

**Remarks of Douglas L. Faulkner
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Energy Efficiency and Renewable Energy
U.S. Department of Energy
at
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Opportunity"
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Thank you, Stephen (Stephen Director, Dean of the University of Michigan College of Engineering) for that introduction.

It's great to be back home in the Midwest today. Secretary Abraham was unable to attend today and asked that I extend his regrets.

As a former "Fighting Illini" I feel a little out-of-place standing here in Ann Arbor. We have never quite gotten over Illinois' defeat by Michigan in the NCAA basketball tournament of 1989 - - although just getting to the semi-finals is still a point of pride for us.

When Secretary Abraham asked me to represent him today, I realized that I would be hard-pressed to find a more appropriate venue to discuss the connections between alternative energy technology research, entrepreneurial leadership, and venture capital. And, since I will focus on revolutionary personal transportation technologies – both new types of vehicles and new fuels to power them – where

else should I be but in Michigan with its companies and institutions that “drive” the nation’s transportation sector?

I would like to take this opportunity to say that Michigan – and the entire nation – should be grateful that President Bush appointed your former Senator, Spencer Abraham, to be his Secretary of Energy. From the moment he assumed his post, his vision of the future and his strong leadership have helped change the long-running energy debate and the impact of energy on the lives of everyday Americans. This is particularly true in the critical area of transportation.

Through the direct involvement of Secretary Abraham, this nation’s personal transportation industries are starting to be transformed to reflect economic, environmental and political realities. Secretary Abraham’s thoughtful, step-by-step approach is redirecting the expectations of the transportation industry and the public. We stand on the cusp of revolutionary change in personal transportation in this country – and the world.

Through remarkable public-private partnerships, we are completely recasting this nation’s vision of personal transportation. Secretary Abraham has focused on an exciting future where vehicles will be fueled by hydrogen, not gasoline. Under his watch, we have cemented into place a steady stream of building blocks for the coming hydrogen future:

- In early 2001 in his first DOE budget, funds that once supported research on a prototype family sedan were

redirected to focus more on hydrogen-powered, fuel cell vehicles;

- In January 2002, he announced here in Michigan the FreedomCAR Partnership with the automotive industry;
- One month later, a national hydrogen strategic vision was published;
- In November 2002 the National Hydrogen Energy Roadmap was unveiled, outlining the challenges we face and suggesting a path forward to achieve the promise of hydrogen and fuel cells;
- And, also last November he hosted the Global Forum on Personal Transportation in Dearborn, bringing together an international audience of senior government, industry and academic officials to discuss opportunities in international cooperation on technology and transportation issues. At the forum he also announced a reinvigorated 21st Century Truck Partnership with that industry.

This is a critical time for our nation, a time when issues of energy security are near the top of anyone's list of formidable challenges. And Michigan's industries – particularly its transportation industries – have a very large stake in these national energy issues.

The facts are clear – more than two-thirds of the 20 million barrels of oil Americans use each day are used for transportation. As such, working with Detroit and the automotive industry to devise energy solutions is a key element for your federal government in ensuring a prosperous future for us all.

My office is working toward such a prosperous future where energy is clean, abundant, reliable and affordable. We are working to strengthen America's energy security, environmental quality and economic vitality through public-private partnerships that:

- promote energy efficiency and productivity;
- bring clean, reliable and affordable renewable energy technologies to the marketplace; and
- make a difference in the everyday lives of Americans by enhancing their energy choices and their quality of life.

This is a daunting challenge, but with the help of people like you, I believe we're well on our way to accomplishing these goals.

In his recent State of the Union Address, President Bush announced his groundbreaking plan to transform our nation's energy future from one dependent on foreign petroleum to one that utilizes the most abundant element in the universe – hydrogen.

He said: "Our...goal is to promote energy independence for our country, while dramatically improving the environment....The greatest environmental progress will come about not through endless lawsuits or command-and-control regulations, but through technology and innovation.

"...Tonight I'm proposing \$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles.

"With a new national commitment, our scientists and engineers will overcome obstacles to taking these cars from

laboratory to showroom, so that the first car driven by a child born today could be powered by hydrogen, and pollution-free.”

And, then just a few days later the President spoke again about energy independence in Washington, D.C., at an event featuring new uses for fuel cells including automobiles. The President fleshed out his commitment to his new Hydrogen Fuel Initiative and said, “The technology we have just seen is going to be seen on the roads of America. And it’s important for our country to understand that by being bold and innovative, we can change the way we do business here in America; we can change our dependence upon foreign sources of energy; we can help with the quality of the air; we can made a fundamental difference for the future of our children.”

The concept for this initiative is simple, yet profound – create automotive operating systems that run on hydrogen rather than gasoline. Hydrogen can be produced from diverse domestic sources, freeing us from a reliance on foreign imports for the energy we use at home. One thing is certain: demand for energy will continue to grow throughout this new century.

Department of Energy analysts foresee a 54 percent increase in demand for electricity...54 percent for natural gas...and 47 percent for oil...by the year 2025. We expect to see similar or even greater increases in energy demand all over the globe.

