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CLIMATE CHANGE: NATIONAL SECURITY THREATS

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CLIMATE CHANGE: NATIONAL SECURITY THREATS

WEDNESDAY, MAY 9, 2007

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The committee met, pursuant to notice, at 9:32 a.m., in room SD–419, Dirksen Senate Office Building, Hon. Joseph R. Biden, Jr. (chairman of the committee) presiding.

Present: Senators Biden, Kerry, Boxer, Nelson, Obama, Menendez, Casey, Lugar, Hagel, Corker, and Murkowski.

OPENING STATEMENT OF HON. JOSEPH R. BIDEN, JR., U.S. SENATOR FROM DELAWARE

The CHAIRMAN. The hearing will come to order.

Let me begin by saying we're honored to have the chairman of the Environment Committee here today, Senator Barbara Boxer, who has been in the lead on this issue of climate change in the Senate, and we're happy to—as a member of this committee, to have her here this morning in sort of a dual capacity. So—and I'm going to make an opening statement that's a little longer than I usually do, and than yield to Senator Lugar, but, with Senator Lugar's permission, maybe, if you have an opening comment, Senator Boxer, because this is something that is of such interest to you in your other—wearing your other hat.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM CALIFORNIA

Senator BOXER. Well, Mr. Chairman, I am so proud, as you know, to be a member of this committee. Both you and Senator Lugar are dynamic—a dynamic duo—and you're proving it yet again today with this hearing, which, if you asked many people, they wouldn't get the connection between the potential crisis we're facing on global warming and national security. But, as we'll learn today, there's a real nexus here.

I appreciate being called on first, because, at 10 o'clock, I have a hearing right down the hall at EPW about this very issue. So, let me just put my whole statement in the record and ask for about 2 or 3 minutes, if I might.

The CHAIRMAN. Without objection.

Senator BOXER. I also, Mr. Chairman, want to thank you personally and publicly for going on the Sanders-Boxer global warming bill. This was a bill that was really written by our great former colleague Senator Jeffords, the most far-reaching global warming bill

in the Senate. And I urge Senator Lugar to take a good look at it because it meets the threat head-on. It's the one that follows the scientists' recommendations in terms of what we need to do to reduce greenhouse gas emissions and save this planet, which I think is a moral and spiritual responsibility.

Well, clearly, we live in a time when numerous threats post risks to our great nation every day. We see it—we saw it yesterday, over at Fort Dix. We have these threats from terrorism, ongoing conflict, geopolitical instability. And here we have another threat, I say to my colleagues. Global warming poses a threat to our overall well-being. And the report we'll hear about today is not the first time we've heard that global warming and national security are related. And I just want to make a couple of quick points.

In 2003 the Department of Defense commissioned a report on this very subject, agreeing that unchecked global warming could create a large refugee population, shortages of food and water, and eventually lead to widespread conflict between nations. Now, I have to admit, in 2003 I didn't pay enough attention. I'll be completely honest here, it wasn't until we began reading more and more about it, and Al Gore came forward with "An Inconvenient Truth," and it is inconvenient—it is inconvenient to have to pay attention to this subject because we have so much else on our plate. That's why I commend you so much for it.

The IPCC report, Intergovernmental Panel on Climate Change, issued in March, underscored the fact that global warming could have national security and world security implications. In Asia alone, fresh water shortages could affect more than a billion people by 2050. In Africa, by 2020 up to 250 million people could face shortages of fresh water. You know, in California we have what we call "water wars." If you know the history of California, really all of the development took place—and I know both of you spend a lot of time in southern California, you—if you saw the movie "Chinatown," you get a little flavor of what really drove development: fights over water. And there was a book written, called "Cadillac Desert," about California, which basically made the point of how much we depend on water. Now, if you look at worldwide shortages of water—droughts and the like—we know that these shortages could cause conflicts and could have severe—severe—consequences.

So, I go through, in my statement, which will be printed in the record, a number of other problems that we face, beside droughts. We know that there'll be different kinds of problems with vectors, we'll have political instability, we'll have famine—more famine than we have now. But here's the good news. We can act with hope, not fear. And I think the fact that you're looking at this today gives me even more hope, because this is how I approach global warming: With hope; not fear. The last IPCC report said there is so much we can do, starting today, and they lay that out. We don't have to wait for some magic technology of the future. We don't have to wait for China to move. Since when do we wait for China before the greatest country in the World—America—does the right thing and leads the world with these technologies, which everyone will import, we'll have green-collar jobs, and the world will once again look to us?

So, I am so grateful to both of you for holding this hearing. I thank you very much. And, Mr. Chairman, again, for going on the bill, for doing all this work, you have my deep gratitude.

Thank you very much.

[The prepared statement of Senator Boxer follows:]

PREPARED STATEMENT OF SENATOR BARBARA BOXER

Thank you, Mr. Chairman for holding this hearing on climate change and national security. I also want to thank you, Mr. Chairman, for co-sponsoring the Sanders-Boxer bill to address global warming.

We live in a time when numerous threats pose risks to our great nation. This committee knows well the threats we face everyday to our national security, from terrorism, ongoing conflict, and geopolitical instability. This committee is also aware of the threat global warming poses to our overall well-being. But we now better understand how global warming and national security are closely linked.

The report we will hear about today is not the first time we have heard that global warming and national security are closely related. In 2003, the Department of Defense commissioned a report on this subject, agreeing that unchecked global warming could create large refugee populations, shortages of food and water, and eventually lead to wide-spread conflict between nations. These warnings are well founded. According to a recent report by the Intergovernmental Panel on Climate Change (IPCC), issued in March, global warming will have numerous impacts that could affect world-wide national security. For instance, in Asia alone, fresh water shortages could affect more than a billion people by 2050. In Africa, by 2020, up to 250 million people could face shortages of fresh water. World-wide, many millions of people will be flooded every year from sea-level rise by the 2080s. This could have severe consequences and create vast numbers of refugees.

The Center for Naval Analyses (CNA) report we will hear about today, which was authored by 11 retired Admirals and Generals is very significant. The report found that projected global warming "poses a serious threat to America's national security," and that global warming "acts as a threat multiplier for instability in some of the most volatile regions of the world."

The report also says that the impacts of global warming could further weaken governments, leading to political instability in already fragile regions and create conditions that are "ripe for turmoil, extremism, and terrorism." The report goes on to say that global warming impacts will likely increase the pressure on the United States and Europe "to accept large numbers of immigrant and refugee populations."

One of our greatest vulnerabilities for our security is our dependence on foreign oil. We send large amounts of money to politically unstable and unfriendly areas of the world by purchasing large amounts of oil. We need to find ways to reduce our use of oil through conservation and to promote the production of clean, home-grown renewable fuels. That way we can fight global warming and enhance our national security at the same time.

I hope the dire consequences that the Admirals and Generals have warned us about never come to pass. The way to make that happen is to act immediately to reduce greenhouse gases and stop global warming.

I look forward to hearing all of the witnesses' testimony.

The CHAIRMAN. Thank you, Senator.

Gentlemen, thanks for your patience. We're going to each make an opening statement. Then we'll yield to you gentlemen for your statements.

Let me reiterate what Senator Boxer just said. Under the leadership of Senator Lugar—and I want to make it clear, it is Senator Lugar who, we were having a discussion a couple of years ago, pointed out that he thought this committee should be focusing on the energy crisis, its impact upon our foreign policy. And Senator Lugar started a series of hearings, as chairman, and continues them now, as, essentially, the cochairman of this committee, focused on the national security threats that flow from our country's dependence on imported oil.

And—but we've moved beyond that now, and, as he has, as well, and we have—we've paid a very high price over the decades, not just financially, but also in securing the lifeblood of our economy; that is, oil. The hearings we held, and the cold hard facts they illuminated, have begun to change the debate. We're no longer simply asking—as you three gentlemen well know—we're no long simply asking what it takes to secure oil from foreign sources; we're asking new questions now: How do we move away from oil? How—and how soon—can we develop alternative technologies that can loosen the grip of the axis of oil on our economy and on our foreign policy? And how, in short, can we achieve real energy security?

This morning, we'll have a chance—we'll have a chance to change another very closely related debate, and that is how we talk about climate change. I have quoted, a number of times, the report that Senator Boxer referred to in 2003 by the Defense Department. And, quite frankly, when I started quoting it, in 2004, I don't think people really believed me when I'd be out, around my State, around the country, and involved in speeches to The Councils on Foreign Relations and things like that, and I'd quote it, and people would literally glaze over, like, I mean, "What do you really mean? There's a prospect that—how we deal with global warming—or fail to deal with it—could actually cause wars?" I mean, it literally was met with disbelief, until I realized I should start literally taking the report with me. But even that didn't seem to get much attention. And so, we're here to discuss, now, what has become much more apparent, an important new report by the Center for Naval Analysis Corporation on "National Security and the Threat of Climate Change."

With us are three very, very senior members of—and of this Military Advisory Board responsible for this study, and the real contribution of this report will be, I hope, to change the way we think about global warming, to add a whole new dimension to our discussions about global warming as a new and very different national security challenge and will change the way we calculate the risk we face and the way we calculate the cost and benefits of our energy and climate policies.

I want to welcome the witnesses today, who I'll speak to in just a moment, but—their very distinguished careers in the military, all retired: Admiral Joseph Prueher, who is U.S. Navy (Ret.) former Commander in Chief of the U.S. Pacific Command and former U.S. Ambassador to China; Vice Admiral Richard H. Truly, U.S. Navy (Ret.), former NASA administrator, Shuttle astronaut, first commander of the Naval Space Command; and General Charles F. Wald, U.S. Air Force (Ret.), former Deputy Commander, Headquarters, U.S. European Command.

I'm afraid those brief introductions aren't going to even begin to do credit to the contributions you've made to your country already and the outstanding service you're continuing to perform, but I do want to just acknowledge the incredible service you have provided over the decades, and I think maybe the service you're providing now may be among the most important that you've provided.

Though the report you have brought to us is striking, in my view, in several ways, first, this position on the science. Comprised of retired flag and general officers from all four services, the advisory

board brought to this task many combined decades of experience in analyzing risks. The intelligence they used in their uniformed careers to assess the threats facing this country range from atomic physics to, quite literally, rocket science. They understand the need for the best-available technical information. They also understand the need to make decisions in the absence of mathematical certainty. Here, in the words of one of the members of the board not with us today, General Gordon Sullivan, former Chief of Staff of the Army, and I quote, "We never have 100 percent certainty. We never have it. And if you wait until you have 100 percent certainty, something bad is going to happen on the battlefield." Well, this report moves us beyond the paralyzing debate over 100-percent scientific certainty. The authors have seen that the science is robust and convincing, and their conclusions—their conclusions call for action.

Second, I was struck by the clarity of the connections between the predictable effects of global warming and the human actions that we know will follow. The report warns us to expect profound shifts in the fundamental building blocks of nations and of economies. Climate change will reduce access to fresh water, impair food production, spread disease, erode coasts, and increase flooding, displacing millions, if not tens of millions, of people.

Then the report shows us the consequences. Throughout human history, disruptions on this scale almost always, and everywhere, meant war. In those nations already on the brink, governments will lack the capacity to cope. When that happens, we will either be drawn in early to mitigate the worst of the climate effects, or we will be drawn in later as a nation when a conflict has destabilized those countries.

This report shows how global warming will become a threat multiplier for instability and push failing states over the edge. And it also shows why delay, indifference, and inaction are simply no longer options.

Finally, I was struck by the positive, mission-oriented response of this report. Here are some of the report's recommendations:

Our National Intelligence Estimate, which we refer to up here as the NIE—our National Intelligence Estimates should, it's recommended, account for the threat of climate change. Senator Hagel has been a leader on this matter. I, and others on this committee, have joined him and Senator Durbin on their legislation calling for the incorporation of climate change into these National Intelligence Estimates.

Second, our defense strategy should also address the effects of climate change, as should our Quadrennial Defense Review. We know the threat, and our plans must reflect it.

The report calls for stronger national and international efforts by the United States to stabilize climate change. That means cutting deals that cut the greenhouse gas emissions that cause global warming. Senator Lugar and I, along with two dozens of our colleagues on both sides of the aisle, hope the Senate will soon be able to take up and pass our resolution calling for the return of U.S. leadership in global climate negotiations.

The assessment of this report is that our current efforts are not adequate to the threat we face. There is much more to be explored

here. So, I want to get to the testimony of our distinguished panel into our discussions, but I'll close with this.

Climate, energy, national security—these are all facets of the same single challenge. A strong domestic and international response that increases our energy security, that slows, stops, and reverses the buildup of greenhouse gases, that policy—that policy—will make us more secure. Absent—absent—such a policy, we will be less secure, physically less secure. Denial, delay, and half measures are not going to be the order of the day any longer, I hope, and this report is contributing mightily to that change. This report takes all excuses, in my view, off the table.

I'd now like to yield to my colleague Senator Lugar.

OPENING STATEMENT OF HON. RICHARD G. LUGAR, U.S. SENATOR FROM INDIANA

Senator LUGAR. Well, thank you very much, Mr. Chairman. I thank Senator Boxer for her generous comments about the hearing and our leadership. And I am honored to join you, Mr. Chairman, in welcoming our distinguished panel.

During the last Congress, as you pointed out, the Foreign Relations Committee held a series of eight hearings addressing the geopolitical consequences of energy imbalances and United States reliance on energy imports. In these hearings, we focused on quantifying the costs of the United States energy dependence and examining options for improving our energy security. We also explored in detail how energy is shaping our relationships with other nations, including India, China, Russia, Latin America, and the Persian Gulf states.

