

Remarks by the Honorable Ray Mabus
Secretary of the Navy
Johns Hopkins Applied Physics Lab
Climate and Energy: Imperatives for Future Naval Forces
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Dr. Roca, thank you so much. I am glad to be back at Hopkins after a 40 year gap since my Master's. My topic today will be a discussion of quark-gluon plasma and its importance as a testing ground for finite temperature field theory within the broader field of quantum chromodynamics.

Wait, wrong speech. I thought I had to do that since I'm here at APL. I wanted to say that I lectured on Physics to my friend and colleague Steven Chu, Secretary of Energy. Once I tell him that and give him the topic, I'll have to change the course of the conversation pretty fast because it took me about thirty minutes of reading just to come up with that one sentence. Steven Chu was flying with Secretary of Agriculture Tom Vilsack who tells the story that Steven Chu had a large textbook on gravity. He asked him what he was doing and he said, I think I can prove Einstein's Theory of Relativity using gravity - certain constructs around gravity. Vilsack said, yeah, I think I can do that too.

So, I'm happy to be here, not to talk about chromodynamics, but to talk about energy. First I want to thank those of you at the Applied Physics Lab; thank you for what you do for our country every day. Your work with the Navy in putting together the Radar Hull study helped us determine the best shape for our future fleet and your work with the Naval Integrated Fire Control – Counter Air System will drive integration of all of our Fleet Air Defense capabilities over the near future.

Those of you who are here for the conference, it is great to see this crowd turn out to discuss the incredible importance that energy and the harmful effects of climate change will have on our Navy, our Marine Corps, and our Nation in the coming years. It is an area that I've talked a lot about and focused on in the 10 months that I've been in this job.

How we as a military and we as a country deal with the ramifications of these issues will have dramatic impacts on our military strategy, our military capabilities and our force structure throughout this 21st Century. Changing the way we use and produce energy, and the fallout from climate change, are fundamentally issues of national security.

This is not a new fact. Last week I was privileged to go to a premier of the HBO series *The Pacific*, which brings the campaign, particularly for the Marines, across the Southern and Central Pacific to the screen in a very vivid and graphic way. But when you watch the show, you're reminded that one of the chief underlying causes of the war in the Pacific was the competition to control the natural resources of Southeast Asia and ensure access to the sources of petroleum necessary to sustain the economic expansion and military might of Japan. That competition, in the 1930s and '40s, manifested itself in military operations and ultimately open conflict between the United States and Japan.

Today, competition for natural resources, specifically oil, still exists. We know that the global supply of oil is finite, we know it is getting harder to find and to exploit, and that much of it comes from volatile areas of the world susceptible to price and supply shocks largely outside the scope of our control. Demand for energy continues to rise, and although competition for additional energy has largely manifested itself as economic competition as opposed to military action over the past few decades, the potential exists that some triggering event could set off a chain reaction and bring parts of the world once again into open conflict based not on ideology,

but on a desire for resources and the corresponding desire to ensure access to those resources. Add in the additional pressures that Admiral Titley talked about earlier – a summer arctic free of ice in the next quarter century and loss of access to clean water - you add those in and you have the potential powder-keg of security challenges that have to be realistically confronted and deliberately addressed.

These geopolitical and strategic concerns are amplified by the tactical complications associated with energy use and the dependence of our ships, our aircraft, and our tactical vehicles on fossil fuels. Take, just for example, a Marine platoon operating from a forward operating base in Helmand or Nimroz Province in Afghanistan. In order to get fuel to them, in order to get a gallon of gasoline, first you have to take it by ship to Pakistan, get it into trucks, and truck it through the Hindu Kush, move it to the forward operating base, and only then does that fuel go into the tank of a fighting vehicle, an airplane, or generator, or a water purifier. At every stage of that process you add incremental cost, and more importantly you take a Marine away from doing the things a Marine ought to do - patrolling a city or conducting development - and you expose them to one of the most dangerous tasks in the theater– guarding a fuel convoy.

For the Navy, the argument is broadly similar – the less fuel that a ship or aircraft uses to do the same tasks, the more operational capability you provide to the tactical and fleet commander. To put it simply – fuel efficiency improves warfighting capability.

These arguments are absolutely compelling, and it is for these strategic and tactical reasons that I have committed the Navy and Marine Corps to meeting five comprehensive energy goals over the next several years. The most important of these targets requires that by 2020, half the Department of the Navy’s total energy consumption comes from alternative sources. The other major goal changes the way we award contracts. It requires industry to be contractually

accountable for meeting energy goals – and beyond that, we are also looking at the individual energy performance and energy footprint of competing companies when we make procurement decisions.

I've said before – these goals are ambitious, but it's been my experience that people tend to meet expectations. If you set high expectations, people will surprise you to reach beyond them. You set low-expectations, and that becomes a self-fulfilling prophecy and it becomes the standard. “Small dreams have not the power to move the hearts of men.”¹

Nothing big was ever accomplished without taking some bold first steps. And we are taking those first steps across the Navy and Marine Corps now.

Next month, April 22 – very appropriately Earth Day – we will conduct an airborne test of the Green Hornet, one of our F/A-18s, using a biofuel blend made with camelina. For those of you who don't know what camelina is, and I was certainly in your number until a few months ago, it is a grain related to mustard that can be grown in crop rotation with wheat all across the United States. This test will build on successful ground tests that we conducted last year and is critical as a proof of this concept. It will demonstrate that our systems can work on biofuel. After it is successful, and we are absolutely confident that it will be, we will move to expand biofuel testing to our marine gas turbine engines and to the engines of our tactical vehicles.