This energy challenge is further complicated by two additional factors. First, the United States today is 54

percent dependent on foreign oil; and that dependence is projected to grow to 68 percent by 2025. Second, despite our progress, we must continue to address environmental concerns surrounding the production and use of energy, including those related to motor vehicles.

From his first days in office, President Bush resolved to address these challenges and, in early 2001, released a comprehensive national energy plan which calls for a host of measures to diversify our sources of energy, expand our range of fuels, increase domestic energy production, and improve conservation and energy efficiency. The plan called specifically for the development of next-generation technology, including hydrogen and fusion.

My office is particularly involved in diversifying our energy supply through a broad range of renewable resources and new measures to improve conservation and energy efficiency across the board. We pay particular attention to the transportation sector, one of my Office's two Presidential priorities.

The President's State of the Union announcement focuses sharply on this last area. Today I want to describe our plan in more detail and explain why its implementation is critical to our nation's future.

Michigan's industrial sector has worked long and hard to improve its signature product. It produces the best vehicles in the world and strives to satisfy consumer demands for innovation. Detroit already has devoted a lot of attention to reducing emissions and developing new, more efficient vehicles. This is reflected in the hybrids and other

vehicle technologies now entering the fleet. These build on the good work Detroit has been doing for years – cars and trucks today are over 90 percent cleaner than they were in the 1960s.

And there will be no letup in efforts to make conventional vehicles run cleaner and more efficiently. My department is working with industry and other private institutions on cutting edge technologies to improve existing operating systems. Indeed, our latest budget submission requests significant increases in investment in R&D for hybrid technology and lightweight materials.

But, important as improving current technologies may be, they will not eliminate our dependence on oil nor will they completely eliminate harmful emissions. While we invest in these technologies in the near-term, we view them as a bridge to a hydrogen future, one radically different from today's carbon-based world. Secretary Abraham long ago challenged each and every one of us in the Department to change the way we do business and "leapfrog" the status quo. We have taken his charge very seriously and believe we have made great progress, particularly in the way we approach transportation technologies.

I am proud that the President has put the Department of Energy in charge of his pioneering hydrogen initiative. As President Bush said in the State of the Union address, the key to arriving at a hydrogen-powered future is embracing the basic scientific fact that a simple chemical reaction between hydrogen and oxygen generates clean energy. That energy, in turn, can be used to power motor vehicles.

Like all else though one thing depends on another. As we began placing greater emphasis on powering cars using hydrogen fuel cells instead of gasoline-powered internal combustion engines, we realized that we needed to jumpstart the development of hydrogen fuel cell operating systems. This, in turn, would require an entirely new kind of automobile, which we are aiming for in the FreedomCAR partnership.

The CAR in FreedomCAR stands for Cooperative Automotive Research. FreedomCAR is a public-private partnership between the Department of Energy and the U.S. Council for Automotive Research whose members include General Motors, Ford and DaimlerChrysler. Our collaboration seeks to develop generational leaps in new automotive technology. Getting to that future will be the equivalent of the shift from the horse-and-buggy to the Model T.

But, even as we announced FreedomCAR last year, we asked our partners to work with us to develop a comprehensive hydrogen vision and roadmap to help guide the way. It was an eye-opening process.

We discovered that the hoped-for, fuel-cell-powered car would be useless without hydrogen for refueling. So, in addition to the advances the FreedomCAR partnership promises, we must develop a hydrogen-based infrastructure like today's petroleum infrastructure. Without a hydrogen fuel infrastructure, fuel-cell powered automobiles of the future could not enter the mainstream of American life. No easy task.

Today's petroleum-based infrastructure has evolved over the past century. It represents well over \$1 *trillion* of investment. Forged in a competitive market, it is remarkably efficient, effective, and available everywhere. Drawn from the ground as crude oil half a world away, affordable gasoline makes its way to America's largest cities and smallest neighborhoods. And, it's still cheaper than bottled water.

Our shared vision of a hydrogen-fueled future depends upon this same availability. Drivers must be assured that hydrogen manufacturing plants and vast distribution and storage networks will allow refueling where and when they need it.

Some characterize this as a classic "chicken and egg" situation. But we believe it is not a question of which should come first – the *vehicle* or the fuel *system* that supports it. Rather, we have concluded that unless work is conducted in parallel – developing the vehicle and the infrastructure concurrently instead of consecutively – achieving our goal would take three decades or longer - - too long.

We simply do not have the luxury of this amount of time.

With an energized research and development partnership, we believe commercialization decisions by the private sector could be made as early as 2015.

We believe that the energy, economic, environmental and public health benefits that hydrogen fuel cell technology would bring demand that the federal government commit to

an expedited schedule. And we have made that commitment, without reservation.

Achieving our goals requires scientific ability; requires close working relations among industries, individual companies, foreign governments, federal agencies, and state and local officials; requires significant financial resources to support investments in high-risk R&D; and, most importantly, requires national resolve.