During—these hearings identified six fundamental threats to United States national security associated with our overdependence on imported oil and other fossil fuels. Each of these six threats is becoming more acute as time passes. Any of them could be a source of catastrophe for the United States and the world.

First, oil supplies are vulnerable to natural disasters, wars, terrorist attacks, that can disrupt the lifeblood of the international economy.

Second, as large industrializing nations, such as China and India, seek new energy supplies, oil and natural gas will become more expensive. In the long run, we will face the prospect that the world's supply of oil may not be abundant and accessible enough to support continued economic growth in both the industrialized West and in large, rapidly growing economies. As we approach the point where the world's oil-hungry economies are competing for insufficient supplies of energy, oil will become an even stronger magnet for conflict.

Third, adversarial regimes are using energy supplies as leverage against their neighbors. We are used to thinking in terms of conventional warfare between nations, but energy is becoming a weapon of choice for those who possess it. Nations experiencing a cutoff of energy supplies, or even the threat of a cutoff, may become desperate, increasing the chances of armed conflict, terrorism, and economic collapse.

Fourth, the revenues flowing to authoritarian regimes often increase corruption in those countries and allow them to insulate

themselves from international pressure and the democratic aspirations of their own peoples. We are transferring hundreds of billions of dollars each year to some of the least accountable regimes in the world.

Fifth, much of the developing world is being hit hard by rising energy costs, which often cancel the benefits of our foreign assistance. Without a diversification of energy supplies that emphasize environmentally friendly energy sources that are abundant in most developing countries, the national incomes of energy-poor nations will remain depressed, and that will have negative consequences for stability, development, disease eradication, and terrorism.

The sixth threat is the risk of climate change, made worse by inefficient use of nonrenewable energy. Our scientific understanding of climate change has advanced significantly. We have better computer models, more measurements, and more evidence, from the shrinking polar caps to expanding tropical-disease zones for plants and humans, that the problem is real, and is exacerbated by manmade emissions of greenhouse gases. In the long run, this could bring drought, famine, disease, and mass migration, all of which could lead to conflict.

Given these potential outcomes, the study by the Military Advisory Board is particularly relevant and timely. To adequately prepare our security and diplomatic forces for future threats, we need to understand how climate change might be a source of war and instability. We also must ensure that our military infrastructure can adapt to new circumstances, a component of which developing secure alternative sources of fuel. The American military is at the forefront of those working to develop energy resources that do not depend on the goodwill of unpredictable, and sometimes hostile, regimes from volatile regions.

As our 2006 hearings underscored, at just $60 a barrel, the annual import cost to the U.S. economy is well over $300 billion a year. This revenue stream emboldens oil-rich governments, and enables them to entrench corruption and authoritarianism, fund anti-Western demagogic appeals, and support terrorism.

As global oil demand increases and the world becomes more reliant on reserves concentrated in these regions, the likelihood of conflict over energy supplies will dramatically increase, and energy-exporting countries will have more opportunity to use their resources as leverage against energy-poor nations.

America is rich in coal, as are large developing nations, like China, India, and Ukraine. Coal remains a big part of the energy plans of many countries. The United States and the world are unlikely to be able to deal with climate change without progress on clean coal technologies.

The Pentagon is experimenting with coal-to-gas and coal-to-liquid technologies to fuel America's military. As the Pentagon moves to expand the use of coal fuels, it should simultaneously work to develop cost-effective carbon sequestration methods and cooperate with other agencies and entities engaged in this endeavor.

I've urged the Bush administration and my colleagues in Congress to return to an international leadership role on the issue of climate change. As Senator Biden has pointed out, we've cosponsored Senate Resolution 30, a resolution that advocates U.S. par-

ticipation in multilateral forums that attempt to achieve global solutions to the problems of greenhouse gases. The resolution is intended to find common ground in a debate that too often has been divisive and politicized.

Senate Resolution 30 is not an endorsement of the Kyoto Protocol, nor does it support a negotiated outcome that is not in the national security and economic interests of the United States. Supporting the resolution does not require one to suspend reasonable skepticism regarding the pace, severity, or causes of climate change; it does not advocate a one-size-fits-all policy. It acknowledges that greenhouse gas emissions of developing countries will soon surpass those of developed countries, and that a successful agreement will occur only if both developed and developing nations are involved.

Even those who are skeptical of prevailing climate-change science should recognize that absenting ourselves from climate-change discussions is counterproductive. Many nations and businesses across the globe are moving to respond to climate change in innovative ways. How the United States participates in these efforts will profoundly affect our diplomatic standing, our economic potential, and our national security.

We should also recognize that many of the most important steps that could be taken by the United States to address climate would yield benefits for other U.S. priorities, especially bolstering energy security, generating export markets for high-technology industries, strengthening our rural economy, and improving air quality.

Safeguarding the environment should not be viewed as a zero-sum decision in which limited resources must be diverted away from programs that more directly impact our immediate well-being. To the contrary, the environment and energy security are interlinked priorities, the advancement of which increases the welfare of all Americans.

I thank Chairman Biden for holding this timely hearing. I look forward to the testimony of our panel.

The CHAIRMAN. Thank you very much, Mr. Chairman.

Gentlemen, again, we appreciate, very much, your being here. If you will proceed in the order you were mentioned, I'd appreciate it.

Start with you, Mr. Ambassador.

STATEMENT OF ADMIRAL JOSEPH W. PRUEHER, USN (RET.), FORMER COMMANDER IN CHIEF, U.S. PACIFIC COMMAND, FORMER AMBASSADOR TO THE PEOPLE'S REPUBLIC OF CHINA

Ambassador PRUEHER. Thank you, Mr. Chairman, for your invitation to testify before this committee. I think you've introduced me sufficiently, I won't go through credentials and things here.

But today, I'm here with two colleagues——

The CHAIRMAN. I just have one question. Would you prefer being called "Admiral" or "Ambassador"? I'd rather be "Admiral," but it's up to you.

Ambassador PRUEHER. I answer that question that if an honorific is required, choose "Admiral." That was 35 years, and——

The CHAIRMAN. I'm with you.

Admiral PRUEHER.—"Ambassador" was 2.

The CHAIRMAN. Admiral, keeping going.

Admiral PRUEHER. The—I'm here with two of my colleagues, Air Force General Chuck Wald and Admiral Dick Truly. And I think one point should be that Dick Truly is a person who has a perspective on our planet that, I'd dare say, no one else in this room has, he's looked at it from a lot of different angles than the rest of us have, and he has a particularly valuable insight.

The CHAIRMAN. I think Senator Nelson got a little bit of a view——

Admiral PRUEHER. I think he did, too. That's right. We have a double view, there.

But each of us will touch on different parts of this issue, and, hopefully, among the three of us, will give you a sense of the complete picture, as we see it.

We were a group of other retired three- and four-star flag officers from the Army, Navy, Air Force, and Marine Corps, and we agreed to serve on this Military Advisory Panel to consider the potential impacts of climate change. By using our military experience, we were asked to—at a relatively high level—to assess the national security implications.

Now, I think—listening to the statements that the Senators on the committee have made, we may not bring issues to this that have not been mentioned, but perhaps we can recognize them and frame them in a way that will be helpful and be persuasive, as well.

And there are three basic points in my portion of the testimony that I'd like to stress:

First, there is a direct linkage between climate change and energy security for our Nation. As we work to address the answers to one of these issues, we also make progress toward the other.

The second point is, climate change will exacerbate many of the causes of instability that exist today in the world, and a lot of these instabilities are the underpinnings of extremism that we see in the world today.

The third point is that climate change is going to be an increasingly important national security issue.

Now, let me explain how we—our group arrived at his conclusions—at our conclusions. Like most of the other members of the board, I entered onto this endeavor with a good bit of skepticism, because there are a lot of conflicting reports surrounding climate science and about the factors that may drive climate change. But with all the scrutiny that we could muster—and we tried to look at it as objectively as we possibly could—all of us came to see that there are some really broad areas of agreement within the scientific community.

There are several facts on which almost all scientists agree:

One is that climate change is occurring and that it brings about warming changes in most regions.

Second, atmospheric carbon in the environment is higher than it's been in the last 400,000 years, and it is increasing.

Third, there is a linkage between the increased temperatures and the increased carbon levels, along with other greenhouse gases, in

the atmosphere. This relationship is a complex one, but it does exist.

And, fourth, that the reduction of atmospheric carbons, or arresting the increase, needs critical attention now from all of us.

There are other things that we don't know for sure. We don't know exactly what kinds of effects climate change may bring; we just know that there is a range of possible effects. On the low end of the spectrum, and the very likely things that we will see, are rising temperatures, increased storm intensity, and shifts in precipitation and drought patterns throughout the world. These are Katrina-like events that I'm talking about here.

On the higher end of the spectrum, the higher risk, we could see—maybe are not likely to see, but could see—dramatic shifts in weather, spread of infectious diseases, rapid loss of glaciers and sea-level rise.

Now, this range of projected environmental effects will, in turn, affect societies. I'm trying to go through a logic train here. If, as projected, precipitation patterns change, and already stressed nations, nations which have fragile environments which are struggling now to provide food, clothing, and shelter for their people—if we—as they affect nations like these, that the access to food and water can be limited, and extreme weather events, as they occur more frequently, can decimate the infrastructure of poorer nations. As some project, if sea levels rise, human migrations may occur, both within and across borders, and these are issues that can, and will, affect societies and nations. These changes beget security risks for us.

And, as you know, national security in—is discussed frequently, just having to do with guns and military strength. The people in this room are well aware that national security is defined as a confluence of political, military, economic, and cultural issues, and these all fit into the national security diagram. And when we—we risk a hazard when we don't consider all of these issues when we talk about national security.

Climate change can have an impact on each of these: The political, military, economic, and cultural. And these will be particularly true in the world's most volatile regions, where environmental and resource challenges have already added greatly to the existing political, economic, and cultural tensions. These instabilities that result create fertile ground for extremism, and these instabilities are likely to be exacerbated by global climate change. When we add it up, the—our view is that global climate change yields a group of challenges with which we have not yet grappled in a systematic way in our country.

I request that our report, Mr. Chairman, be included in the record of this hearing, so I'd briefly like to summarize our findings.

The CHAIRMAN. The full report will be included.

Admiral PRUEHER. Thank you.

[The report referred to by Admiral Prueher, "National Security and the Threat of Climate Change," can be viewed at the following web-site:

http://securityandclimate.cna.org/report/SecurityandClimate—Final.pdf]

Admiral PRUEHER. The are four fundamental findings:

Climate change poses a serious threat to America's national security.

Climate change acts as a threat multiplier for instability in the most volatile regions of the world.

Third, climate change will add to tensions in even stable regions of the world.

And, fourth, climate change, national security, and energy independence are a related set of global challenges, as has been pointed out before.

I know General Wall will offer rich detail on these findings and talk about our recommendations. Admiral Truly will touch on ways in which climate change will affect military commanders, moving forward. And with my remaining time, I'd like to make three quick observations.

The first is to complete the link and highlight that link between climate change and energy security. One can describe our current energy supply as finite, foreign, and fickle. And continued pursuit of overseas energy supplies, and our addiction to them, cause a great loss of leverage for our Nation in the international arena. Ironically, our focus on climate change may actually help us on this count. Key elements of the solution set to mitigate climate change are the same ones we would use to gain energy security. Focusing on climate is not a distraction from our current challenges, it may actually help us identify solutions.

Second point is, this issue is one that the United States alone cannot solve. If we in the United States do everything right from now on out, assuming what we know to do is right, the hazards of global climate change would not be solved. China, India, Brazil, other nations are integral to the global solution, but we can't use this as an excuse for inaction on our part. We must, instead, engage them on many fronts. Many issues of great importance to our world will not get solved without the United States and China working together. So, not talking to the Chinese, and not engaging them on global climate change, is not an option, or it's certainly not a useful option.

My third point, for military leaders our first responsibility is always to try to fight the right war at the right place in the right time. The highest and best form of victory for one's nation involves meeting the objectives that one seeks for the—as a servant of the nation without having to actually resort to conflict. It's a process of trumping the battle, if you will. It takes a great deal of planning, strategy, resources, and moral courage, but it's the higher art form for servants of the nation to use, and we need to use it in this way.

It seems like, to me, to be a reasonable way to think about climate and security. There are a great many risks associated with climate change. We don't know what they all are, and we also don't know what all the costs are. They're uncertain. But if we start planning and working now, we may be able to meet our security objectives and also mitigate some of the climate battles that we might face in the future. They will not—they will not attenuate, they will only get worse.

The potential and adverse effects of climate change could make our current challenges seem small. Facing and sorting these challenges for our Nation's leaders can be daunting. It will require vision, it will require perseverance and proactivity and courage, and it'll require thoughtful articulation. What we cannot do is wait.

And we're most grateful to the committee for asking us, and for considering this issue.

Thank you.

[The prepared statement of General Prueher follows:]

PREPARED STATEMENT OF ADMIRAL JOSEPH W. PRUEHER, USN (RET.), MILITARY ADVISORY BOARD TO THE CNA CORPORATION REPORT, "NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE"

Thank you, Mr. Chairman, for your invitation to testify before this committee.

My name is Joseph Prueher. I served the people of the United States for 39 years as a Navy officer. My last position in the Navy was as commander in chief of the U.S. Pacific Command. After retiring from the Navy, I served, under Presidents Clinton and Bush, as our Ambassador to China.

