

Did you know?

Sharing stories of NREL's work to transform our energy future

Did You Know That an NREL Team Led by Terry Penney was Instrumental in Moving Hybrid Vehicles to Market?



NREL's Terry Penney has had this "HYBRIDS" license plate since the early 1990s.

Terry Penney refuses to accept the title of "Technology Champion" for hybrids – pointing to the larger NREL team that worked together to develop hybrid vehicle technologies and move the innovative cars to the marketplace. And there's no doubt that the U.S. Department of Energy (DOE), other national labs, and the automotive industry played key roles as well.

But if you meet Penney, NREL's Principal Laboratory Program Manager for Advanced Vehicle and Fuel Technologies, it's not hard to believe that the sheer force of his passion and personality, along with his political and technical skills in dealing with industry and government, had some influence.

"I sat with the guys from the auto industry, and after hours of frustration with the meeting going nowhere, I said, 'Who's going to be a leader here? Are you going to be a leader or not?'" Penney recalls.

The story began in the early 1990s, when Penney helped launch an advanced vehicle research branch at NREL.

"I came from Detroit. During the summer in college, I worked at Ford. I knew that no matter what we did with vehicles at NREL, the industry had to be involved," Penney says. "Hybrids were kind of stalled at the time. Believe it or not, they were actually invented 100 years ago. We thought it was high time to get things moving again."

So he came together with automakers to talk hybrid vehicles – and met with skepticism. Industry leaders predicted hybrid vehicles would be prohibitively expensive, with a niche market, at best. Industry wasn't willing to do this research alone – they wanted help in the form of hundreds of millions of dollars in government research funds.

"Of course, the industry thought that was the end of the story," Penney says.

But Penney worked behind the scenes with senior DOE management and helped obtain \$300 million in federal funding for hybrid development, which was eventually matched by industry investment. The request for proposals announced in 1992 was the largest subcontract MRI/NREL has ever had.

In 1993, when President Clinton and Vice President Gore announced the Partnership for a New Generation of Vehicles (PNGV), General Motors, Chrysler, and Ford got involved. PNGV's goal was to double the fuel economy of vehicles on the road at that time. Hybrid vehicle projects at NREL were the centerpiece of the effort, with major contributions from other national labs and industry.

For more information about NREL's work on vehicles, advanced fuels, and transportation, visit NREL's [Advanced Fuels and Vehicles Research web page](#).

“Our strategy was to develop a core team at NREL to partner with industry. We only teamed in areas where we could be useful,” Penney says. “We wanted to add value by solving complex problems that were recognized by industry, but as an outsider, taking a fresh approach.”

Unlike many other NREL research and development partners, the automotive industry has been around for over 100 years – with thousands of engineers each year trying to refine their “well-oiled machine.” It can be difficult to make a meaningful impact in this well-established, competitive, and cost-sensitive business.

Penney and his team listened carefully to what issues the automotive manufacturers and their supply chain faced, then carved out a differentiating niche for NREL to add value and earn the respect of their partners by solving real problems.

It worked, and PNGV reached its goals. But at the time, with gas at \$1.06/gallon, GM, Ford, and Chrysler decided that the consumers did not have adequate incentive to pay more for a hybrid.

Other automotive OEMs, most notably Honda and Toyota, were well aware of the PNGV program and launched a hybrid development race of their own. Although they had similar cost concerns, they came to a different conclusion – that gas prices could not remain low forever, and that within a few years, hybrid vehicle production would be the right decision. The Prius ultimately emerged as the most commonly-owned hybrid vehicle worldwide, having sold over one million to date.

“In 1992, we thought success would be the ability to buy a hybrid vehicle in the showroom by 2002,” Penney says. “Obviously, we’ve succeeded beyond our wildest imaginings. Our program spurred international competition – and it’s one of the reasons we have many hybrids on the road today.”

NREL’s handful of researchers in energy storage, auxiliary loads, power electronics and analysis tools has matured into a team of over 70 people, many who are recognized internationally as experts in the field of advanced electric drive powertrains. After two decades of hard work, Penney and his colleagues have helped produce technology for a family of electric drive vehicles, including electric vehicles, fuel cell and plug-in hybrids, as well as long-lasting partnerships between DOE and the automotive industry.

Although the vehicle work continues, Penney has not stopped dreaming of a more efficient, sustainable vision.

“Our next evolution needs to combine electric drive transportation options with smart grid and net zero energy buildings – a renewable community,” Penney says. “Our earth’s resources are finite, and we must look at system solutions rather than silos in our approach to creating a more sustainable development.”

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Cover photo by Dennis Schroeder, NREL/PIX 18550



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NREL is a national laboratory of the U.S.
Department of Energy, Office of Energy Efficiency
and Renewable Energy, operated
by the Alliance for Sustainable Energy, LLC.

June 2011
NREL/FS-7A10-51042

Printed with a renewable-source ink on paper
containing at least 50% wastepaper, including 10%
post consumer waste.