The participation of government is essential to coordinate the pre-competitive, high-risk research and development efforts of numerous private sector partners and to harness the unique expertise and capabilities of our national laboratories. Our tax dollars also will leverage billions of private sector dollars to ensure American corporate leadership in the global marketplace in a variety of fields. Government leadership will help resolve inherent challenges in revolutionizing a critical component of the nation's infrastructure. In parallel, along with the necessary codes and standards, these initiatives will overcome traditional barriers to institutional overhaul

These are steep requirements, but all signs point to an energy future based upon hydrogen. We need only to determine how fast to proceed. The President's answer is unequivocal – he wants a hydrogen "future" in our lifetime and he wants the United States to lead the way.

To succeed, the President is proposing to significantly increase hydrogen and fuel cell spending. Over the next five years, the federal government will spend \$1.7 billion on the

FreedomCAR and Hydrogen Fuel initiative, focusing on the following key areas;

- First, we must lower the cost of fuel cells by at least a factor of ten. To illustrate why this is so important, if we were to mass-produce today's fuel cell designs, energy would be produced for approximately \$300 per kilowatt. The comparable cost with today's modern internal combustion engine is \$30 per kilowatt.
- Second, we must significantly reduce the cost of *producing* hydrogen for fuel by increasing funding for efforts to produce hydrogen from clean coal, nuclear energy, and, especially, from renewable energy sources. Our goal is the equivalent of a \$1.50 gallon of gas by 2010.
- Third, we must develop new methods for storing hydrogen fuel aboard vehicles. Our goal is sufficient hydrogen aboard the vehicle – at ambient temperature and pressure – to allow the consumer to travel at least 300 miles between fill-ups.
- Fourth – and most critical – is our goal to overcome the range of infrastructure challenges.

Overcoming these barriers has the potential to transform our society on a scale achieved only by our greatest technological accomplishments – electrifying our cities and countryside; developing the internal combustion engine; creating the transistor or, harnessing the atom.

President Bush's commitment to the FreedomCAR and Hydrogen Fuel initiative will have a great impact on Michigan, America, and, the world:

- In the United States, meeting the FreedomCAR and Hydrogen Fuel program goals will mean reducing or even ending our long and dangerous dependence on foreign oil imports and reducing harmful emissions of pollutants, including greenhouse gases. The FreedomCAR and Hydrogen Fuel programs could result in mass-market hydrogen fuel cell vehicles and nationwide hydrogen fueling stations by 2020. By 2040, this could reduce light duty vehicle annual oil use by 78 percent; reduce overall U.S. petroleum use by one third; and reduce carbon dioxide emissions by 19 percent.
- For the world, the FreedomCAR and Hydrogen Fuel initiative will nurture whole new industries - - industries that will go way beyond the automotive industry to include probably some we can't even imagine today. Fuel cells will power homes and businesses; diverse and affordable energy supplies will strengthen economies; the geopolitics of oil will become less complicated since hydrogen fuels can be produced from a variety of feedstock and processes, including from fossil fuels and nuclear power plants; and the less developed countries of this world will gain access to the energy they need to prosper.
- In Michigan, the FreedomCAR and Hydrogen Fuel programs provide golden opportunities for individuals and businesses with vision, determination and expertise. These transformative technologies will help draw the blueprints for 21st Century economic success. Michigan communities and workers will be able to continue in their cutting edge role of shaping the manufacturing sector of the future.

- Overall, money spent on domestic transportation fuels and cars made-in-America means more money kept here at home to power our economy.

Before I close, I want to stress that we at the Department of Energy know that transportation systems are not made up of cars alone. While the FreedomCAR Partnership addresses the light-duty portion of our transportation R&D portfolio, we also are addressing energy efficiency in the heavy-vehicle sector.

The importance of the trucking industry to the nation cannot be overemphasized. It is a key element of our economy, hauling more than two-thirds of all freight tonnage transported in the U.S., and accounting for about 88 cents of every dollar spent on freight transportation.

Yet for all its importance to our economy, the trucking industry faces significant operating, environmental and manufacturing challenges, if it is to continue making a vital contribution to American life. The Department's new 21st Century Truck Partnership addresses these challenges. Ultimately we are pursuing a program that will produce safe, secure, and environmentally friendly trucks and buses that use sustainable and self-sufficient energy sources.

All of these are significant challenges. But they are challenges that we look forward to facing with our partners. And we will succeed.

Taken together, these initiatives are exactly the kind of effort that government should invest in because the potential benefits are so large. Government can catalyze

change. And, only the federal government can convene all of the interested parties for the National interest.

A great deal of work remains to be done, but the promise of a hydrogen future is real and achievable. Hydrogen presents us with the possibility of both a revitalized transportation and energy sector. We look forward to a world where safe, abundant and clean hydrogen is an everyday fact-of-life that underpins a growing standard of living.

This Administration's new budget submission to Congress includes the initial down payment on what will be a substantial, multi-year investment in achieving our long-term vision of an independent, zero-emission future. We will move forward aggressively to achieve our goals. We hope you will join us in this adventure.

Thank you. Any questions?