Today, I am here with two of my colleagues, General Chuck Wald and Admiral Richard Truly. We'll each touch on different parts of this issue; hopefully, the three of us together can give you a sense of the complete picture, as we see it.

Along with other retired three- and four-star Flag Officers from the Army, Navy, Air Force, and Marines, we agreed to serve on a Military Advisory Board to the CNA Corporation to consider the potential impacts of climate change. Using our experience as military leaders, we were asked to assess the national security implications of climate change.

In speaking to you today, here are the points I'd like to stress:

- There is a direct linkage between climate change and energy security. As we work to address one, we can make progress toward the other.
- Climate change will exacerbate many of the causes of instability that exist today. Those instabilities are part of the underpinnings of extremism.
- Climate change will become a significant national security issue. Now, let me explain how our group reached its conclusions.

Like most of the others on the board, owing to conflicting reports, I entered our discussions with skepticism about the arguments surrounding climate science and about the factors that might drive climate change. But with all the scrutiny we could muster, all of us came to see that there are some areas of broad agreement in the scientific community.

There are several facts on which almost all scientists agree. Climate change is occurring now, with warming trends in most regions. Atmospheric carbon is higher than at any point in the last 400,000 years, and is increasing. There is a linkage between increased temperatures and increased carbon levels (along with other greenhouse gases) in the atmosphere; that relationship is complex, but it does exist.

There are other things we don't know. We don't know exactly what kinds of effects climate change may bring—we just know there is a range of possible effects. On the low end, we are likely to see rising temperatures, increased storm intensity, and shifts in precipitation and drought patterns. These are Katrina-like events. On the higher end of the spectrum, we could see more dramatic shifts in weather, the spread of infectious diseases, rapid loss of glaciers, and sea level rise.

This range of projected environmental effects will in turn affect societies. If, as projected, precipitation patterns change, an already-stressed nation's access to food and water can be limited. If, as projected, extreme weather events occur more frequently, a poorer nation's infrastructure can be decimated. If, as some project, sea levels rise, human migrations may occur, likely both within and across borders.

These are issues that can, and will, affect societies and nations. These changes beget security risks.

As you know, national security involves much more than guns and military strength. The national security diagram consists of political, military, cultural, and economic elements. These elements overlap, to one degree or another, and every major issue in the international arena contains all of them. We risk our security when we don't consider the full range of these issues. And climate change has an impact on each of them. This will be particularly true in the world's most volatile regions, where environmental and natural resource challenges have added greatly to the existing political, economic, and cultural tensions. The instabilities that result now create fertile ground for extremism—and these instabilities are likely to be exacerbated by global climate change.

When we add it up, our view is that global climate change yields a group of challenges with which we've not grappled in a systematic way.

I request that our full report be included in the record of this hearing, so I will very quickly summarize our key findings.

- Projected climate change poses a serious threat to America's national security.
- Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world.
- Projected climate change will add to tensions even in stable regions of the world.
- Climate change, national security, and energy dependence are a related set of global challenges.

I know General Wald will offer some rich detail on these findings and will note our recommendations, and Admiral Truly will touch on the ways in which climate change will affect military commanders moving forward. With my remaining time, I'd like to make three quick observations.

The first is to highlight that link between climate change and energy security. One can describe our current energy supply as finite, foreign, and fickle. Continued pursuit of overseas energy supplies, and our addiction to them, cause a great loss of leverage in the international arena. Ironically, a focus on climate change may actually help us on this count. Key elements of the solution set for climate change are the same ones we would use to gain energy security. Focusing on climate is not a distraction from our current challenges; it may actually help us identify solutions.

Second, this issue is one that the United States alone cannot solve. If we in our Nation do everything right—assuming we know what is right—the hazards of global climate change would not be solved. China and India are integral to the global solution, but we cannot use this as an excuse for inaction. We must instead engage them—on many fronts. Many issues of great importance to our world will not get solved without U.S. and Chinese cooperation. Not talking to the Chinese about climate change is not a useful option.

My third point: For military leaders, the first responsibility is to fight the right war, at the right time, at the right place. The highest and best form of victory for one's nation involves meeting the objectives without actually having to resort to conflict. It's a process of trumping the battle, if you will. It takes a great deal of planning, strategy, resources, and moral courage, but that is the higher art form for a servant of the nation.

That seems to be a reasonable way to think about climate and security. There are a great many risks associated with climate change, and the costs are uncertain. But if we start planning and working now, we may be able to meet our security objectives, and mitigate some of those battles.

The potential and adverse effects of climate change could make current changes seem small. Facing and sorting these challenges, for our Nation's leaders, can be daunting. It will require vision, proactivity, courage, and thoughtful articulation. What we cannot do is wait.

I'm most grateful that this committee is considering this issue. Thank you.

The CHAIRMAN. We're grateful to you.

Admiral, let's do this the military way. I'll go to you next, since you were the next one referenced.

Thank you.

STATEMENT OF VICE ADMIRAL RICHARD H. TRULY, USN (RET.), FORMER NASA ADMINISTRATOR, SHUTTLE ASTRONAUT, AND THE FIRST COMMANDER OF THE NAVAL SPACE COMMAND

Admiral TRULY. Thank you, Mr. Chairman. Thank you for having us here today. And thank you for your introduction a little earlier. We, all three of us, appreciate it.

This—our Military Advisory Board—spent about the last 8 months dealing with this issue in many meetings. We had 11 members. Eight of the eleven members are retired four-stars. I had the privilege of being the junior officer on the group.

Our members had a wide range of experience—a former Ambassador, NASA Administrator, heads of things other than the military—in my mind, though, the thing that—the voices of experience that I really appreciated most were those, two of whom are sitting at this table, are former commanders or deputy commanders of U.S. forces in the very regions of the world that our report addresses, and that is the—Asia and the Pacific, Europe and Africa, and the Middle East.

I can tell you that we had spirited discussions, different points of view, and we certainly did not agree on everything. However, we did agree on the findings and recommendations that we're presenting here to your hearing today, and we did that because everywhere we looked, and no matter how long we examined the possibilities, we kept coming back to something that Admiral Prueher just mentioned, and that is the potential impacts of climate change—first, on the environment, and then the ways that those environmental stresses impact societies, and then those ways that those societal effects could turn into security consequences—led us to our findings and recommendations.

This is particularly true in the regions of the world where margins of survival are thin, where borders are uncontrolled, and where societies are already extremely stressed. It's really hard to see how we can avoid these areas become breeding grounds for further trouble.

One region that is particularly important, that General Wald will talk about from his personal experience, is in Africa. Another is in the Middle East.

In the Middle East, two natural resources dominate the discussion: First oil and its abundance, and then water and its scarcity. Climate change has the potential to exacerbate tensions over water, because projected—precipitation patterns are projected to decline in this area—some, as much as 40 to 60 percent—leading to more—even more trouble in this region that has a history of both stable and very fragile governments and infrastructures, and historical animosities between countries and religious groups.

Another threat is the combination of both observed and projected sea-level rise, with increases in violent storms, and the threat that they pose to coastal regions. Much of our critical infrastructure, both in trade and energy and defense, lies on our coasts. In the Pacific, particularly, and in some places in the Indian Ocean, there are literally low-lying island nations that are—that, depending on the level of sea-level rise, could literally be inundated. And we have, also, strategic military installations around the world that

are very low average elevation, such as in Diego Garcia, which is a principal strategic military facility that's critical to our Middle East operations.

Sea-level rise, when it occurs, and depending on its severity, also will pose a severe risk to the major river deltas of the world. One that General Wald will mention is the Niger River, in Africa, but, in addition, particularly the mouths of—the Ganges Delta, in the Bay of Bengal, comprising a large portion of Bangladesh and east India. This is one of the most densely populated areas on Earth, and it is also one of the most stressed areas on Earth. A small sea-level rise of—literally measured in inches could displace millions of people from this delta. And as—and what does this have to do with security? Well, as they turn around to walk to drier ground, they're also facing more of the most densely populated places on Earth, and also borders between Bangladesh, India, and east Pakistan.

Another thing that's going to be different about the national security pressures caused by climate change with those that we have been—we have experienced in our history, is also pointed out by the example that I just gave about river deltas. We are used to normally dealing with single conflicts that are generally geographically confined. However, in this case, if the Niger River Delta becomes stressed and flooded by sea-level rise, and the mouth of the Ganges becomes flooded, so will the Mekong, the Yangtze, the Nile, the Mississippi, all at the same time. And this has potentially overwhelming security challenges, and that's why we recommend that we begin to assess and plan for them now instead of later.

There will also be added tensions in stable parts of the world, including here in the United States. However, with our strength and wealth, we will be far better able to cope with internal stresses. But we will see them. Where I live, out in the West, it'll be water. At places down in the Mississippi Delta and other coastal regions, it may be storms and sea-level rise. But we have a much better chance of coping.

However, just south of us, the climate models predict major decreases in precipitation and rainfall, and—particularly in Mexico and the northern parts of Latin America, and that could pose additional immigration stresses on our southern border that we are already dealing with, but could possibly be exacerbated.

And the polar regions is another area that climate change will affect—again, at the same time as these others—and feel those effects sooner. In the Arctic Ocean, all indications are that the Northwest Passage that is—connects the Atlantic Ocean and the Pacific through Canada's high Arctic—in coming decades, is going to become navigable part-year, and, later this century, it's predicted that the Arctic Ocean itself will be ice-free in the summer, and—later in the century.

An example of an issue that will have to be dealt with—an international issue—is the fact that—is the Northwest Passage Canadian territorial water, or is it international water, open to navigation? This is a example of a international issue that will have to be dealt with, and caused by climate change.

In the polar regions, also, we've read a lot, and we heard a lot, about indications—and, in some cases, accelerating indications—of melting of the Greenland ice cap, and particularly, also, of the west

Antarctic ice sheet. This will directly affect sea-level rise. There's great uncertainty in the scientific community as to levels and timetables. But, in fact, they are major issues that will have to be studied.

Mr. Chairman, we came together today with just a few examples of what we spent a lot of time in the last several months—there are others—of the various elements of our national security—again, that Admiral Prueher mentioned—political, economic, cultural, and military issues that we believe the Nation should address as we look at the effects of climate change on our national security.

And I thank you very much for allowing us to be here.

[The prepared statement of Admiral Truly follows:]

PREPARED STATEMENT OF VICE ADMIRAL RICHARD TRULY, USN (RET.), MEMBER, MILITARY ADVISORY BOARD TO THE CNA CORPORATION REPORT, "NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE"

My name is Richard Truly, and I served more than 30 years on active duty in the U.S. Navy. Much of this period was on exchange duty with the Air Force and NASA, serving in both the national security and civilian space programs. My final Navy duty assignment was again at NASA, charged with returning the space shuttle to safe flight following the *Challenger* accident. I retired from the Navy in 1989 as a vice admiral, and was sworn in the following morning as Administrator of NASA. Following my departure from NASA in 1992, I served several years as director of the Georgia Tech Research Institute, then as Director of the Department of Energy's National Renewable Laboratory for 8 years. It was during this period that I began paying serious attention to the possibility of global warming, leading to climate change.

No issue could possibly be more global than the possibility of changes in the Earth's climate. During the 8 months that our Military Advisory Board debated these effects on our national security, we were fortunate to have such a wide range of senior military, diplomatic, and civilian agency experience and differing viewpoints at our disposal. Of particular importance, in my view, were the voices of experience from commanders of U.S. combat forces in Asia and the Pacific, Europe, Africa, and the Middle East as we explored the possible effects of changing environments in these regions.

We had quite spirited discussions about a range of issues from climate science to the causes of local, regional, and global conflict.

But we coalesced around a single set of findings and recommendations because everywhere in the world we looked, and the longer we examined the possibilities, we kept arriving at the same conclusion which Admiral Prueher mentioned—that the potential impacts of climate change inevitably exacerbate societal stresses, which in turn have potentially severe security consequences. This is particularly true in some of the regions of the world where margins for survival is already thin, borders are uncontrolled, and societies are extremely stressed. It's hard to see how these regions can avoid becoming breeding grounds for further trouble.

One of these regions is the Continent of Africa, which General Wald covered in some detail.

Another is the Middle East, long a tinder box of conflict. The natural environment of this region is dominated by two important natural resources—oil because of its abundance, and water because of its scarcity. Climate change has the potential to exacerbate tensions over water as precipitation patterns decrease, projected to decline as much as 60 percent in some areas. This suggests even more trouble in a region of fragile governments and infrastructures and historical animosities among countries and religious groups.

Observed and projected sea level rise coupled with the predicted increase in violent storms poses a new threat to coastal regions. Some of our most critical infrastructure for trade, energy, and defense is located on our coasts. Further, a number of low-lying island nations, particularly in the Pacific and Indian Oceans, could literally be under threat of inundation in coming decades. Some of our strategic military installations are located on low-lying islands, such as Diego Garcia, which is a critical base of support for our Middle East operations.

Major river deltas are at severe risk from projected sea level rise. General Wald discussed the consequences of the Niger River Delta flooding; other examples that could pose disastrous conditions are the Nile Delta in Egypt, and of course the

Mouths of the Ganges Delta in Eastern India and Bangladesh, one of the most densely populated and stressed locations on the planet. Sea level rise has the potential to displace tens of millions of people from this area with potentially serious destabilizing effects in a region that is strategically and economically important to the United States.

These potential river delta floodings also point out a major difference in national security threats caused by climate change than those we are accustomed to. Normally, we deal with single isolated conflicts in generally confined geographical areas. But when the Niger Delta floods, so will other rivers such as the Nile, the Ganges, and the Mississippi, for example. This could present overwhelming security challenges for our military in widely dispersed areas of the world.

