

Testimony to the U.S. House of Representatives Science Committee

Observations on the H-Prize Act of 2006 (H.R. 5143)

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by

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Good morning. My name is David Greene. I am a Corporate Fellow of Oak Ridge National Laboratory where I have researched transportation energy policy since 1977. The comments I offer the Committee today are mine alone and do not necessarily reflect the views of Oak Ridge National Laboratory, UT-Battelle or the U.S. Department of Energy. I am also a National Associate of the National Academies. I point out these two affiliations in the interests of disclosure since some of my comments below pertain to these institutions.

We are all aware that our country faces serious energy problems. Despite world oil prices at or near historic highs, U.S. net oil imports averaged 60% for the year 2005 and for the first three months of this year, as well (USDOE/EIA, 2006). According to estimates by the Energy Information Administration, oil imports added \$230 billion to our balance of trade deficit in 2005. By my own estimates, U.S. oil dependence costs, comprised of transfer of wealth to oil exporting countries and negative impacts on our Gross Domestic Product, amounted to approximately one quarter of a trillion dollars last year (Greene and Ahmad, 2005). By my best estimates, the economic costs of our oil dependence over the past three decades exceed \$3.5 trillion. These estimates do not include political, strategic and military costs which are difficult to estimate but clearly very large.

I know of nothing that could do more to solve our nation's energy problems in the long run than the creation of technologies to enable clean, efficient, economical hydrogen-powered transportation. However, major technological barriers stand in the way of achieving this goal. I endorse the following conclusions of the National Academies Committee on Alternatives and Strategies for Future Hydrogen Production and Use (NRC, 2004) with respect to the technological barriers to hydrogen powered transportation.

“There are major hurdles on the path to achieving the vision of the hydrogen economy; the path will not be simple or straightforward.

Specifically for the transportation sector, dramatic progress in the development of fuel cells, storage devices, and distribution systems is especially critical. Widespread success is not certain.” (NRC, 2004, p. 116)

The Department of Energy's Hydrogen, Fuel Cells and Infrastructure Technologies Multi-Year Research, Development and Demonstration Plan identifies three key "technology barriers" that must be overcome if the vision of hydrogen-powered vehicles is to be achieved.

- "Hydrogen storage systems for vehicles are inadequate to meet customer driving range expectations (>300 miles) without intrusion into vehicle cargo or passenger space.
 - Hydrogen is currently three to four times as expensive as gasoline.
 - Fuel cells are about five times more expensive than internal combustion engines and do not maintain performance over the full useful life of the vehicle."
- (USDOE/EERE/HFCIT, 2005, p. ii)

The H-Prize categories correspond well to the key areas in which breakthroughs are needed. As stated above, these are, (1) hydrogen storage, (2) fuel cell powertrain cost and durability, and (3) the cost of producing hydrogen, especially from renewable energy resources. A fourth critical area noted by the National Academy Committee is the sequestration of carbon if hydrogen is produced from fossil fuels. While this is indeed key to achieving the full environmental benefits of a hydrogen economy, I believe that the technological challenges in this area are not as great and, in addition, that it is not a problem peculiar to the use of hydrogen as an energy carrier. Other uses of fossil fuels will also likely require carbon sequestration.

From a scientific and engineering point of view, the needed technological breakthroughs appear to be independent. That is, a breakthrough in one area, e.g., on-board hydrogen storage, will not necessarily increase the likelihood of a breakthrough in fuel cells or hydrogen production. The fact that multiple, independent breakthroughs are needed magnifies the technological challenge. For this reason it is wise to mobilize creative thinking throughout our society.

I believe that H.R. 5143 would increase the likelihood of overcoming these technological barriers by mobilizing creative minds that might not otherwise tackle them. A substantial, prestigious prize provides motivation that an R&D contract cannot: a challenge with the promise of public recognition for scientific achievement. The H-Prize will also cast a wider net, potentially including individuals and organizations that would otherwise not be part of the hydrogen R&D effort.

Let me emphasize as strongly as possible that creating the H-Prize cannot substitute for adequately funding research, development and demonstration. It is sometimes said that science is 95% perspiration and 5% inspiration. The fact is, there is simply no substitute for sustained and concentrated effort. Thus, I see the H-Prize as a useful supplement to a well-designed and adequately funded R&D program.

H.R. 5143 clearly intends to isolate the H-prize competition from political considerations and conflicts of interest. This is not only the right thing to do but is essential if the H-prize is to provide the intended incentives for innovation. With this in mind, I believe it would be wise to specify in the legislation the independent third party to be responsible for selecting award winners. Designating an institution such as the National Academies that has a long and well established history of independent, objective assessment would make clear, in advance, that neither politics nor special interests would influence the selection of winners.

The draft bill states that the Secretary of Energy, through an agreement under section 3(c), shall assemble a panel of qualified judges to select the winner...” It is not clear to me from this language whether the Secretary of Energy has authority to appoint the judges or whether this authority would reside with the third party administering the competition. In my opinion, in order to avoid even the appearance of political influence in the selection of winners, the authority should be given to the independent third party.

Finally, I congratulate the Committee and its staff for listening to the expert panel it convened on the H-Prize, digesting their recommendations and incorporating them in this draft legislation. I wish you every success with this important initiative.

Thank you for your attention. I look forward to answering any questions you may have to the best of my ability.

REFERENCES

Greene, D.L. and S. Ahmad. 2005. “Costs of U.S. Oil Dependence: 2005 Update,” ORNL/TM-2005/45, Oak Ridge National Laboratory, Oak Ridge, Tennessee, January.

(NRC) National Research Council. 2004. *The Hydrogen Economy*, Committee on Alternatives and Strategies for Future Hydrogen Production and Use, National Academies Press, Washington, DC.

(USDOE/EERE) U.S. Department of Energy, Energy Efficiency and Renewable Energy. 2005. “Hydrogen, Fuel Cells & Infrastructure Technologies Program: Multi-Year Research, Development and Demonstration Plan,” Revision 1, February, 2005, Washington, DC.

(USDOE/EIA) U.S. Department of Energy, Energy Information Administration. 2006. “Weekly Petroleum Status Report, March 2006,” Table H1, Washington, DC.