It is important to note that we are not doing this alone. We are working with a lot of partners in industry and in academia across America to improve biofuel production and continue research into both grain-based and algae-based biofuels. The Defense Advanced Research Projects Agency (DARPA) has been looking at algae-based biofuels over the past couple of years and they have pioneered some very promising work in Hawaii. If their work meets its

¹ Johann von Goethe

objectives, their algae ponds will be able to produce, at scale, an algal biofuel at affordable prices, prices perhaps approaching what we buy gas for today. That is amazing, and the commercial and security possibilities of this technology are fascinating.

Our partners in government see these possibilities. I've had meetings and conversations, we've signed agreements with both Secretary Vilsack at Agriculture and Secretary Chu at Energy and we have resolved to work together for more alternative energy, more biofuel research, and move these sources of energy forward. All three of us, and all across government, we recognize that there are tremendous economic and agricultural opportunities in alternative energy that our country has only begun to tap. We recognize that there is a new economy that can be based on these alternative fuels and that America can not be left as a non-participant in this new economy.

There are two objections that get raised in opposition to biofuel development. One is that they cost too much, and the other is that the infrastructure is not available to support them. But as folks like DARPA are proving, these challenges can be – and are being – answered. In supporting biofuels, we are providing one of the most important economic incentives to production – we are creating demand. Just for a moment imagine you are an energy company, and there is a customer that wants a specific kind of product – and that customer owns 4.4 million acres of land; that customer has 72,500 buildings, 50,000 commercial vehicles, 3,800 aircraft, 286 ships, and more than 900,000 employees. That customer is the Department of the Navy. You as that energy company and you as the people who finance energy development might want to investigate what the customer wants to buy. The market power of the Navy and Marine Corps is pretty big.

Together, these two services consume about a third of the petroleum power used in the federal government. And the federal government consumes 2 percent of all petroleum that the United States uses. So it's like the reverse of *Field of Dreams*, if we come, they will build it. As we build demand, the supply will come. And with this additional supply we'll be able to reap the benefits of some basic economics – greater supply will create some economies of scale and drive the price down. It becomes economically and fiscally responsible to do once the supply reaches a critical point. What we're doing is providing that demand for the supplier to meet.

You've got two parts of this. First, looking at alternative ways of producing and using energy. The second is making the energy that we use more efficient. Doing the same jobs, just using less energy to do it. We've made some significant strides there. Last year we commissioned the USS *MAKIN ISLAND*. On its first voyage from my home state of Mississippi, around South America to its homeport in San Diego, the *MAKIN ISLAND*, which has a hybrid drive system that switches to electric power at speeds of 10 knots or less, saved almost \$2 million in fuel costs. If you take the price of fuel today, the *MAKIN ISLAND*, over the lifetime of that ship, will save about \$250 million in fuel. If fuel prices increase, that savings will only go up. We are now investigating and prototyping similar systems on some of our DDG-51s, our *ARLEIGH BURKE* destroyers.

Ashore, we have invested a good bit in a lot of different alternative energy sources including solar power. Through the stimulus act, the American Recovery and Reinvestment Act, we've been able to contract more than 20MW of additional solar power. We could add another 40MW at Navy and Marine Corps installations in the Southwest through contracts we've signed this year. We started small, we had a baseline of 5MW and we are increasing our solar capacity by another 60MW over the next few years, which is the equivalent of powering 41,000 homes, or

about half the homes in Arlington, Virginia. Our other initiatives - wind, solar, ocean, and geothermal - across our bases are also looking promising, and I think you'll begin to see the results of these over the next few years.

Tactically, the Marine Corps is moving forward. That's really the only way the Marine Corps ever moves, is forward. Once they get a project, they are focused and they are aggressive in meeting that project. The Commandant of the Marine Corps and all Marines take energy seriously, because every Marine that guards a convoy is a Marine lost to the fight – and every dollar spent on gasoline is a dollar that could be better spent on armor, or weapons, or ammo, or equipment. To fix this, the Marines have established an experimental Expeditionary forward operating base at Quantico and they're testing the power and durability and savings of new energy-saving systems. As these systems prove reliable, they will be pushed forward to our Marines on the ground in Afghanistan. One has already made it. The Corps has deployed several solar-power water purification units across the country and they are providing cleaner, cheaper water.

All these measures are is a start, but it is important for of us to realize that they are only a start. To reach these goals, a lot more has to be done between now and 2020. It is up to the people in this room, the people who work in the Department of the Navy, to the individual Sailors and Marines in the Fleet, to make this future happen. I've spent a lot of time talking about this on the road to any audience that I can find, but words don't get stuff done. We have to get down to a lot more serious work now. One of the things I want to make sure the Department of the Navy does is to be absolutely open to any idea, absolutely open to anything that will help us meet these goals. To not have some predetermined idea that this is exactly the way we're going to get there. Were going to look at solar and biofuel, we're going to look at wind, nuclear,

ocean and geothermal energy. We're going to look at technological based efficiency measures, and by doing so, we're going to improve the range and endurance of our aircraft and our ships. We're going to reduce their vulnerability to a fragile supply chain, we're going to create a resistance to external shocks that come from over reliance on the global oil infrastructure, and we're going to bring down the carbon footprint of the Navy and the Marine Corps.

The stakes could not be higher. It will make us better fighters. But in the end, it is a matter of energy independence and it is a matter of national security. Our dependence on foreign sources of petroleum makes us vulnerable in too many ways. The stakes are clear and the stakes are high. Our response has to be equal to that challenge.

Thank you all very much.