Projected climate change will add tensions even in stable regions of the world, including the United States, although our strength and wealth places us in a far better position to cope. But prolonged declines in rainfall in Mexico and Latin America predicted by climate models could exacerbate an already challenging immigration situation on our southern border.

Polar regions feel the effects of climate sooner, and more acutely, than lower latitudes. All indications are that the Northwest Passage connecting the Atlantic with the Pacific Ocean by way of Canada's high Arctic will be navigable part year within a decade or so, and ice-free in summer later in the century. The United States considers the Northwest Passage as international waters free to navigation, but Canada considers it territorial waters. We anticipate many countries will push for the passage to be declared an international waterway—including the European Union, Russia, and others. This would pose an international issue, directly caused by climate change, to all the nations bordering the Arctic Ocean.

These are but a few examples of how the expected effects of climate change can lead to increased stress on populations and increased strife among countries. In the national and international security environment, climate change threatens to add new hostile and stressing factors. We believe that climate change, national security, and energy dependence are a related set of global challenges.

As Admiral Prueher pointed out, our security revolves around issues that are political, economic, cultural, and military in nature. We have concluded that the potential effects of climate change warrant serious national attention, and I want to thank the committee for addressing this serious and important issue.

The CHAIRMAN. Thank you very much.

General Wald.

STATEMENT OF GENERAL CHARLES F. WALD, USAF (RET.), FORMER DEPUTY COMMANDER, U.S. EUROPEAN COMMAND

General WALD. Thank you, Mr. Chairman and Senators.

As was introduced earlier, I'm Chuck Wald. I recently retired from the U.S. Air Force after 35 years of service. And during my career I was stationed overseas for more than 15 years, the majority of the time in Europe and the Middle East. And in my last assignment I was the deputy commander, as was mentioned, to the United States European Command, in Stuttgart, Germany, which is somewhat of a misnomer, because European Command includes 91 countries, including Africa and—most of Africa, the Middle—some Middle East countries, and the Caucasus.

As part of my duties as the deputy commander, I traveled extensively and spent a considerable amount of time in countries facing significant challenges, economically, politically, and environmentally, as was mentioned earlier by the admirals.

The countries facing the greatest obstacles to stability and prosperity were in Africa, in my estimation. In European Command, we believed a new model of engagement was necessary to adequately address the issues required to create a stable and productive and secure environment. This is particularly true in Africa, where nontraditional threats to stability, like massive health issues due to extensive HIV/AIDS problems, malaria, limited-to-nonexistent infra-

structure, and poor governance all contribute to a very volatile and potentially explosive situation. These factors will likely be severely complicated by shifting weather patterns, due to climate change.

Beyond the more conventional threats we traditionally address, I believe we must now also prepare to respond go the consequences of dramatic population migrations, pandemic health issues, and significant food and water shortages due to the possibility of major climate change.

I would like to offer a bit more detail on how we, as a group, see climate change as a national security issue, and I'll do that by focusing on Africa.

If we look at one country—Nigeria—we can get a sense of how projected environmental impacts could easily become serious security challenges. Even in a time of relative stability in Nigeria, there is very little governance, and very limited capacity to provide huge numbers of people with the basics, such as electricity, clean water, healthcare, or education. That's the situation today, and it's a very tenuous environment.

If Nigeria's access to fresh water is reduced, or additional stresses are placed on food production, which could be a result of projected changes in rainfall patterns, millions of people would likely be displaced. And, as Dick mentioned, if the Niger Delta were to be flooded from sea-level rise, or if major storms damaged oil drilling capacity, the region would lose its primary source of income. Again, millions of people could be displaced. And I've personally spent time in Lagos, several times, and the best description I could make of it is, it's like a Mad Max movie. There's probably—they claim 6½ million people live there. I think the real number is more likely 17 million. Most of them live on stilts on the water, and it's the most abject poverty I've ever seen. And I think if, as Admiral Truly mentioned, there was no way that the Nigerian Government could really handle that problem.

The other part of Nigeria that I think is incredible to many is its population is 160 million people today, estimated, which is larger than Russia, and their population is very dramatically split between the north and the south, with Muslims in the north and Christians in the south. They've recently had an election in Nigeria, as you all know, and, while we were there, we visited with the President several times. The political environment there is complicated by the fact that they have 250 political parties and over 250 dialects. So, you're talking about a country that has huge problems. And the stresses that could be placed on them would add dramatically to the existing confusion and desperation, and place even more pressure on the Nigerian Government, and it makes the possibility of conflict, I believe, very real.

One of the issues we worked on in European Command was: What would we do if there was a major civil disruption in Nigeria? And one of the complicating factors, there are 36,000 Americans in Nigeria today, in various capacities, which, obviously, as the military, that's one of our functions, to ensure their security.

If we look at the—Darfur, for example, we can see that the impact of climate change is not just an issue off in the distant future, it's having an effect on security today. The conflict in Darfur has many root causes, but one of its key instigators was driven by cli-

mate. Long periods of drought resulted in the loss of both farmland and grazing land to the desert. The loss of grazing lands led to nomads to migrate southward in search of water and herding grounds. This, in turn, led to the conflict with the farming tribes occupying those lands. With the added stresses of population growth and ethnic and tribal differences, the competition for land became violent. It's a perfect case study of how existing marginal situations can be exacerbated beyond the tipping point by climate-related factors. It's also why we refer to climate change as a threat multiplier. The Darfur region was already fragile and replete with threats, but those threats were multiplied by the stresses induced by climate change.

The same could be said of Somalia, where alternating flood—drought, and floods led to migrations of varying size and speed. A prolonged instability grew out of those conditions, and the warlords capitalized on it. It's a glimpse at how climate change can cause the type of instability and failed states that lead to extremism and terrorism. Ungoverned spaces filled with desperate people are also the perfect recruiting ground for terrorist groups.

These examples are all from Africa. And I think for—there are many reasons why Americans should be concerned about Africa and African security issues. For example, there are many exotic minerals found only in Africa that have essential military and civilian applications to the United States.

We import more energy from Africa than we do from the Middle East today, and I think that would probably shock a lot of people. And that share of energy imports will grow in the near future. There are predictions that by 2015, the United States will import 40 percent of our oil from the west coast of Africa. By the way, that oil is sweet crude, and they tell me that you can pump it out of the ground and put it in a diesel car and drive it, so it's very appealing to us. But for those that have been to Africa, as Senator Hagel has visited with me several times there, their capacity to do maritime security is very, very limited to almost nonexistent.

Other powerful nations, including China, are taking a keen interest in Africa, largely because of oil and mineral resources.

And there is also a very human suffering taking place in Africa. Even in the context of security discussions, this reason matters, because part of our security depends very much on remaining true to our values as a nation. It's also important to note that the examples I have given, while all from the African Continent, can be replicated elsewhere. Our view is that climate change could be a threat multiplier in every global region.

I'd like to finish by very briefly noting the recommendations—and I won't read them now; as the chairman mentioned, they'll be read into the record and were alluded to by Admiral Prueher, as well—but I would like to mention that the Military Advisory Board drew a very narrow line in making these recommendations, not wanting to stray too far from national—the national security area of expertise that we all have. But, as Admiral Prueher mentioned and others have stated, security is a broad field, and enhancing our Nation's security is certainly not the sole purview of the Department of Defense.

There are many steps we can take as a nation to enhance our security. Some of these steps include reconsidering our energy choices and our carbon emissions. Some initiatives will include engaging with other nations, working together to bring about changes that will improve our environment. Some of the steps will be as difficult as they are necessary.

And I'm very grateful to this committee—that this committee understands this and has chosen climate change—chosen to consider climate change through the very important prism of our national security. Your decision to address this matter is, by itself, an important statement, and I thank you very much.

[The prepared statement of General Wald follows:]

PREPARED STATEMENT OF GENERAL CHARLES WALD, USAF (RET.), MEMBER, MILITARY ADVISORY BOARD TO THE CNA CORPORATION REPORT, "NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE"

I am Chuck Wald and I recently retired from the U.S. Air Force after 35 years of active duty service. During my career I was stationed overseas for more than 15 years, the majority of the time in Europe and the Middle East. In my last assignment I was the deputy commander of United States European Command in Stuttgart, Germany. European Command's area of responsibility includes 91 countries in Europe, Eurasia, the Middle East, and Africa.

As part of my duties as the DCOM of European Command, I traveled extensively and spent a considerable amount of time in countries facing significant challenges economically, politically, and environmentally. The countries facing the greatest obstacles to stability and prosperity were in Africa. In European Command, we believed a new model of "engagement" was necessary to adequately address the issues required to create a stable, productive, and secure environment. This is particularly true in Africa where nontraditional "threats" to stability, like massive health issues due to extensive HIV–AIDS problems, malaria, limited to nonexistent infrastructure and poor governance all contribute to a very volatile and potentially explosive situation. These factors will likely be severely complicated by shifting weather patterns due to climate change. Beyond the more conventional threats we traditionally address, I believe we must now also prepare to respond to the consequences of dramatic population migrations, pandemic health issues, and significant food and water shortages due to the possibility of significant climate change.

I want to offer a bit more detail on how we as a group see climate change as a national security issue. And I'll do that by focusing on Africa.

If we look at one country—Nigeria—we can get a sense of how projected environmental impacts could easily become serious security challenges. Even in a time of "relative" stability in Nigeria, there is very little civil governance and very limited capacity to provide huge numbers of people with the basics—such as electricity, clean water, health care, or education. That's the situation today—it's a very tenuous environment.

If Nigeria's access to fresh water is reduced or additional stresses on food production—which could be a result of projected changes in rainfall patterns—millions of people would likely be displaced. If the Niger Delta were to be flooded from sea level rise, or if major storms damaged oil-drilling capacity, the region would lose its primary source of income. Again, millions of people could be displaced. There really is no controlled place in Nigeria for displaced people to go, no organically controlled capacity for an organized departure, and an extremely limited capacity to create alternative living situations. And the movements would be occurring in a country with a population of 160 million people that is split geographically between Muslims and Christians. These stresses would add dramatically to the existing confusion and desperation, and place even more pressure on the Nigerian Government. It makes the possibility of conflict very real.

If we look at Darfur, we can see that impact of climate change is not just an issue off in the distant future; it is having an affect on security today. The conflict in Darfur has many root causes, but one of its key instigators was driven by climate. Long periods of drought resulted in the loss of both farmland and grazing land to the desert. The loss of grazing lands led the nomads to migrate southward in search of water and herding grounds. This, in turn, led to conflict with the farming tribes occupying those lands. With the added stress of population growth, and ethnic and tribal differences, the competition for land became violent. It is a perfect case study

of how existing marginal situations can be exacerbated beyond the tipping point by climate related factors. It is also why we refer to climate change as a "threat multiplier." The Darfur region was already fragile and replete with threats—but those threats were multiplied by the stresses induced by climate change.

The same can be said of Somalia, where alternating drought and floods led to migrations of varying size and speed. A prolonged instability grew out of those conditions—and the warlords capitalized on it. It's a glimpse at how climate change can cause the type of instability and failed states that lead to extremism and terrorism. Ungoverned spaces, filled with desperate people, are also the perfect recruiting grounds for terrorist groups.

These examples are all from Africa, and I think there are many reasons why Americans should be concerned about Africa and African security issues.

- Many exotic minerals, found only in Africa, have essential military and civilian applications.
- We import more energy from Africa than the Middle East today—probably a shock to a lot of people—and that share will grow significantly in the near future.
- Other powerful nations, including China, are taking a keen interest in Africa, largely because of oil mineral resources
- There is also the very real human suffering taking place in Africa. Even in the context of security discussions, this reason matters, because part of our security depends very much on remaining true to our values as a Nation.

It's important to note that the examples I have given, while all from the African Continent can be replicated elsewhere. Our view is that climate change could be a threat multiplier in every global region.

I'd like to finish by very briefly noting the recommendations made in the report, "National Security and the Threat of Climate Change." As a group, we made the following recommendations:

- The national security consequences of climate change should be fully integrated into national security and national defense strategies. The intelligence community should incorporate climate consequences into its National Intelligence Estimate. In this regard, we support the legislation introduced by Senators Durbin, Hagel, and Feinstein calling for a National Intelligence Estimate on Global Climate Change.
- The United States should commit to a stronger national and international role to help stabilize climate changes at levels that will avoid significant disruption to global security and stability.
- The United States should commit to global partnerships that help less developed nations build the capacity and resiliency to better manage climate impacts.
- The Department of Defense should enhance its operational capability by accelerating the adoption of improved business processes and innovative technologies that result in improved U.S. combat power through energy efficiency.
- The DOD should conduct an assessment of the impact on U.S. military installations worldwide of rising sea levels, extreme weather events, and other possible climate change impacts over the next 30 to 40 years.

The Military Advisory Board drew a very narrow line in making these recommendations, not wanting to stray too far from our National Security area of expertise. But as Admiral Prueher and others have stated, security is a broad field, and enhancing our Nation's security is certainly not the sole purview of the Defense Department. There are many steps we can take as a nation to enhance our security. Some of those steps include reconsidering our energy choices and our carbon emissions. Some initiatives will include engaging with other nations, working together to bring about changes that will improve our environment. Some of the steps will be as difficult as they are necessary. I'm very grateful that this committee understands this, and has chosen to consider climate change through the very important prism of our national security. Your decision to address this matter is, by itself, an important statement.

The CHAIRMAN. Thank you very much, gentlemen.

With the chairman's permission, we'll go—7-minute round. Does that make sense?

