

Partnership for a New Generation of Vehicles:  
Challenges and Opportunities

Written Testimony before the  
United States House of Representatives  
Committee on Science, Space, and Technology  
Subcommittee on Technology, Environment, and Aviation  
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In September, 1993, the President, Vice President, and the leaders of Chrysler, Ford, and General Motors announced an ambitious joint initiative targeted to tripling automotive fuel efficiency within the next decade. Variouslly called the Clean Car Initiative, Super Car Program, or Partnership for a New Generation of Vehicles (PNGV), this collaborative effort will be led by an interagency team on the government side and by USCAR on the industry side. We welcome the opportunity to comment on the goals of this effort and to suggest issues that we feel must be considered as the pursuit of an environmentally more efficient vehicle moves forward. We will first make some general observations, then turn to a few of the specific issues the Committee has identified for discussion.

We would like to stress at the outset of our remarks that we applaud this initiative and strongly endorse its overall goals. We are particularly pleased that this effort shows evidence of true cooperation between industry and government in pursuit of sound policy objectives, improved fuel economy and a cleaner environment, or what our economist friends would call social goods. Such cooperation should confer a number of benefits. First, it should foster the development of appropriately balanced goals. Cooperative effort should ensure that the needs and preferences of both the automotive industry and society are considered and optimized simultaneously. This increases the probability that decisions will be made that properly reflect the complexity of the system that underpins our transportation use and vehicle production. In our view, regulation of the industry has all too frequently been narrowly conceived, often without full consideration of all of the consequences of the actions of the numerous agencies that oversee important different

aspects of industry activity. This has too often resulted in suboptimization at the total system level. For example, while one might reasonably argue that the costs of regulations targeted to safety, fuel efficiency, and clean air are all individually justified, their combined costs have driven up the price of cars by a substantial amount, slowing sales and thus the retirement of older vehicles in the fleet. Consideration of these regulations as a package might well have yielded initiatives that conferred greater environmental benefits to society at lower cost to consumers, while allowing the companies to pursue other necessary investments.

Second, cooperation is likely to promote the efficient use of resources to achieve those goals. Coordinated, cooperative effort should avoid duplicative and wasteful attempts by both industry and government, or by companies within the industry, in pursuit of the same solutions, while encouraging the exploration of alternative solutions. Industry analysts are still puzzled by the requirement in the 1970s that each of the Big Three independently pursue technologies to meet mandated emission requirements. The catalytic converter soon emerged from General Motor's Technical Center, as analysts expected, but after significant expenditures by AMC, Chrysler, and Ford.

Third, cooperation decreases the likelihood that the selected means will have unintended negative side effects for either the industry or society. The Corporate Average Fuel Economy (CAFE) standards undoubtedly provided the stimulus to the vastly improved fuel economy of today's cars. However, it did nothing to alter consumer preference for fuel efficiency, a preference that temporarily surged during the oil shocks of the 1970s, but quickly subsided to its historic low levels. Thus the domestic industry faced enormous investments to downsize vehicles, reconfigure drivetrains, and redesign engines to meet CAFE standards—investments with little market value. Meanwhile, they faced serious challenges from foreign manufacturers on performance dimensions of more significance to consumers, such as quality, reliability, and styling. Moreover, those manufacturers' home governments had long provided consumer incentives for fuel efficiency, resulting in more fuel efficient fleets, so CAFE standards imposed no constraints on them. The investments required by CAFE harmed the market competitiveness of domestic manufacturers during the late 1970s and early 1980s, and surely contributed to delaying until recently their competitive revival. Carefully crafted, staged increases in fuel taxes could have achieved fuel conservation goals and avoided competitive damage to the domestic industry.

