

MYTHS AND REALITY OF PNGV

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If there is anything we can all agree on, it is that the future for advanced vehicles is highly uncertain and the cost of developing and commercializing new advanced technologies will be high. The result is a high degree of risk for those manufacturers investing in fuel cells, ultracapacitors, advanced batteries, lightweight materials, flywheels, and other advanced technologies. High risk means delayed investments. Delays are worrisome for 2 reasons: U.S. industry becomes less competitive, and environmental degradation and disruption continues.

If the transition to environmentally benign fuels and vehicles is to be sustained, investments in the riskier, more far-off technologies need to be accelerated. A research partnership between government and industry is essential to spur the development of more advanced technologies. It is also an appropriate role for government to play.

In theory, PNGV, as currently conceived, benefits virtually everyone. The beleaguered national labs (who are the primary recipients of PNGV spending) are given a renewed mission; thousands of highly trained scientists and engineers at the labs are kept productively employed; automakers receive a much-needed infusion of technical know-how; the adversarial relationship between automakers and government is converted into a partnership; and the transition to more environmentally benign technologies is accelerated.

MYTH 1: Government has made a major funding commitment to PNGV.

The initial government-industry agreement called for government splitting an investment of \$10 billion over 10 years with industry -- that is, \$5 billion each.

This presentation is adapted from Chapter 9, Technology Policy for Sustainable Transportation, in Daniel Sperling, Future Drive: Electric Vehicles and Sustainable Transportation (Washington, D.C.: Island Press, 1995), pp. 141-43.

Reality: Only about \$30 million in new projects were awarded in the first year. In fact, the Administration has said that no new funding will be allocated for PNGV.

Some awards have been made over the past 2 years -- in the "goal 3 area," for hybrid and fuel cell vehicle technology -- but virtually all of the award commitments pre-dated PNGV. The only true PNGV award commitments were for a total of \$30 million to Ford and Chrysler for fuel cells. Virtually all other federal support for PNGV since its inception has been in the form of shifts in national lab personnel from military projects to vehicle technology.

MYTH 2: Weapons labs can make a major contribution.

The PNGV vision is one of personnel and equipment from the national labs, mostly the weapons labs, being switched from guns to butter; they would be reassigned to work with the three domestic automakers and their principal suppliers. The intent is to make the vast storehouse of knowledge and technology at the laboratories available to those companies. Since the three weapons labs-- Lawrence Livermore, Los Alamos, and Sandia--each have budgets of over \$1 billion per year, diverting even a small part of these budgets to PNGV could have a large impact.

Reality: The weapons laboratories were not intended to design products destined for the marketplace. Their strength is basic science and designing high performance and high precision equipment, not designing products and manufacturing processes for mass production and low cost. If basic science were the critical missing ingredient, then these laboratories might have an important role to play. That is not the case.

The reality is that many promising technology concepts already exist in prototype form, including fuel cells, ultracapacitors, flywheels, batteries, and lightweight materials. While it is certainly true that these technologies still need considerable improvement, the principal need over the next 10 to 15 years is not new science or new technology, but cheap technology. The challenge is to improve the performance and reduce the cost of these existing technologies; these are engineering and manufacturing challenges, for which the weapons laboratories have only passing expertise and little understanding. It may be a national priority to save the jobs and expertise of these institutions, but that goal may be only tangentially compatible with the goal of making cleaner and more energy efficient vehicles.

MYTH 3: Automakers are making a major commitment to commercializing advanced technologies and fuel economy.

Reality: Whatever internal R&D investments are being made by the Big 3, there is little evidence or reason to think that those investments will lead in a timely manner to commercialization. I provide the following five observations in support of this assertion.

1) Automakers are suing states to block adoption of electric vehicles. Yet electric drive technologies embedded in battery-electric vehicles are at the heart of any future vehicle developed by PNGV -- whether those vehicles are powered by fuel cells, flywheels, or some hybrid combination of ICEs and electricity. John Wallace, a director of the EV program at Ford has said in public that Ford will delay complying with ZEV mandates as long as possible. Automakers are large conservative, organization with huge investments in the status quo -- that is, in ICEs. They resist change.

