Freeing America from its addiction to oil

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CNN Editor's note: Amory Lovins is cha*irman and chief scientist of the Rocky Mountain Institute, which describes itself as "an independent nonprofit think-and-do tank," and is chairman emeritus of and a small investor in the institute's fourth commercial spinoff, Fiberforge. The author of 29 books, he has won many academic, business, technology, design and environmental awards. He has advised major firms and governments worldwide, including Wal-Mart, Ford, Deutsche Bank, General Motors, Boeing and the Pentagon on advanced energy efficiency and was a 2007 visiting professor at Stanford University's School of Engineering*

Snowmass, Colorado (CNN) -- Oil is on its way out. That journey will take several decades, but it's begun. Mindful markets and civil society will complete it as inexorably as innovators and capitalists got America off whale-oil lamps in the 1850s.

My 2005 TED talk explained how to get the United States completely off oil by the 2040s, led by business for profit. This would cost an average of about $15 per barrel in 2000 dollars, or about $18 per barrel in 2009 dollars -- less than a third of oil's current price, conservatively assuming that all its environmental, security and other "external" costs (paid in taxes, illness or insecurity rather than at the pump) are worth zero. The Pentagon-co-sponsored September 2004 study Winning the Oil Endgame by the Rocky Mountain Institute details how.

In the five years since its publication, implementation has accelerated, led largely, as it proposed, by private-sector innovation and often stimulated by the institute's "institutional acupuncture": figuring out where the business logic is congested and not flowing properly, and then sticking needles into sensitive sites to get it flowing.

The 2008 oil-price spike and 2009 policy shifts all helped too. Of the six sectors needing transformation to increase efficiency and reduce oil use -- cars, trucks, planes, fuels, finance and military -- three or four are near or past their tipping point and starting to get easier.

Buy a good hybrid car or light truck and drive it right, and you'll halve your oil use per mile. Make it from very light but strong materials, improve its tires and aerodynamics, and you'll halve oil consumption again.

Fuel it with 85 percent ethanol made from woody, weedy stuff like switchgrass, and you'll save three-fourths of the remaining oil without interfering with food production.

Next, make the vehicle a plug-in hybrid (due in major makers' showrooms this year), and your oil savings rise to 97 percent. One such vehicle -- the IDEA, a 100-mpg, 1-ton utility/delivery fleet van due 2012 from Rocky Mountain Institute spinoff Bright Automotive -- needs no subsidy to motivate fleet buyers, because its light weight and low drag eliminate most of the costly batteries.

Even greater efficiency is illustrated by Hypercar's 2000 Revolution, a halved-weight midsize SUV design getting 114 mpg with hydrogen or -- repaying its $2,511 extra price in a year -- 67 mpg with gasoline, and by Toyota's 2007 1/X concept car, a plug-in hybrid with half the fuel use and one-third the weight of a same-size Prius.

To eliminate the last 3 percent of oil use (and optionally the biofuels), you could even use a battery or hydrogen car; both make sense and money if they're so light and slippery. When your electrified car is parked (96 percent of the time), you could plug it in as a power plant on wheels and earn money by selling power back to the utility when and where it's most valuable, such as downtown on a hot afternoon.

The Smart Garage -- smart cars hooked through smart buildings to a smart grid -- will soon be swapping electricity and information for mutual advantage. Many cities are planning such infrastructure through Project Get Ready.

The lightest ultrastrong automotive materials, carbon-fiber composites, looked too costly for cars until a Rocky Mountain Institute spinoff commercialized an automated manufacturing process that makes complex composite parts in less than a minute. It should ultimately be capable of making ultralight cars at automotive scale and cost, halving steel cars' weight and fuel use, improving safety, costing no more per car and saving oil equivalent to finding a Saudi Arabia under Detroit.

The world's biggest carbon-fiber producer, Toray, announced in 2007 a factory to mass-produce carbon-fiber car parts for Toyota; Honda and Nissan followed suit in 2008. That leapfrog is off and running.

Meanwhile, Ford, Nissan, Audi, key Chinese and other automakers are lightweighting with familiar metals, saving somewhat less fuel at a comparable cost per gallon.

Wal-Mart and its suppliers cut the world's biggest civilian heavy-truck fleet's diesel use per ton-mile by 38 percent in 2004-08 and aim to halve it by 2015. Replicate that nationwide, and 6 percent of U.S. oil use vanishes.

The Pentagon too is leading the nation off oil by starting to value it about 10 to 100 times higher than before, to reflect the huge cost (in blood and treasure) of delivering fuel to the battlefield. The resulting military innovation will also transform civilian vehicles, much as military research created the Internet, GPS and the jet-engine and microchip industries.

Boeing's 787 Dreamliner combines a 50 percent carbon-composite structure with advanced engines, aerodynamics and other improvements to save one-fifth of its fuel at no extra cost. It's sold out into 2018.

A radically new design that could ultimately save most of the remaining fuel has made over 50 scaled test-flights. Now Boeing is spreading the 787's innovations to every plane it makes, creating a breakthrough competitive strategy.

In 2004, I suggested that Detroit imitate Boeing's strategy. Two years later, Ford hired the CEO of Boeing Commercial Airplanes as its own CEO. After three years, Ford looks nothing like GM or Chrysler: surging innovation, no bailout, no bankruptcy. But can we accelerate even faster?

In 1942-43, Detroit switched in six months from automaking to producing one-fifth of all the materiel that won the war. To make automakers that bold today, how about a real carrot, not just sticks painted orange?

Our government could pay automakers for quickly selling large numbers of super-efficient cars. Valuing saved barrels at the low end of credible estimates of their "external" cost could repay taxpayers' bailout loans, rebuild automakers' competitiveness, boost security and save carbon.

Surging innovation is coming to policy, too. In late 2007, France launched the first large-scale "feebate" (fees on inefficient cars, offsetting rebates to efficient models in the same size class). In 2008, French sales of inefficient cars fell 42 percent while sales of efficient models rose 50 percent.

An epochal shift has been triggered: "Peak oil" is emerging on the demand side. In 2009, The Wall Street Journal reported agreement among Exxon-Mobil and "many private analysts and government ... forecasters" that U.S. gasoline demand peaked in 2007 and is headed down.

Cambridge Energy Research Associates doubts that the industrialized countries' oil demand will regain its 2005 peak. Deutsche Bank forecast that light-vehicle electrification will turn world oil demand downward from 2016, falling by 2030 to 8 percent below current levels or 40 percent below most forecasts.

Two-thirds of the world's increase in oil use to 2030 is supposed to happen in China. China, however, now plans to electrify 80 percent of its new cars by 2020, but Deutsche Bank's forecast conservatively assumed only 26 percent, no cuts in any cars' weight and drag, and ordinary trucks and planes.

Add up vehicular innovations, reversing sprawl and feebates, and you'll see that oil, as I've been predicting for two decades, is becoming uncompetitive even at low prices before it becomes unavailable even at high prices.

The opinions expressed in this commentary are solely those of Amory Lovins.