We are not naive “cooperationists,” believing that industry and government can or should seek an absolute identity of interests across all economic, political, and social domains. Rather, we believe that these important institutions of our society must shift their historic adversarial stances, recognizing that areas of common as well as conflicting interests exist. The United Auto Workers and the Big Three are making a similar transition. They have recognized identical interests in some areas, and are successfully working together on those issues. Yet they still bargain hard over the legitimately conflicting interests and goals that will probably always characterize management-union relationships. They have learned to cooperate in some areas, and to contest in others, and both sides have rejected the “all-or-nothing” approach that often characterized the past.

We fully expect that conflicts will emerge as the details of the PNGV program emerge and take shape, but are confident that such obstacles can be reasonably resolved. Our Office has been deeply involved over the years in cooperative efforts, both within the industry and between the industry and state government. Such endeavors are rarely easy, but they can be extremely successful when both sides approach them with a problem-solving orientation and a commitment to seeking win-win solutions.

We also believe that PNGV can benefit from the technical contributions of both the companies and the various governmental agencies and the National Labs, the companies’ marketing experience, and the government’s expertise in policy means to achieve social goals. We think it is critical for the survival of joint efforts such as PNGV that both parties contribute and benefit. If the costs are perceived to be severely imbalanced, or the benefits one-sided, then the efforts will often deteriorate and lose momentum.

As we understand it, PNGV includes three broad objectives:

1. Developing advanced manufacturing techniques to enhance the U.S. industry’s competitiveness by more effective and efficient processes and reduced lead time required to deliver new products to domestic and international markets;
2. Developing technologies to support near-term improvement in automobile fuel efficiency, emissions, and safety; and
3. Undertaking research to support the development of production prototypes that triple the fuel efficiency of today’s vehicles.

These are broad objectives indeed, and some might believe them too broad. However, our general reaction is that these PNGV objectives address appropriately broad targets for industry-government cooperation, and we are heartened by their development to date. In particular, our experience in automotive research, ranging from technical refinements in engines to international comparisons of fundamental competitiveness suggests two important lessons. First, objectives for ambitious programs ought not to be frozen too early. Rather, they should be kept fluid enough to respond to new information, concerns, and realities. Such flexibility often yields better results than the original objectives could even envision. Second, a systems approach to automotive issues is absolutely essential. The vehicle and the industry are each too complex and interdependent to permit ready and easy separation of issues for consideration in isolation. This is particularly the case when the long term objective calls for sweeping and fundamental change, and that is certainly the case here.

Some might say these goals are too optimistic and simply not reachable. After all, it took the industry over ten years to double its vehicles' fuel efficiency under the pressure of CAFE standards, and those early gains were in many senses easier and more readily available than the gains required for a tripling of fuel efficiency over the coming ten years. This view certainly has merit, but we believe the goal of tripling fuel efficiency is a reasonable target. To be sure, we are not absolutely certain that PNGV can reach it, nor do we have a crystal clear idea of how one would best attempt to reach it. But in general we believe in "stretch" goals, those that take one beyond the realm of the familiar and well-understood, and spur creativity and innovation. While there certainly is a high risk of failing, there is some chance for achieving the goal. In our view, goals completely reasonable and reachable with today's technology offer little hope of the breakthrough technologies necessary for substantial improvement in fuel efficiency.

Again, we emphasize that we are here considering goals, our views of the appropriateness of these targets as mandates with penalties for nonattainment, would be quite different. Thus the California LEV/ZEV effort is a mandate that makes little sense to us, and we are confident will be rejected by consumers once they experience its consequences. In contrast, we see PNGV as providing incentives for the development of appropriate and effective technology, not forcing the deployment of vehicles whose excellence on one performance dimension is massively underwritten by inadequate performance on so many others.

The automotive industry increasingly has adopted a philosophy of continuous improvement, calling for it to make frequent, small changes that can cumulate to substantial changes over time. This philosophy has been forced on the industry by the realities of day-to-day competition and an increasingly demanding and sophisticated consumer. In the past, the industry tended to store up possible changes in process and product, and then tried to implement them as a package at the time of annual model change or at the introduction of a new vehicle. This approach ultimately encouraged a view of improvement that came to ignore the small steps and prized approaches that promised quantum leaps. In reality, of course, both kinds of change are important, and effective change strategies require both. That is why so many companies today pursue both continuous improvement and “business process reengineering,” the current term for radical or leap-frog improvement strategies.