Let me begin. Admiral Prueher, may I ask you—that in this—in understanding and planning national security threats, what would you say to someone who would argue that we're already stretched pretty thin, and that we shouldn't glorify an environ-

mental issue by treating it as a national security threat, and therefore we shouldn't put a burden on the intelligence communities to make it part of their National Intelligence Estimate?

Admiral PRUEHER. Yes, sir.

The—I think the response to that is the—it's the—we have urgent issues, and—urgent and important issues. This is one that is important, and is in the process of becoming urgent. I think the question implies that our accountable and responsible commanders, and our accountable and responsible agencies in government, are pretty well stressed right now, they've got a lot on their plate, they're dealing with the day-to-day fires that are licking around their ankles. This is—this issue of global climate change is one that we have the benefit of time to think about it in advance, it is one that we need to start to deal with it now, or it will become a very urgent issue that licks around our—the fires lick around our ankles all the time.

So, the—we do need to spend some resources on it, and we need to get ahead of this issue. And it's important, because there is momentum to climate change, as well as just a static condition. And the momentum is already going on. Even if we do nothing right now, it'll continue to—the situation will continue to worsen.

And—but what we—we need to look at it, and assess it, and the—the point, I think, of putting it in a National Intelligence Estimate, which we talked about in our report, I don't think the members of the committee would break our pick on having it just put in the National Intelligence Estimate, but it needs to be in the national security directives, the national strategy session, and the Quadrennial Review. It needs to be elevated to a position where it gets proper attention.

The CHAIRMAN. My recollection of the 2002 report the Pentagon did, there was discussion about a breakpoint here, that if, at some point, we didn't begin the—there's a point at which our ability to respond to climate change is going to be vastly limited. It relates to atmospheric changes, when—the ocean warming, the—and so on and so forth. But I won't bore you with it. Did you guys look at whether or not—you know, you used the phrase, "We have some time"—how much time we have before the world has to begin to reverse this process or it really becomes—it gets out of reach in being able to actually control it?

My recollection was that that report—and I don't have it in front of me, and it's been a year since I've read it. There was a debate about the year 2040, or in that range. I mean, did you guys discuss any of that, in—or is that—did you not deal with that piece?

Admiral PRUEHER. We did. And let me take a moment, and then I'll ask my colleagues——

The CHAIRMAN. If you'd be brief, General, because my time—I only have 3 minutes left. The answer—did you look at it, or not?

Admiral PRUEHER. Yes.

The CHAIRMAN. OK; good. That's the first thing I wanted to ask.

The second thing I want ask you is—I want to follow up on this—is that—the point that Senator Lugar raised in his opening statement, coal amounts for 70 percent of the energy that is used in China now. You were Ambassador to China, and they're the second largest user of oil, behind only the United States. In just 5

years in this century, their energy use has jumped 40 percent, with a 10-percent annual growth rate, and their huge resources of dirty coal. It seems impossible—impossible—to deflect them from the path they're on right now. So, I'd like to hear your views on China's energy situation, and what, if anything, you think we could do to make them part of a global solution here, because we can do, as I think you pointed out, General, or—I'm not sure who said it—we can do everything right—we're not doing everything nearly right, but we can do everything right, and if China and India keep consuming energy at the rate they are now, particularly using dirty coal and fossil fuels, we're in real trouble.

Admiral PRUEHER. I'll try to get that as quickly as I can.

The Chinese energy consumption is rising. They—there is not a sign of it abating. The legitimacy of the leadership—read, the Communist Party—in China rests on their delivering the economic goods to the Chinese people, and they see that as requiring energy to continue to do so. They also are aware of environmental hazards, polluted rivers and things like that. They have a beginning awareness on it—of it, but not enough to cause them to diminish their economic growth.

I would like to toss a bouquet to Secretary Paulson in the approach he's taking in the economic world, to take little steps to start to engage and get them to work on it. And we need to start that dialog.

The CHAIRMAN. Well, it seems to me that—I know the environmental community is not real big on coal gasification, and—but it seems to me it could be a win-win situation for us, exporting technology as well as diminishing their—the negative impact of what they're clearly going to do.

Let me conclude by asking each of the other two panelists one question—and we'll have plenty, but we have a very talented panel here who will ask you probably all the questions I'd like to follow up on—and that is that: Do you, gentlemen, get a sense that your colleagues still in uniform share your sense of urgency, or think about this issue in the context of national security, the prospects of looking down the road at future conflicts over territory, space, arable land, population movements, et cetera? Do you get a sense—I mean, because, as you point out, most of these women and men are up to their ankles in alligators right now. I mean, we are so stretching them, in my view. But, at any rate, that's another question. But, do you get a sense that those in uniform now feel this sense of urgency?

I'd ask, General, and then you, Admiral Truly, if you would.

General WALD. I'll start.

I doubt if very many have thought it as much as we have, frankly. Now, first of all, I think they'd understand it quickly if they did. But I will say that I think the U.S. military—and there's a sense of, I guess, being overstretched with Iraq, which is an understandable issue—but we have a lot of other people in the military in the world doing other things, as well. And one of the issues in European Command is—we were, I guess, somewhat blessed. We didn't have the Iraq problem as our problem, but we had other problems.

And the way I'd answer it is that I think the U.S. military is looking at nontraditional ways to approach threats. Now, we still

need to maintain a conventional capacity, and we have a great conventional capacity. And that will be a challenge in the future. And when you talked about China, the—I think the jury is out, but I think China can be a competitor without being an adversary.

But we still need to think be thinking in terms of what that would do to us. But, in other terms, nonconventional threats, as Admiral Prueher mentioned, the diplomatic, information, military, and economic part of this equation, military people understand that.

And, in European Command, we were in the process—and I think they still are—of recruiting people from the interagency to actually be on the staff to help us with the nontraditional approach, you know, the USAID folks or Treasury or Commerce or Department of Defense Logistics. And I think that's part of the future. And I'm encouraged that military people understand the complexity and dynamics of the threat.

So, the real short answer, again, is, I doubt very many people have spent as much time in the military on it as we have, but I think there's a sense that we need to start changing our approach.

The CHAIRMAN. How about you, Admiral.

Admiral TRULY. Mr. Chairman, my sense is, is that most of our military today are not paying attention to this issue. I have a grandson who's Army Special Forces in between deployments to Colombia and Afghanistan, and I hope he's not thinking about climate change. On the other hand—and I will say that I think most of them, like us, come to this issue first as skeptics. However, if they had the opportunity, as we have, to take time and listen, I believe that a great majority of them would agree that it's time to do the planning required for something, that we have the time to do.

The CHAIRMAN. Well, I appreciate that very much. And I—the reason I asked the question—I'll conclude with this, Mr. Chairman—is that if I had to list, in the 34 years I've been here, the 10 brightest people I've ever worked with, 6 would be people wearing uniforms. And I am astounded by the service that you guys are giving. And just 10 days ago—2½ weeks ago, 13—15 of your colleagues, three- and four-star, asked to meet with me. And I met with them. You know what they wanted to talk about? They wanted to make sure I'd continue to holler about torture and I'd continue to holler about the failure of the administration to abide by treaties, Why didn't we close down Guantanamo?

The truth of the matter is that the most informed people I have met in my career here have, by and large, been people wearing stars on their shoulders or stripes on their sleeves, and the service—you and folks like General Hoar and others have put together this other group about civil liberties. I don't think most people know that.

You know, you've got 15 generals insisting we continue to talk about civil liberties. That's pretty darn good stuff. And what you guys are doing, I hope permeates the tundra here and gets through.

But, anyway, I want to thank you for your service, and I'll yield to my colleague, Senator Lugar.

Senator LUGAR. Thank you very much, Mr. Chairman.

Let me just continue on your line of reasoning. This hearing we're having today will be dismissed by many in America who are paying any attention to it as being another one of those sorts of indulgences in which people think broadly about the future several decades outward on something that's not at all certain, and, as a result, we will be allowed to continue, sort of, with the romance of the climate change business, but ordinary Americans don't take it that seriously; it's not just people in the military uniforms.

Now, you take it seriously, we take it seriously. But let me just ask: Is it conceivable that the Chinese and the Indians—we've talked about them, one-third of the population of the world, with reams of dirty coal and inexhaustible need for energy, which most people predict will—their use will exceed ours within at least two decades—are going to make any difference in this unless somebody has some idea about how you go about doing this in a practical manner?

Now, take as a possibility—what if somebody running for President of the United States were to say, "If I am elected, we're going to have CAFE standards for every vehicle the United States Government buys. We're going to have renewable sources for electricity." It's being debated in our committees, now, whether it should be 10 or 15 percent, or what have you. "But we're going to do it as a government, a huge consumer of electricity." And so, it goes down through all the arguments that we're having, which we haven't decided, tied up in various committees and so forth. In essence, we're going to prove that you can do these things, physically, that the automobile industry can renovate rapidly enough to build all of this, ditto for the power industry, which, right now, the school of realists would say is inconceivable. Interesting enough, but simply not in the cards, and you need a lot of ways to get out if the requirement doesn't work.

And, furthermore, they would say, it's just simply nonsensical, in terms of security, to be jeopardizing the fleet of all the military vehicles, plus our sources power, and so forth.

My point is, unless there is that kind of leadership of that consequence, that size, so that Governors of States say the same sort of thing, mayors of cities, and so forth, it seems to be inconceivable the Chinese and the Indians are going to be convinced that they could do it. It's not just a little bit of transfer of technology to somebody with the hope that they might do it. Here are whole countries—as you say, the political system is vested in growth of poor people into income, and to be bound up in this without the technology, without the example, seems to me, is not going to occur.

Now, do you have any reaction to this kind of leadership and the impact that it might have, or that it might not have—finally, they say, "It's just too hard." You managed to do it, but, nevertheless, we just couldn't get it across the finish line; my point is, without that, without our active diplomatic intervention, there's no possibility these things will occur in these countries.

Admiral, from your experience?

Admiral PRUEHER. Thanks, Senator Lugar.

The—one reason we're sitting behind this table, and not behind that one, is we're not politicians, so I don't know that we can—I

don't know whether a person could win on an environmental ticket or not.

But the—but with respect to China and India—and I can speak with a little more authority about the Chinese—the—if we try to lead without having our skirts being pretty clean, if we don't have the moral high ground in the energy area, we can get discounted by the Chinese and the Indians, in—just out of hand. The fact—if we do—if we are doing what we ought to do, or what we need to do to gain energy security—and the linkage with energy security and climate change, I think, we've made—then we at least have the ability to have the conversation with the Chinese and the Indians.

The—I think one of the U.S. core strengths is technological solution, which is a part of this. It's not the—it's not all of it, but it's a part of it. We can then talk about technological solutions. And I think it's a long process to start this discussion and to turn the consumption and the environmental wastes that go on in China and India, and also in our country—to turn them. It's a long process, which needs to start.

So, I—my view is, it is possible to do it. One could argue, "You're naive to say that. It's not possible." I don't—I think it's then immoral and irresponsible not to try. So, that's pretty much my own view of this, is that we can do it, it takes a long time; it's not our strong suit, we like bold solutions, but I think it's something we need to start. And this is my point earlier, in trying to toss the bouquet to Secretary Paulson, whose energy and willingness to take some heat about taking some baby steps forward to move forward on economic issues with the Chinese. I think that's the nature of the approach we have to take here.

Senator LUGAR. But that's the core of this hearing. If we do not succeed as a world, cataclysmic results are going to occur. And you've outlined many of those.

Admiral PRUEHER. And——

Senator LUGAR. And, therefore, even then, as you say, we don't know whether the Chinese or the Indians will finally do it, but, without there being a huge technology change and some example—and that's the reason I selected the U.S. Government, as a huge consumer—I doubt whether individual consumers around the country are going to be able to make all of those decisions, or have the technology. There has to be some very powerful force. And I don't know of any alternative, other than the Federal Government that we all serve.

Admiral PRUEHER. That's something with which we wholeheartedly agree, sir.

Senator LUGAR. Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Kerry.

Senator KERRY. Mr. Chairman, thank you very much.

First of all, thank you for having this hearing, which I think is a critical hearing. And I echo what Senator Lugar just said about how some will, sort of, you know, somehow pass by this hearing, and, you know, the room is, sort of, half to three-quarters full, and half the committee is here—but, in my judgment, this is one of the

most important hearings I've been to and that we could have here in the Senate.

Normally, I'm a questioner in these little moments we get, but I want to make a few comments today, if I can, and perhaps put an exclamation point on the testimony that we've heard from these extraordinarily distinguished retired military——

Mr. Chairman, let me just say to Senator Lugar, in 2004 I did run for President, saying all of those things. And, unfortunately, they were hidden behind the cloak of a completely false debate about the war on terror and a lot of misleading statements about what the war was really all about.

And one of the things we need to do in this country is understand the nature of the foreign policy challenge, the security challenge, that we really face. The population of Egypt, the population of Saudi Arabia, is about 60 percent or so under the age of 25, 50 percent under the age of 21, 40 percent under the age of 18. They're unemployed, they're uneducated. And, I'll tell you, if global climate change occurs at the rate and quantity that it is now occurring without our adequate response, the capacity for madrassas and radical fundamentalism and all kinds of, you know, extreme ideas to fill people's heads with what their plight is really due to, and who's responsible for it, is going to increase our military demands, our conflict responses, across this planet. And if we don't "get that" quickly, we are really missing our responsibility here.

But let me just throw a couple of things in front of my colleagues, if I can, quickly. I've spent a lot of time on this. I was part of the first hearings, in 1987, with Senator Al Gore. We held them in the Commerce Committee. We've been at it for over 20 years now.