2) Big 3 executives who are representing their companies in the Partnership appear to be not receiving full access to all technology under development by their company. The intent, understandably, is to protect key proprietary technologies from their competition and from regulators, who are seen as overzealous, intrusive technology forcers. The effect, through, is that companies downplay what they are doing and, more importantly, what they could do.

3) It is widely suspected that the Big 3 embraced PNGV largely to undermine CAFE standards and the ZEV mandate. Even the mainstream trade press of the auto industry believes this.

4) The Big 3 are aggressively excluding all but their principal suppliers from participating in the so-called "Partnership". They are excluding large and small technology companies that are already developing many advanced technologies and who are enthusiastic about doing so.

5) A special review panel created by the National Research Council to review PNGV states that, after more than a year, PNGV still was "unable to provide detailed and defined program plans, schedules, and milestones...." How enthusiastic can the 3 automakers be if it takes them over a year just to get organized?

MYTH 4: PNGV will accelerate commercialization of superclean and energy-efficient technologies.

According to a press release issued at the time of the PNGV announcement in September 1993, the goal of PNGV is to advance technology to the point where government regulation is no longer necessary: "to replace lawyers with engineers."

Reality: PNGV specifically rejects commercialization goals, production quotas, economic incentives, and regulatory requirements (including the ZEV mandate in New York, Massachusetts, and California). The only commitment by the Big 3 is to build a production prototype in 10 years. In contrast, I note that a handful of students and faculty researchers associated with me at the University of California, Davis, are planning to build a fuel cell car in 2 years. They will be working with a few technology companies who will supply the fuel cells and components. While this car admittedly will not be engineered to OEM standards, it will be built in 1/5 the time and at a tiny fraction of the cost.

So long as automakers feel no regulatory pressure to commercialize their research, the movement of technology from the lab to the marketplace will be slow.

SUMMARY AND RECOMMENDATIONS

There are many bright, hard-working people sincerely committed to the PNGV goals and working hard at attaining them. Indeed, a government-industry partnership of the type being forged could be highly effective in accelerating the development of advanced propulsion and vehicle technologies. But the promise is not likely to be realized unless some changes are made. I have four recommendations.

1) Expand the R&D partnerships well beyond the weapons labs and, especially, well beyond the major automakers. Closer links with other technology companies, should be forged. Doing so will take substantial effort on the part of the Administration, but the result is likely to be quicker commercialization of the research. The Big 3 perhaps should be allowed to direct the PNGV research agenda with incremental technologies such as some materials and manufacturing processes, since they and their suppliers are likely to be the principal users of that technology. But I would argue that the Big 3 should not play a central role with advanced propulsion technologies, given their ambivalence toward the introduction of new propulsion technologies (and new manufacturing processes premised on lightweight composite materials).

2) Provide real funding. How long will anyone stay committed, including my fellow panelists, Rob Chapman and Tim Adams, if no real funding is forthcoming?

3) Require commercialization agreements with manufacturers (or stiffened regulatory standards) in return for government funding.

4) Create small independent research facilities at universities and elsewhere to provide a benchmark of what is possible and to

evaluate progress by the Big 3 and their partners.

POSTSCRIPT NOTES:

1. Because of limited time for my presentation, I did not address one other important issue: the exclusivity and "first-come, first-served" nature of CRADA's, which are the principal means being used to transfer technology and know-how to the Big 3 and principal suppliers. I would suggest that closer scrutiny (and perhaps stricter limits) should be placed on proprietary agreements between national labs and private companies to make certain that the public interest is being protected. After all, taxpayers paid for all that research and technology at national labs; should it now be given free to a handful of huge corporations, especially when those companies are inhibiting their commercialization? A good reference on this subject is: M. Granger Morgan and Robert M. White, "A Design for New National Laboratories," Issues in Science and Technology, Winter 1993-94, pp. 29-32.

2. While I avoided the use of the term "corporate welfare," I addressed it in the form of myth #4, and recommendations 1, 3, and 4. By creating a more competitive environment for the funding, by creating a quid pro quo, by benchmarking their progress with "skunkwork" facilities, and by protecting the public interest in CRADAs, the specter of corporate welfare evaporates.