We see the near term goals of the second objective as essentially a continuous improvement strategy in the fuel efficiency arena, calling for the development of a wide range of technologies that will improve the environmental performance of the vehicle. Most of these technologies will likely be minor refinements and improvements on the existing base. On the other hand, the third objective clearly calls for a technical leap, a breakthrough approach to improvement. We think this combination of efforts makes sense, since the incremental approach will probably provide some measure of improvement while we pursue the admittedly less likely breakthrough. Unfortunately, there are no quick fixes available to achieve the goals laid out by PNGV.

However, we are less comfortable that the third objective specifically calls for developing a production prototype vehicle. We think efforts under the third objective would better focus on the specific barrier technologies, such as the batteries necessary for a market acceptable and effective electric vehicle, hybrid powertrains, and advanced—and manufacturable—composites structures. Our concern is that effort will be diverted to developing the vehicle itself, rather than its key enabling technologies. In our view, the vehicle itself may be much less of a problem, and can be readily developed once the underlying necessary technology exists. The breakthrough effort requires laser-like precision in targeting those key enabling technologies, and must also avoid the politicization of the technical effort. This program must be driven by the need to develop and exploit world class technical and competitive capability, not by other criteria, such as job creation, however laudable such goals may be.

We are especially pleased to see the emphasis the first objective places on manufacturing techniques. Manufacturing is a key step in successful commercialization of any technologies developed or advanced under the PNGV effort, and it as an important element of the overall effort to achieve competitiveness. We have long argued that to the extent that the U.S. industry has faced competitive disadvantages in the technology arena compared to their major international competitors, the Japanese industry, that disadvantage has primarily been one of process rather than product technology. Moreover, the disadvantage in process technology has been concentrated far more in the softer, linking technologies—or techniques—of overall process layout, control, and efficiency rather than in the focused, hard technologies of the actual production machinery.

The entire product development process, from initial idea to the car on the dealer's lot, can benefit from focused efforts to improve manufacturing and design techniques. In fact, we would suggest that this objective might be broadened to encompass not just manufacturing techniques, but also the broader engineering, design, and management techniques that encompass all the business and organizational processes required to deliver a vehicle to market more quickly.

We also believe that it is important to recognize at the outset that the time constant in change equations for the automotive industry is very large. The size and complexity of the industry, combined with the complexity of the vehicle and the competitiveness of the market simply means that the industry realistically requires more time to implement substantial change than do smaller industries producing less complex products, often for less competitive markets. Battleships in heavy seas do indeed require more time to change course than speedboats on calm lakes. Perhaps none are more impatient for rapid change than the members of the industry themselves, but the past twenty years have amply demonstrated that trying to accelerate the pace of change beyond a feasible rate virtually always leads to slower change than more realistic schedules. Forcing the pace of change can lead to overlooking or only partially accomplishing important elements of the change effort, and often fosters resistance to the change itself.

For many years now our Office has published biennial technical forecasts for the automotive industry based on the views of technical experts both inside and outside the industry. A recurring pattern in those results suggests another important caution in evaluating the pace of change led by PNGV: the time lapse between a technology's development and its commercially viable deployment is typically longer than we anticipate.

Our experts rather consistently (although not always) overestimate the deployment rate of newer technologies. Quite simply, the process of taking a working technology from the development stage to commercial acceptance often requires additional major investments of capital, effort, and time. Technical feasibility does not automatically and readily convert to commercial success, and one cannot simply throw the technology over the wall and hope it succeeds. That transition must be carefully managed to maximize acceptance.