I went to the Rio meeting in 1992, when President George Herbert Walker Bush agreed to a voluntary framework. We've seen, over the last 15 years, that voluntarily doesn't—didn't, and doesn't, work.

But the science that was put forward 15 years ago is now proving more and more true. Recently, I met with some of our top scientists—Ed Miles, from University of Washington, Bob Corell, at the Heinz Center, John Holdren, at Harvard—all a part of writers of the IPCC, which we are now listening to, finally, after its fourth report. They tell us there's a 90-percent likelihood that all of these things are human-induced, and happening at the rate they are; 10 percent, in other words, perhaps not. But there's a certainty, as our own memo in this hearing says, that it's warming.

There's an absolute certainty that humans are contributing to that. We don't know all of the parameters, the models, of what happens, but what the scientists tell us—and, you know, you can't be half-pregnant on this—if you accept the science that global climate change is happening, and that global climate change is human-induced, to the largest degree, then you also are duty bound to accept what they're beginning to tell us is happening. And all of those scientists—and scientists are conservative, you know, very restrained in their pronouncements. They—by nature and profession, they don't just leap out there and say anything. They say what they can prove and the deductions they draw from the science. And all of those scientists are now telling us that what is happening is hap-

pening at a greater rate, and to a greater degree than they previously predicted.

And here's the conundrum. And it's in the committee memo today. Pre-Industrial Revolution, we had 280 parts per million of global climate gases in the atmosphere. Post-Industrial Revolution—today—we're up to 380 parts per million. So, we've traced 100 increase, concomitant with the increase of the temperature and the carbon dioxide. And the scientists are now telling us that, whereas 2 years ago they believed we could tolerate a 3-degree centigrade increase before catastrophe, which translates into 550 parts per million of greenhouse gases—they now have revamped that, and they've revamped it because of the rate of change that's taking place, and the quantity of change that they're seeing—the accelerated ice melt, the movement of species, the shift of currents, the increase of forest fires, the increase of violence of storms. I mean, you can go down a long list of things—the disappearance of coral, the increased acidity of the oceans, up 35-percent acidity, which changes the likelihood of how crustaceans can form their shells—i.e. lobsters, crabs. We're threatening all of these species. And that increase is a direct result of the amount of carbon dioxide, and, to some degree, sulfur dioxide, you know, mercury, and other things that go into the water. So, we're now revamping that.

Scientists now tell us we can tolerate a 450-parts-per-million level, and a 2-degree centigrade increase. Well, what's already—Admiral Prueher just talked about what's already up in the atmosphere, the damage that is already going to occur, that we have no knowledge of how to stop. What's already in the atmosphere guarantees an increase, additional, of about .8 degrees centigrade to the already-measured increase of .8 degrees centigrade. That brings you up to about 1.4/1.5 degrees centigrade. My colleagues, that gives us a .5/.6-degree centigrade cushion. It gives us the difference between 380 and 450 parts per million—that's 70 parts per million—cushion before you invite catastrophe.

The bottom line is that you can't build any more pulverized coal-fired plants that don't capture and sequester—can't do it—if we're going to be responsible. And, you know, we recently had a global climate—global legislators meeting here in Washington. Chinese delegation was there, a very significant Chinese delegation, significant Indian delegation, people from all over the world. They're aware of this—130 nations—Foreign Ministers, Finance Ministers, Economic Ministers, Prime Ministers, Presidents—have all staked their politics in doing something about this. Only the United States of America has refused, and doesn't.

And so, that affects our foreign policy. If you don't think it doesn't affect our ability to move in the Middle East, and leverage people, and begin to deal with credibility, you're crazy. It just has a profound impact on people's sense that we're a scofflaw. We're 25 percent of the world's pollution, we're not doing anything.

So, I say to my colleagues—I'll just wrap it up quickly; I don't want to abuse my time—but, you know, there isn't anything more important than this, because if this begins to happen, populations are going to move, trees and forests are going to migrate, the people—ability to grow crops is going to change, lakes are already drying up; water, which is scarce, about which wars can be fought

now, will be that much more intense. So, the need for us to think this through, and not just think through, sort of, how do we mitigate, but how do we prevent the catastrophe itself from happening—believe me, you look at the MIT study, the technologies are there. We've just never put them to scale.

And what leadership needs to do now is put 10 demonstration projects out there in the next few years, and say, "Let the marketplace decide which one of these works best." But give them the options and the choices. All of our fleet—the Senator is correct, we shouldn't be contracting any fleet purchase that isn't hybrid or more effective. Green buildings—we're building all over Washington; how many of them are lead-certified so that they're platinum-certified and build to the new technologies of building materials and of design?

We can do this. Other countries are way ahead of us. You walk up to an escalator in Japan, it's not running, you say, "It's broken." You get there, and it starts. And you go down, you get off; if nobody else is coming, the escalator stops. Show me a place in America where that happens. You walk out of a hotel room into the hall, the lights come up as you walk out. They automatically go down as you pass. They're off when you're gone. Show me the hotels in America where we do that.

So, we have a long way to go. And admirals, and general, this is a great service. I think it's going to be recorded as one of the more important, sort of, statements about real security in our country. And we're going to have to factor this into everything we do. And our military, I believe, is going to have to be far more trained and structured to be faster, responsive, and capable of dealing with the kinds of conflicts that are going to come out of this, because it's going to shape the next generation security future. And I think this is that important.

And I'm sorry, I rarely, sort of, use my whole question period just to talk, but I think it is that important to put an exclamation point on it. You folks are powerful validators for this. And I hope Americans will focus on what you bring to this table, and how important it is to all of us.

Thank you.

The CHAIRMAN. Well, you shouldn't apologize, Senator. You've been speaking about this for 15 years. And if we all had spent a little more attention, all of us at this panel, we may not be here in this spot.

Senator Hagel.

Senator HAGEL. Mr. Chairman, thank you.

And, gentlemen, welcome. I add my appreciation to each of you and your colleagues who invested time and continue to make contributions, as you have, to our country in one of the issues that is as critical for our future as any one issue. And you have all articulated that clearly. Your report indicates that. What my colleagues have said, I think, has fastened onto the reality of what's coming if we are not far wiser in how we address this issue.

And what I think is particularly important, for those watching this hearing, to understand what you are saying, and have said, is not just the more defined scientific, technological aspects of climate change, but more to the point that you have all made, and that is

that if we are to be successful in dealing with the 21st-century challenges that face our world today—and each of you have noted, within the context of this subject—extremism, terrorism, very limited margins of error, and all the dynamics that go with that, what you have produced is a clear understanding of a wider frame of reference for our national security—not only interests, but needs, as we approach these new challenges of the 21st century.

The other part of this that you have been able to capture with, I think, complete clarity is that all of our interests are woven now into the same fabric, just as the three of you have noted. This is no longer a national security debate or interest or policy about our navies, our air forces, our armies, our marines, it's economic security, it's energy security, environmental security. And, I believe, for some time—and I've spent a little time on this issue—that until we come to a complete understand that we cannot talk about the environment without talking about energy, without talking about the economy, our national security—all are woven into the same fabric. And we have squandered a great deal of time in this country over the years of not—not only not appreciating that, but the economic and energy and environmental issues all being polarized, fighting each other over a capsulized, segmented area of interest and of concern and of importance. And your contributions here help us define this in a way that we need to define this in order to find solutions.

General Wald, you noted that I have spent some time with you in Africa. And I always appreciated what you have done—and General Jones—to try to leap out ahead of this and project, not just for the military, but for all of us, an understanding. And those were very valuable times that I spent with you, and we spent considerable time in Nigeria in some of the areas that you've talked about. And it's helped me understand, far better than I would have otherwise, what this issue is about. And I do think it deserves the same attention that John Kerry talked about, Dick Lugar, Joe Biden, others. It is that serious.

Many of you may know that Senator Durbin and I introduced legislation, over the last month, which would instruct the Director of National Intelligence to come forward with an integrated understanding of the consequences of this issue within the context of our national security interests, how that should be integrated. And we'll continue to follow up and push on that issue.

I want to take the time I have left to ask each of you to define a little more clearly and specifically—and you didn't have the time to do it in your opening statements—but as we are adjusting to the realities of what's ahead—and we, I think, have that defined pretty well, we have a pretty clear inventory of these challenges that are coming, unless we do something about it—so, it always comes down to: What do we do about it?

Let's go to the developing countries, which you have all laid out clearly, where much of this problem is going to come from, and already where much of the problem resides; China and India are two of the most clearly defined examples—use of coal. What should this Government be doing to work with, to help, to coordinate with, these countries in order to move this issue forward? The fact is that China and India and these developing countries are going to use the resources they have to develop their country—they have

immense pressures and problems, you all know that better than almost anyone—to find jobs and to find a standard of living that improves the quality of life for their people.

And so, they're going to reach to coal, they're going to take what they have. I'm encouraged—and I was a strong supporter of the arrangement we made with India last year, partly because it puts us in a position to have more influence, but the Indians, as you know, are now online to build 25 new nuclear power plants. Where does nuclear fit into this? Should it fit into this?

So, if the three of you could, maybe, each take a minute to define, Where should this Government be going, the next administration—I'm sorry Senator Obama's not here—but the next President, as Senator Lugar noted, is going to have to deal with this, and is going to have to make this a priority. Where should we be going first to integrate these policies and strategies with these developing countries?

Admiral Prueher.

Admiral PRUEHER. Senator, let me ask Admiral Truly to go first. I've talked more than—and he's got some great ideas on this, and I'll go last, if that's all right with you.

Senator HAGEL. Admiral Truly.

Admiral TRULY. Thank you, Admiral.

First, I think that we need to show leadership here in this country so that others will listen to us. And, furthermore, going back to what—Senator Lugar's comments before, I think that the Federal Government needs to show leadership on this issue. And a few years ago I chaired a—the first Defense Science Board Study on the—improving fuel efficiency of weapons platforms. When it comes to oil uses—usage in this country, the DOD really is a small percentage, but it is the largest organization that uses petroleum in the country, and it is not—we've found that it is not principally a matter of technology, it is just as much a matter of business processes within the DOD, and particularly visible leadership from the top, that says that we're going to begin to change the way that we operate. And that's not for environmental reasons, although they are important, it's for efficiency of our fighting forces.

So, I really think that we need to—the United States, in order to be diplomatically successful as we deal with all these other countries, needs to improve the way we are acting about this problem, and, with that in our background, then, I think our diplomatic efforts will bear—have the hope of bearing great fruit.

Senator HAGEL. Thank you.

General Wald.

General WALD. Thank you, sir.

I think that the United States is at a crossroads today. We've come out of the 20th century into the 21st century, and the world is changing rapidly, as you all know better than anybody, probably. But I don't think we recognize it yet. I remember in—when President Bush senior, mentioned that after the Berlin Wall fell, that we were in a new world order. And we were. But we haven't recognized what it is yet. And we have talked about this often. And I think it's defining itself now, and I think we're a little slow to realize what that is.

One of the things I believe is, there should be a new structure of relationships in the world. And I am discouraged sometimes that we treat China, as I mentioned earlier, as a potential adversary. I think we should recognize that it could happen, but it's not a fait accompli. And so, we should start looking at that.

I think we need enlightened leadership and vision on that, as you pointed out, and Senator Lugar did earlier, from the next President, whoever that may be, in the United States.

But the way I, kind of, categorize the threats today are, I would put terrorism, No. 1, which is a—simple, I think, thing to do—with proliferation of WMD, or whatever that may be, as No. 2, but you combine them, they're No. 1 together. That is the threat that we face. After that, I'd put energy security as the next serious threat. Then after that, I'd put climate change. And me, as a military guy, I mean, I believe we need to continue to maintain a strong conventional capability, but I don't put that, right now, today, as one of the top five threats we're facing.

And so, I think the Foreign Relations Committee has already done some excellent things to help us, and one was last year, when you introduced legislation to talk about Corporate Average Fuel Economy standards, which I think, Senator Lugar, you and Senator Biden and Senator Obama initiated—and yesterday, in the Commerce Committee—that was marked up, and I think that's a huge step in the right direction, and it will help us a lot from the standpoint of reducing our dependency.

Now, that's not the only thing we need to do. I mean, to get out of—we know the terrorism/WMD issue, and, once again, Senator Lugar, what you've done in the Nunn-Lugar act, I think, is one of the most important pieces of legislation we've had, security wise, and we need to continue to do that in a serious way. And we're—we should really address that in a bigger way than just the Proliferation Security Initiative.

But when you go back to energy security and our dependency, there's—there are multiple things we need to do, as you pointed out, and one—there isn't one issue that will solve it. It isn't just nuclear power; I think we should do that. It isn't just CAFE standards; we—it isn't just alternate fuels, and it isn't coal-to-liquid, necessarily; it's all of those things. And if we do coal-to-liquids, which I think has a part to play, we firmly believe we should do sequestration and clean technology.

Now, on that point, with China, for example, we visited the United Kingdom and visited with Prime Minister Blair's staff on this issue, and asked them what they were doing with China, and they said they're developing clean coal technology, but they wouldn't be able to transfer it until 2015, because that's when they think they're going to get to it. And I think that is unfortunate. I think it has to do—much of it has to do with dedication of resources to that problem. And I think the U.S. Government should be—should take the lead on helping with clean coal technology, for example. And we also need to pass legislation that gets us down the road on doing a multidiscipline approach to getting us off dependency.

