

Ammonia power offers cars chance to clean up their act

Unless you're one of the very few drivers who has an electric car, that's a steam engine under your hood, says John Bates.

Probably, you put gasoline in the tank when you fill up. Maybe diesel oil. Maybe you've converted to propane. You might even have juggled your motor to run on compressed natural gas, or methanol, or gasohol, or one of the other new substitute fuels we hear about.

Makes no difference, Bates assures us. It's still a steam engine pulling you around.

"There's a common element in all the fuels we use in internal combustion engines," he explains. "That's hydrogen — and it provides all or almost all the power when those fuels burn."

Of course when hydrogen burns — inside a motor or anywhere else — it simply combines with oxygen to form water. But because this is a burning process, there's a lot of heat. So during the first instant, the water is in the form of steam. That's when the power of the combustion is being used to drive the engine's piston or turn its turbine rotor or whatever.

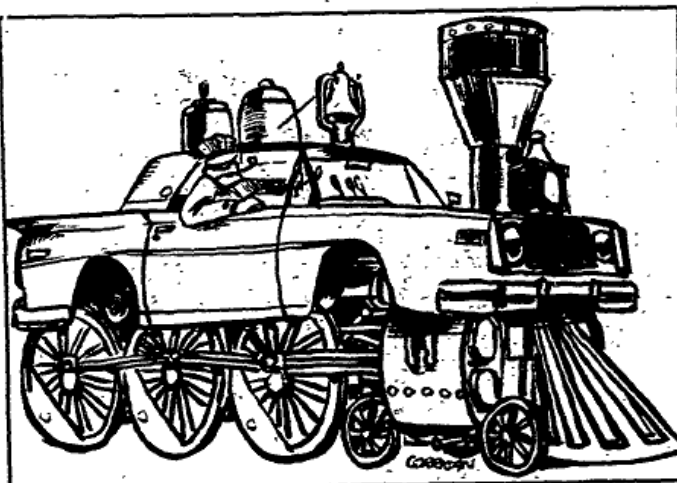
By the time the combustion product finds its way through the system and out the exhaust pipe, it's cooled down to become water vapor. On a cold day, it cools further to become a cloud of water droplets. Did you ever wonder what that white mist is, coming out of your exhaust pipe in winter? It's the end result of what's keeping you rolling.

Bates is former editor of Energy Forum Magazine and a respected Canadian authority on the chemistry of motor fuels. And he feels it's important that people understand about hydrogen and what it does for us all the time.

There's a common feeling that since gasoline comes from oil, and since oil has carbon in it, that it's the carbon that burns and gives us those jackrabbit starts from stop lights. We know that the carbon in gasoline is what fouls up our spark plugs. It forms other miserable compounds inside an engine that break down the motor oil so we have to replace it every few thousand miles, too.

And worst of all, burning carbon helps produce the engine-exhaust elements that make cars pollute our air so much. Yet we put up with this, partly because we may perceive the carbon as the fuel's source of power.

In fact, it's not much help that way. Gasoline and the other familiar motor fuels fall into the chemical category of "hydrocarbons," because they combine both hydrogen and carbon.



Steaming along: The internal combustion engine is basically a steam engine, says energy expert John Bates, and ammonia would be a better and cleaner fuel to power it.



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And, says Bates, our world would be a cleaner place if we developed a fuel with lots of hydrogen and no carbon in it.

There is one he likes. It's ammonia. Yes — the stuff you use to take wax off floors, the stuff farmers use for fertilizer. It's a compound of hydrogen and nitrogen. It can be formed by taking hydrogen out of water and nitrogen out of the air. And when it's burned, the hydrogen combines with oxygen to turn back into the water it came from. And the nitrogen is released back into the air it came from. The process is virtually pollution-free and infinitely self-renewing. There's a little nitrous oxide formed, but not enough to cause problems, Bates says.

(A recent Star story told of a North Bay company that's developed a way to use ammonia in today's cars and trucks.)

"Pure hydrogen would be the best fuel of all, but it's too hard to contain and carry around. You need heavy tanks and cooling equipment to keep it in liquid form," he adds.

"So we look for a compound that has hydrogen in it and is easy to handle. Until now, we've used gasoline because

it's been cheap and has a high power rating. Ammonia would have been cleaner, and we wouldn't have had to import any (we have lots of water and air). But no one bothered to adapt to it because of the cost. Now, even with oil prices down at the moment, that cost advantage has faded. And it would be nice to be self-sufficient in fuels. And if we used ammonia to run cars, we could save Canadian oil to make plastics and synthetic fibres and other petrochemicals for which we have no other source of supply.

"But," Bates concludes, "the thing that should finally drive us to a cleaner hydrogen fuel is the environment. We just can't go on forever poisoning the air the way we have."

By the way, high-volume production of hydrogen from water (if we ever do shift to it as our main motor fuel) probably would work best using the electrolysis process. But this would call for massive amounts of electricity. And that in turn would call for a commitment by Ontario to expand Hydro's string of nuclear generating plants.

That idea might start a different uproar from environmentalists who think nuclear plants are a threat.

To soothe those worriers, we have a report from the United Nations' World Health Organization (WHO). One of its agonizingly complete studies has concluded that what the world needs most of all to win the energy-supply war is more electricity, and that nuclear generation is not only "viable" but "essential," as a source, especially in developing countries.

Now, would WHO lie to you?