on the environment.

Let's start with a change of fuel: compressed natural gas, or CNG for short. You may have seen city buses or government vehicles powered by CNG. They make up most of the 1% of vehicles on the road running on CNG. CNG burns cleaner, it costs less, and there are large stores of it available on U.S. lands. What we need is technology to get it out of the ground more efficiently and to improve the fueling infrastructure. None other than energy tycoon T. Boone Pickens is barnstorming in Washington D.C., promoting tax relief for those developing new CNG technologies.

Good for you, Mr. Pickens – and take my advice. Put your focus on nanotechnology. It's the ultimate turbo boost for natural gas vehicles. First, nanotechnology will likely provide the key to efficiently extracting natural gas, including the nanocatalysts to separate gas from oil. It may also unlock unconventional or so-called "stranded" gas, that's been cost-prohibitive until nano-surfactants and other nanomaterials arrived on the scene.

There's nano-work to be done in storage, too. Currently, CNG needs to be stored under great pressure, which means storage tanks are small, need frequent refilling and are relatively expensive. Not a great business model for an everyday car. New engineered carbon nanostructures that are highly porous promise the capability of storing natural gas at lower pressures, making fueling stations more efficient and giving drivers more miles per tank – all at lower costs.

Nanotechnology can also help the U.S. optimize our own oil reserves and depend less on foreign sources. To be cost efficient, current extraction methods often leave as much oil in the ground as they pump. In

other cases, the easy-to-drill reserves are long gone. Both offer opportunity for nano-enabled processes. For example, nanomaterials or nano-based surfactants could improve the separation of oil from water in a well, or boost oil's viscosity. That means we can get more out of every well. There's even early work on nanocatalysts that may make recovering oil from unconventional sources possible. Image if we could cost-effectively extract the oil from oil sands or other previously untapped sources.

Want to really think big? Nano-sensors could provide better maps of oil fields, without succumbing to the heat and pressure, and in time, help us better understand how to explore and extract more successfully. Nano-coatings and nanocomposites will make equipment drill faster, perform better and last longer in the harsh drilling environment. And nano-elements are bound to offer better filters to trap pollutants and breakthroughs in environmental remediation.

If you look at the Mapquest of this journey, we've only just cleared the first on ramp, but we're picking up speed. Big-name global oil producers are already partnering with researchers and nano-companies to jump start the process.

How can you help put the pedal to the metal? See where current CNG vehicles could join your fleet. Let your Washington representatives know you and your company support innovation that keeps U.S. energy policy hitting on all cylinders. And be sure that they know nanotech-fueled development will keep things in high gear.

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