Even if we did everything, if we did biofuels, if we did clean coal, we did renewables, we did nuclear power, we did more efficiency,

we're still going to have some dependency on fossil fuel, conventional oil—or fuel, I should say, for the near future, and probably for a couple of decades. So, from that perspective, from a security standpoint, we're still going to be vulnerable to nations that don't necessarily have the common interest, as we do, in mind from affecting our foreign policy.

So, I think, in my lifetime, we're at one of the more challenging times, probably one of the most dangerous times we've been in history, and it's going to take severe vision and leadership in this Nation to get us through this process. And I think the time for discussion is over.

Senator HAGEL. Mr. Chairman, may I ask Admiral Prueher to respond?

The CHAIRMAN. Sure you may.

Senator HAGEL. Thank you.

Admiral Prueher.

Admiral PRUEHER. I may be in the category of, "Everything's been said, but not by me." [Laughter.]

The three things I think are that we need to—the United States needs to lead. Now, that's not a—an indispensable-nation type of leadership that I'm talking about, I think it's a leadership that requires us to get an example, to get our—to do what we can to get—lessen our energy dependence, to decrease our carbon emissions to a reasonable level, and hopefully it takes some further definition of what's a sustainable level. But that type of leadership in the world, of getting ourselves on the moral high ground, where we're not squandering our leadership opportunities, is an important thing, a point that Admiral Truly made.

The second part is—our core competency in the United States, one of them, is technological excellence—so, exporting whatever clean coal technology is—there are some people that say liquefied or gasified coal, there's no way to make it clean, but we can do carbon sequestration, or we can work technological solutions. We have the most advanced—though the French might contest this—nuclear capability in the world for nuclear power plants, and I think that's certainly a piece of the solution. But we're 8 years away from building new nuclear power plants for our country, to decrease the carbon-emission portion of this.

So, I think those two things—leadership, technology, writ large—and the third is working with the other nations to—there are a lot of frameworks, but I—again, my experience with the Chinese, who, like us, do not like to be lectured to at all, but to build a framework and acknowledge that they have a right to have a reasonable life for their citizens, and they need to do what they need to do to have a reasonable life, put these things together, discuss them—given all that, we have a planetary problem we have to solve, and that's the environment, where our kids and grandchildren aren't going to be able to breathe clean air—the Chinese have our problems, in spades—and build a forum in which we can have that dialog to move forward.

Senator HAGEL. Thank you.

The CHAIRMAN. Thank you very much.

Speaking of coal, the Senator from Scranton, PA, my hometown. Senator Casey.

Senator CASEY. Mr. Chairman, thank you very much. We're proud you're a native of my hometown.

The CHAIRMAN. So am I.

Senator CASEY. Our hometown.

Mr. Chairman, thank you for calling this hearing on this critically important issue.

I have a statement, which I'd ask unanimous consent that that be entered into the record.

The CHAIRMAN. It'll be placed in the record.

Senator CASEY. And I appreciate that.

Senator CASEY. And I also want to say how much I appreciate this panel, for your witness here today and the information you're giving us, Admiral, General, and Vice Admiral, for your contribution to our country long before you did work on this report, but especially today, as you inform and enlighten this debate.

And I think, fortunately, the debate about global warming is beginning to—the debate about whether it exists, and who causes it, I think, is beginning to wind down, we hope, because what we should be focused on now is how we deal with it. And I think that's why your testimony today is so important to this. And I think Senator Kerry, in a few short minutes, did a great job of summarizing the data, the information, and the urgency of the challenge.

And I think we all come at this from different vantage points, and we also come at this from—or, I should say, we arrive at conclusions about this subject based upon different types of information. I remember one moment that I'll never forget, just reading a magazine article, it became clear to me. It was a Time magazine story in 2006. I don't remember what month. But I remember reading something—it was very simple, but jarring and upsetting to me, and I'm sure other people read it—which basically said that the—since 1970, in just about 35 years, the percent of the Earth's subject to drought had doubled. That's it. Just that one fact. And when I read that and thought about it later, it made perfect sense to me, as a nonscientist, to be able to realize what that meant, that, if the percent of the Earth's surface subjected to drought is doubling in just 35 years, the inescapable conclusion from that is that that leads to hunger and famine and darkness and death. That, alone, is a clarion call to get something done.

What you do today, what you've done today, is to provide another level of urgency for this issue, because of our national security threat.

So, I wanted to say that, by way of background. Also, I want to say that I appreciate the—Senator Hagel and Senator Durbin and others, who have introduced Senate bill 1018—and I'm a proud cosponsor of that—to make sure that we make this part of our intelligence estimate, as well as our national security debate.

You pointed—all of you pointed to the examples now in Darfur and Nigeria, among others, and I won't try to summarize those. I want to move to a more—I guess, a more basic level, in terms of our national security, and that's readiness. We see this play out every day in the debate on Iraq. We saw it with the horrific footage from the State of Kansas, about our failure to have readiness, in terms of equipment, not to mention troops. We know the wear and tear on our equipment, we know about the extreme conditions, en-

vironmental and geographic conditions, that our military equipment will be subjected to. We know the impact on our—of global warming on our military bases.

And I guess the fundamental question that I have to ask—and I'm sorry to get to it so late—is, What—and I'll—if each of you have an opinion on this, or just one of you—What steps should we take, just on this fundamental question of readiness, when it comes to the global warming impact upon our national security? What are the basic steps we should take to prepare for that, and to mitigate what seem to be some terrible consequences that we're facing?

[The prepared statement of Senator Casey follows:]

PREPARED STATEMENT OF SENATOR ROBERT P. CASEY, JR.

Mr. Chairman, thank you for holding this timely hearing on the national security consequences of global climate change. The evidence is overwhelming—global warming exists. Temperatures are rising and the level of heat-trapping carbon dioxide in the atmosphere is increasing. Some people in Washington are still denying the existence of global warming despite a consensus among scientists from around the world that global warming exists and that the problem is caused by man. We can debate the best ways to solve the problem, but those who try to deny that there is a problem or who claim that global warming is not real are being dishonest with the American people.

From sea to shining sea, America is a nation that has been blessed with incredible natural beauty and resources. And it should be America that takes the lead in fighting global warming. As today's hearing will amply demonstrate, a leading reason for taking action now is to mitigate the likely foreign policy and geopolitical impacts of global climate change. On a broad range of national security challenges—containing refugee flows, preventing failed states, and ensuring our continued military readiness—global warming threatens to exacerbate current threats to our national interests.

Global warming is also likely to enhance existing conflicts and sow the seeds for new battles. As our witnesses today cite in their report, Darfur offers an illuminating example. Long periods of drought turned grazing land into desert in Sudan. Nomads who previously relied on grazing lands migrated southward in search of water and herding ground, resulting in conflict with the farming tribes who already occupied that land. This competition for land turned violent and served as one of the factors to incite a full-fledged civil war in Darfur and the resulting government repression and acts of genocide. In the case of Darfur, climate change helped set off a deadly conflict. If we don't move to limit and mitigate climate change, we may see other Darfurs arise in other parts of the world.

The report issued by the Center for Naval Analyses is an impressive start, but it is just that—a start. The potential national security consequences of climate change deserve further study. This is why I am so proud to be one of the first cosponsors on S. 1018, a bill introduced by Senators Durbin and Hagel that would require the Intelligence Community to produce a National Intelligence Estimate on the anticipated geopolitical effects of global climate change and their resulting consequences for America's national security.

I applaud our witnesses today for producing such a compelling and important report. For too long, we have viewed climate change solely as an environmental issue. It is time to recognize that climate change will directly affect our geopolitical interests around the world and hence treat the problem along the same ones that we do other threats to our national security.

Senator CASEY. Admiral, if we could start with you, or if others want to chime in on this.

Admiral PRUEHER. The impact on readiness is not a subject that our panel directly looked at, of immediate military——

Senator CASEY. Right.

Admiral PRUEHER [continuing]. Readiness. And I think the—you know, the right answer for that comes from accountable and responsible commanders who have to do with it right now.

The impacts of global warming on readiness, I will point out a couple. One, in—when Hurricane Ivan came through Pensacola, FL, it put the Air Station, the Logistics Station, the Education and Training Command—it put the Air Station out of business for a year. It just devastated that area. Low-lying area, intense storm.

What we can see, if we look at long-term readiness—and this is not wear and tear on vehicles that are—is manifest to all of us—but on our facilities and our ability to project our Nation's—the military aspect of our Nation's power to places, if—Admiral Truly talked about Diego Garcia—those things will directly impact readiness in that it will render it much more difficult to do logistics solutions to problems, if we have bases that are taken out by increased storms, increased winds, lack of water, as we transition to new fuel uses, to hydrocarbons and things like that, to—away from hydrocarbons—then I think that will all have a—put an increased strain—for example, if we take the trucks and the tanks and move them to hybrid vehicles, there will be a period where there'll be an increased strain on our ability to respond. And so, I think that'll have a direct impact on readiness. But, it is one that probably we need to do anyway.

Senator CASEY. Let me just quickly follow up with what you just said. Do you think that there are—there is anything, as far as you know, within our budgetary forecasting or in our programmatic prospective look at what we're doing with our military budgets and our programs—anything that you can see that is a series of steps, or moving in that direction, to prepare for that—in terms of moving bases or in terms of doing anything?

Admiral PRUEHER. There are others that may know more about this, but not to my knowledge.

Senator CASEY. I know we're limited on time.

General WALD. First of all, I agree with the Admiral, but I'd also add that I think—these are difficult problems, and serious people need to get serious solutions to big problems. One of the things that has to be faced is that this is not necessarily a zero-sum game on funding, or, actually, readiness either.

And the way I look at it is, I don't think the conventional part of our requirement has necessarily gone away. It's a little more abstract to postulate who a real conventional threat is right now, but you can postulate it without too much trouble. But what's happened, I think, in the spectrum of conflict that we have to be ready for in the military has expanded.

In a traditional sense, the military looks at threats in a spectrum of real low intensity all the way up to real high intensity, and the majority of our assets have been focused on the high-intensity part—high-tech equipment, et cetera. The new threat is at the low end of the spectrum, but it's expanded significantly. And to respond to the new threat takes some less—we still have high technology, but it's more of a personnel-type response. And as that grows, we're going to have to face the fact that we have full-spectrum threats that are fairly significant, from the standpoint of risk, at both ends. And so, I think this issue about, "Do we have to expand the capability to respond?" is probably a good one.

Second, if you look at things like the tsunami that occurred, or the earthquakes in Pakistan, or earthquakes in Morocco, or Alge-

ria, let's say, or the floods in Mozambique, those all required a military response, because of the magnitude of them. There was—there weren't any civilian organizations that could respond to those. Even Katrina, as was mentioned. And if the science says that that is going to happen more regularly, then militaries are going to be expected to respond more routinely.

And so, it isn't—I don't think—I don't think it's a zero-sum game. We can't say that the new world is now at the low end of the spectrum, and we'll shift all our funds toward that. And so, unfortunately, I think there are some budgetary decisions to be made, and we're going to have to face those in the future.

Senator CASEY. Thank you. I know I'm out of time.

Thank you.

The CHAIRMAN. Thank you very much.

Senator Corker.

Senator CORKER. Mr. Chairman, thank you for what you and the ranking member have done to set up this hearing.

And I want to say, in opening, that I asked to serve on this Foreign Relations Committee, and I asked to serve on the Energy Committee, because of the intertwining of those, and their importance to our country in the future. And this is the type of hearing that I think really, obviously puts an exclamation point that. And I want to thank you for this hearing.

And I also want to follow up on a couple of comments that you have made talking about the military and the excellence that you've seen with men and women with stars on their shoulders and stripes on their sleeves. And I want to say that I have found the same thing.

And, just as it relates to the bigger picture of foreign relations and this issue, I think, that we're dealing with today, my sense is that, for instance, in Iraq, if our expectations are not met over time, it will have absolutely nothing to do with our military, and everything to do with the civilian portions of our Government that I think have been underinvested in and their inabilities, if you will, to coordinate all kinds of other activities that need to occur. And I just hope that in this committee in the future, we will focus on that issue, which, to me, is one of the biggest issues we have to deal with in foreign relations.

The other thing I would like to say to you is that—you mentioned clean coal technology—you know, and Senator Lugar talked a little bit about our leading the world in areas of technology would affect countries like China and India. And I want to say to you that it's been somewhat frustrating to me, on the Energy Committee, in that the perfect is the enemy of the good.

We just had a renewable standards bill that came out, and clean coal technology was eliminated because there may be some carbon that comes from that. And I would just like to say to you that this bill will be coming forth soon. I hope that we can—the Foreign Relations Committee will see the benefits of that type of technology in China and India. And, while it may not be perfect, if you will, it is a technology that can help us, if you will, lead the world to do some things that do cause global warming to be less of a threat. I just appreciate the opportunity to say those.

And I would like to ask the panel, and thank you for coming—I'm hearing—I appreciate what you've said, and I really appreciate your leadership on this issue. We've had people come in, talking to us about climate change. We've looked at the models. We realize that there's also a natural heating and cooling that takes place, and we know not exactly when those cycles are going to take place, and we understand that carbon still is adding to the warming, regardless of how those cycles are. One of the things I'm having a hard time getting a grasp of today—we talk about the future threats, and that's where we began, we're talking about some of the solutions, energy wise, now—but how urgent—how closely into the future are we talking about some of the things that you described actually occurring, in your estimation? I think, when we plan for the future—and I know you talked about—this was important, but not urgent—give me a sense, if you were trying to make a—judgments as it relates budgeting, as Senator Casey mentioned, or other issues—how close are the actual on-the-ground threats that we need to be dealing with?

