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ELECTRIC CARS

Chip legend Grove sees an electric future for cars

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LOS ALTOS, Calif — Andy Grove, the former head of Intel Corp., asked students in his Stanford University business school seminar last year to determine whether an electric car market could thrive in the U.S.

Their conclusion: It can't.

That propelled the 1997 Time Man of the Year, now retired, on a personal crusade to reshape U.S. energy policy, take on the auto industry and attack America's leaders for, in his view, risking the nation's security.

Grove, 71, who revolutionized production of the devices at the heart of computers, is exploiting his name and ties to investors and politicians to jump-start a similar advance in battery-run vehicles. His idea is to refit millions of gas-hungry autos to run on electricity part-time and persuade carmakers to adopt so-called open-source rules on advanced technology so that Americans can convert their cars.

"I came to a few conclusions that I was stunned by because they were so obvious and people don't seem to get it," Grove said in an interview in his office in Los Altos, Calif. U.S. dependence on oil might bring economic calamity and eventual conflict with China, he said.

Grove, who joined Intel in 1968 and built it into the world's biggest chip maker, says electrifying cars is the fastest way to ease international competition for energy because passenger autos account for nearly half the U.S. use of oil.

Grove's students said a failure of political leadership is what is keeping electric cars from the market, but automakers and analysts say the challenges include high costs, a lack of batteries sturdy enough for daily use, no recharging infrastructure and environmental damage if coal-fired plants are the main energy source.

"All these objections are absolutely valid in a peace state," said Grove, who titled his 1996 book on management "Only the Paranoid Survive." "What if we are approaching a state of war, whether it is literally shooting or just starving to death economically?"

In four years, Grove wants 10 million vehicles to be equipped with battery packs capable of powering at least 40 miles of all-electric driving before the gasoline engine engages. They'd be recharged with power from domestic sources instead of oil, 58 percent of which is imported.

Grove says he is unimpressed with the energy policies of the presumptive presidential nominees, Republican

Sen. John McCain and Democratic Sen. Barack Obama, calling them "investment plans with no strategy."

Grove is encouraged by conversions of pickups and other autos that have been done by individuals and small shops for years. Batteries and motors are installed to add all-electric range and reduce vehicle's gasoline use.

"I would love to give a lot of light and limelight to these people who have been doing this in their garages, because there are a lot of them," Grove said. "This is how the computer industry became a very large industry."

General Motors Corp. and Toyota Motor Corp., the world's biggest automakers, sold electric cars in California a decade ago and both plan to offer plug-ins by 2010. Converting vehicles not designed to hold hundreds of pounds of additional batteries doesn't work, they say.

"Batteries needed to move a large SUV would be very big and very expensive," GM spokesman Dave Barthmuss said. "If things were that easy, we'd flip a switch and do it."

Lead-acid and nickel-metal hydride batteries that have been used in vehicles converted by individuals are too heavy, and lighter, higher-powered lithium-ion packs aren't ready yet, Toyota spokesman John Hanson said.

"Battery technology is not anywhere near the level it needs to be for us to create a vehicle that delivers performance and range for a price people are willing to pay," Hanson said.

Other technology leaders interested in electrifying transportation include Larry Page and Sergey Brin, founders of Google Inc.; Sun Microsystems Inc. founder Vinod Khosla; and PayPal Inc. founder and Tesla Motors Inc. Chairman Elon Musk.

Rock musician Neil Young is using his fame to fuel a similar campaign. He has gotten a Kansas mechanic to retrofit a 1959 Lincoln Continental convertible to run on batteries as a way to spur electric car conversions.

Grove has reached out to conversion experts such as Andrew Frank, a professor of engineering at the University of California, Davis, to learn about their research and what they need to grow.

Frank is trying to raise at least \$10 million to finance a company to convert pickups to run on electricity for the first 40 miles before switching to gasoline. His startup, Efficient Drivetrains Inc., would train mechanics to perform conversions costing customers about \$10,000, he said.

"I grew up in the days of hot-rodding, and fundamentally what we did was take conventional cars and added widgets to it to improve its performance," Frank said. "That's what we are doing here."

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