We turn now to some of the specific issues raised by the Committee. We interpret the first and fifth issues as both focused on the general question of the balance of the PNGV's objectives, its particular stress on fuel economy, and how this should relate to other vehicle performance criteria. As we suggested in our general remarks, we feel it is absolutely critical that vehicle improvement on a targeted dimension not be achieved at the expense of markedly decreased performance on other dimensions, including the important market factor of price. The automotive industry simply must respond to an appropriate balance of consumer demands, and, unfortunately, fuel economy ranks as an important purchasing criteria only in the price-sensitive entry level segment.

Elevating consumer concern for fuel economy is a daunting challenge. In 1974, the domestic fleet averaged 13.2 miles per gallon (mpg). By 1991, that average had risen to 27.3 mpg, so consumers driving 15,000 miles per year used nearly 600 gallons less fuel a year, saving about \$1.50 a day in gasoline purchases at \$1.00 a gallon. However, another improvement of 14.1 mpg would save fewer than 200 additional gallons of fuel, and, at \$1.00 a gallon, the consumer would spend about 50 cents a day less for gasoline. We believe that dramatic escalation in fuel economy is required to make fuel economy a more important purchase criteria. From that view, the stretch goal of tripling the 27.3 level makes sense, although it still will still save consumers only \$1.00 a day in the above example. The fundamental question remains: will consumers base vehicle purchases on fuel economy when fuel is so inexpensive that its marginal effect on operating costs is probably unnoticeable to most Americans?

In contrast, safety is an increasingly important consumer criteria, as evidenced by consumers' willingness to pay for safety equipment such as airbags and antilock braking systems. (By the way, these are two technologies whose commercial deployment was not overestimated by our Delphi experts.) However, if safety is valued by consumers, then we

would expect the automotive companies to expand and stretch their own research in this area, so perhaps it need not be a major focus of the PNGV, although safety should function as an important constraint.

The critical issue here is one of balance. The CAFE experience should have taught us that focused improvements in areas of low consumer concern that are achieved by surrendering performance in areas of high consumer concern are ineffective. They will slow sales, hurting the industry and the economy, and slow fleet turnover, delaying achievement of the goal. This dilemma is one reason why the pursuit of breakthrough technologies for fuel economy are particularly important: we must find ways of achieving improvements that might be noticeable to consumers, or that come at little or no expense on other dimensions. This calls for a breakthrough.

The second issue targets the important shift in the market from passenger cars to light duty vehicles, such as vans, pick ups, and sport/utilities. As these vehicles grow in popularity, they play a significantly increasing role in overall fleet performance. We are unsure what the appropriate research goals for these vehicles should be, but believe they probably must be somewhat different than passenger car goals. A major rationale for distinguishing these vehicles is their different use patterns. Pick ups, for example, have a different shape, reflecting the type, size, and weight they often carry. Moreover, pick ups are subject to great variation in load, as they might haul a heavy load of dirt one day and a shovel the next. We think the research goals must be sensitive to these differences.

The third issue addresses the coordination of research efforts to meet the California LEV/ZEV mandates and the PNGV goals, and here we simply lack the information to make an intelligent evaluation.

The fourth issue addresses the roles appropriate to different government agencies, and we have little specific to recommend here, since others are certainly more qualified to discuss the issue. However, we feel that it is critical that—whatever roles are appropriate—the actions and decisions of the various agencies be extremely well coordinated. Our work has persuaded us that when industry meets government it is terribly important that government speak with one voice, coordinating and rationalizing its demands and offers before presenting them to industry.



We also have seen too many such cooperative efforts become personalized, and success or failure too much determined by the personalities and relationships of a few key people. While this may be inevitable in the formative stages of such cooperation, we encourage the participants to institutionalize the relationships as quickly as possible. Otherwise one or two key personnel changes on either side can severely hobble the level of cooperation and the pursuit of the program's goals.

Again, we appreciate the opportunity to share these views, and would be happy to address any questions you might care to ask.

Thank you.

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Again, we appreciate the opportunity...  
and questions you might have...

Thank you