Admiral PRUEHER. I'll start with that, and then get—ask my colleagues to add.

When I said "important and not urgent," I may have overstepped what I should have said, because the fact is, we're—one, we're not climate scientists, we don't—I don't know the answer to your question, I don't know how urgent it is. We are dealing with uncertainty. And what we—you know, we have some facts, we know trends, those are things we know for sure. We don't know the outcomes. And so, we deal with the projected range into the future, of outcomes. There are scientists that talk about tipping points, that you're—with which you're familiar. So, it may, in fact, be more urgent than we think.

The idea of whether the—it's a point that Admiral Truly makes, that these things happen slowly. And so, we don't tend to—we don't tend to notice them. But the causes are already in place, and they already have momentum. We don't know the speed with which they'll accelerate with a certain added amount of carbon parts per million. So, we—those are things we don't actually know.

So, given our experience in dealing with uncertainty in the military, and dealing with something that has such high potential risk, and we don't particularly know the answer, we're going to hedge. And so, we're going to start to do something now. And that's why I think we're here, is to ring the bell that now is the time for action, before it gets more adverse than it is now.

Admiral TRULY. I would concur. I think we're late already.

One of the physical things that happens is, we have an entire Industrial Revolution's worth of gases already in that atmosphere, and they stay there, some of them, for centuries. And as we continue to add to this issue, we continue to build up risk. And in the military, we're used to dealing with uncertainty. As a matter of fact, I can't remember many decisions where you—where there was 100 percent certainty. But all the evidence is, is that we need to act and that we—and what we have recommended in the national security arena is to begin serious planning, from a national security perspective, at the very top, and that will—and if we do that—and I hope we're wrong—but if we do that, and the conclusion is,

is that new equipment needs to be developed, and new interfaces need to be developed internationally, nobody does that better than the Department of Defense, but they do respond to leadership from the top.

And so, I believe this issue is urgent. And not in the sense that the climate is going to declare war on the United States. It's not that kind of a problem. But it's a slowly building stress, and it is accelerating. And our conclusion is, is that it is time to fold this into the Nation's security planning, which is the national security strategy, the national defense strategy, the National Intelligence Estimate, and the Quadrennial Review that the DOD holds, in order to institutionalize it.

So, I really think that the time is now.

General WALD. Yeah, I'd echo both Admiral Truly and Prueher's comments and just say that—again, I mean, I don't—I don't try to tell you that I'm a scientist, but I'm smart enough to understand what people tell me. And we've all had our chances to read highly technical things in our careers, and with the expectation we understand them. And in listening to the people that are credible on this, and thoughtful, the concern is that if they're right—and, by the way, I have homeowner's insurance, because I think—you know, I'd hate to have my house burn down, but I think the chances of it burning down are about zero, but I still don't—I'm not going to take a chance.

And when you start having people tell you that, within 10 years, catastrophic things could happen, I don't think we have the right to take a chance with that for our Nation, and I think leadership in this country, in all branches of government, need to say, "It's just—we just don't—we can't take the risk, and we need to do something." And it doesn't have to be extremely costly. There's an issue on the economy, no doubt about it. And there are those that argue the market will take care of itself on this, in this area. I don't think it will, and I don't think we can take the chance. So, I think what's been suggested in the report is something we should do today.

Senator CORKER. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

And I understand we probably have a vote at 11:30, but I wanted to take a few minutes this morning, first of all, to thank you for this very important hearing. I agree with what many of our colleagues have said this morning, in terms of the significance of this.

Gentlemen, you have spoken with a level of urgency this morning that I do hope does not fall on deaf ears or just those that were able to attend here this morning. The message that you have to send is a very powerful one, and you're saying—and, General Wald, I think you used the terms, you know, "We're done talking about it, it's time for action." We recognize, here in the Congress, that oftentimes we're going to talk a little bit longer, and a little bit longer, and then finally we get around to an action point. I think that the good news for us now is we have the luxury, if you will, of some planning time. We recognize that if we were to stop everything today, if we were to shut down every—everything that was emitting anything, we would still be dealing with the cumulative

buildup that has been there for generations now, and we will deal with that. But we recognize that we have the ability to do some smart things now, before the train goes over the edge there. And so, I think it is important to be talking about how we integrate this, how we provide for the planning, and how we do things in a smart way.

I'm a little frustrated—and I'm sure that you probably are, as well, though—when we talk about what we can do here in this Nation. We can be the lead on the technology side, we can be the lead from the political side, but we can't do this alone. We are one world, one planet, and what happens in China is going to affect us. In Alaska, we're seeing levels of pollution in my State, not because Alaskans are polluting, but because it's coming over the Pole from Europe, from Russia, and we see, firsthand, how that travels.

The suggestion that what we need to do with countries like China and India, is to provide for this process of engagement. And I think it was you, Admiral, who suggested that we need to build this framework, working with China and other nations. Are we getting to them the level of urgency? Do you think that they appreciate that it's time to act now? Or do they view us as the nation that—we provide 25 percent of the pollution or the emissions into the air now—do they look at us and say, "Well, yeah, it's fine for the United States to say that, because—you are the envy of all the nations, you have an economy that is strong and solid, and now you're telling us, a nation that is trying to provide economic opportunity for our people—you're telling us that you've got to put controls on—allow us the opportunity to come to the same level that you are, and then maybe we'll talk"? How far are we in truly being able to engage these other nations on these very significant issues?

Start with you, Admiral. And particularly from the China perspective, considering your expertise——

Admiral PRUEHER. Right.

Senator MURKOWSKI [continuing]. And your ties there.

Admiral PRUEHER. The—increasingly, the Chinese are not monolithic, so there are segments in China that understand the hazards—the environmental hazards that we're talking about, and the pollution hazards, and the repercussions of increased carbon in the atmosphere.

The leaders—and, as I mentioned before, their whole legitimacy comes from raising 200 million Chinese out of poverty, you know, since 1992; and they have, they're very proud of what they've done, and justifiably so. I don't think, overall, we get a lot of traction talking to the Chinese about this. Their overt reaction to us—and I don't want to try to put words in their mouth, either—but they—their overt reaction to us is, as you've pointed out, "You've got yours, you're trying to suppress us by having this dialog." We have to be able, one, to get past that by providing a good example, where they can't point to things that we're doing that are—and then, at a, excuse me, "glacial rate," probably move this dialog forward, where the—overall, the leadership there is—sees this as a major issue. I think it will take time, and that's—because it'll take time, we need to start now, we need to work on it hard.

Senator MURKOWSKI. General Wald.

General WALD. Well, I wouldn't argue with any of that. I would just say that—I have a little trouble with the argument that, "If they don't do it, why should we do it?" or—which was—sometimes boils down to. It's a little bit like Kyoto. I mean, I personally didn't think Kyoto was a very solid treaty, because of the China-India issue. That doesn't mean I don't think the United States should do something about it. I mean, I think, even though we're a global, interdependent world, and China is emerging as a huge issue for us, we still have individual interests, in the United States. And I think, as Admiral Prueher mentioned, it's going to be—it's going to be difficult. They want to get 600 million people out of poverty. Their Maslow's hierarchy does not include clean coal right now, it includes energy.

So, it's not a simple answer, but I would think that the United States, regardless of what China does, should take action on this. But we also should show international leadership and try to engage with China. And I, also, would applaud what Secretary Paulson's doing. I think what he's doing is one of the most important foreign policy things for our country we could be doing today. Very complex, but it's not an either/or thing. And I'll end, again, by saying that, for anybody in the United States to say, "Because China isn't doing it, we're not going to do it," is, to me, a—is pretty immature and a loser. So, we should take leadership. And I appreciate what you're doing on the energy side.

Senator MURKOWSKI. Well, and I want to bring up one last point, and that's in the area of the renewables that we're looking to. We had an opportunity, up in the State, a couple of years ago, at the Alaska Clean Energy Symposium, and there was a group there from the Army National Automotive Center, and they had different vehicles, whether it was a hybrid M–113 armored personnel carrier, they had a hybrid electric Humvee, they had a Special Forces fuel cell ATV. I mean, they were moving forward with that transition, being very innovative, I would suggest.

But we recognize that to get from where we are today to where we would like to be is absolutely a mammoth undertaking. It is a change in attitude, it is a change in just, really, vision about where this Nation goes, not only from an energy-security perspective, but, as you gentlemen are saying here this morning, from a national security perspective. And we've got to make that change in attitude. And I think it is nothing short of a phenomenal effort that will be required to make that change. And in order to do it, you've got to start sooner than later.

So, I appreciate the time that you've given us, and the time that you have spent, in your retirement years, really focusing on that next generation, in terms of how we provide security for this country, and all that you're doing. So, I thank you. Appreciate it.

Admiral TRULY. Mr. Chairman, could I make one——

Senator MURKOWSKI. I didn't mean to——

Admiral TRULY [continuing]. Very brief comment——

Senator MURKOWSKI [continuing]. Cut you off, Vice Admiral.

Admiral TRULY [continuing]. To that?

I spent 8 years as Director of the Department of Energy's National Renewable Energy Laboratory, in Golden, and we had a number of projects—wind projects and—in Alaska. And we—and

we have worked on the hybrid electric program with the DOD, and it is a massive job. It is a massive undertaking. And it's part of the portfolio of things that we need to be doing.

But, from a security perspective, it really is important to fold all of these technologies into the mix. It's going to be a portfolio solution. Coal is going to be with us for a long time. So—and nuclear has its place, and renewables has its place, as well. But without having the leadership to take the actions we think we've provided in our recommendations—but others may have better ideas—but to do nothing, we think, is just a—not a moral stance that the United States should continue.

Senator MURKOWSKI. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you, Senator.

Gentlemen, thank you very much. With your permission, I'm sure we'll be calling on you again. We're not just going to hold this single hearing, here, and walk away from this subject.

I happen to be of the school that—which will not surprise anybody—Senator Lugar—maybe I've been a legislator—we've been legislators for a long while here—one of my observations is, in order to get a nation to respond to what seems to be such a gigantic, all-encompassing, frightening, thoroughly destabilizing issue, is—when you talk about it—and we talk about it in the grand scheme of things—it just seems like you can't get your arms around it, it seems so big to average people it just seems almost beyond our ability to deal with it. And that old expression, you know, "In the long run, we'll all be dead." You know, and people talk about the long run and setting goals.

I, for one, agree with Senator Lugar, in that it seems to me we have to do some very concrete, specific things that have—not necessarily significant, but real—real benefits—real, observable benefits. It's a little like the little bill the Senator and I introduced. We don't think it's going to, you know, change the energy picture, but if we mandate automobiles have to be sold with flex-fuel capability, if we mandate that—new automobiles—if we mandate that gas stations, a certain number, have to pump flex fuel, biofuels, E85, if we mandate mileage increases, it just gives the public a sense that there's some something they can do.

And so, I'm of the view—we may come back to you later—I'm of the view that a President has to change the mindset—the mindset of a country, and begin to change the mindset of a world. I mean, we are—you know, we're a gigantic consumer.

And if it's within the power—if it's doable that in the next couple of years we could mandate all Government fleets, I promise you, every State would follow suit, without any—without any legislation. If, tomorrow, the Federal Government were to mandate these fuel economies, and—for vehicles they purchase—I promise you—you add up 50 States, plus the Federal Government, every single thing they purchase, every vehicle they purchase, that begins to have an impact.

And so, I think that's quite—and this is my—the point I'm trying to get to here is that I think it—I think the most valuable part of your testimony—and I'd respectfully suggest, the more you talk about it—because you're not just going to be talking to us, this is something that you are—you guys are going go become disciples

here of what you all—I hope you are—I mean, literally, not figuratively—a little like the 9/11 Commission.

The 9/11 Commission did not cease and desist when we stopped paying for their organizational ability. And the more examples, I'd respectfully suggest, you can give that are bite-sized and concrete as to what the probable downsides of failing to deal with this are, the more people associate with it. It's one of the reasons I believe that Al Gore did such a service with his film. You can argue about the film, and some people argue it was exaggerated—I don't think it was—but there were specific examples, people see things, they actually see ice caps melting and collapsing into the sea. It's a big deal. You guys talk about—you, Admiral Truly, you talk about low-lying countries, just a rise of literally a foot, or less—inches—how it could have genuine fundamental consequences for population shifts.

So, I would—you know, I know you all say you're not politicians, but I've never met a successful military man who can negotiate the Pentagon that isn't a pretty darn good bureaucrat and politician—and a politician in the best sense of the word—being able to get ideas through a very complicated organization. And to the extent that you all are able to, as you—you and your colleagues—I think, in a—literally, in appendices to your report, just giving 20 concrete examples of what the most likely outcomes would be that affect—that average people could look at and say—and average people include our colleagues, you know, the Congress, the Senate, us—would be, I think, a very, very helpful—a very helpful mechanism. And it also gives the press, who is an ally in this—I mean, we need the press to be communicating this idea, this concern—and it gives them something to show, it gives them something to talk about. And—but I do think there is a—it's not just the climate that's changing, I think the attitude is changing a bit here; and so, if we can speed up the sense of urgency, we may actually earn our salary.

So, did you have any comment, Dick?

Senator LUGAR. Well, thank you, Mr. Chairman, just one short comment.

I agree with you, this panel this morning has been so important for our understanding, and hopefully for many Americans who have read your report, listened to you in testimony. But I think, reciprocally, that I would say that the panel that you're addressing the Foreign Relations Committee, does have, as I suggested, a number of people who are running for President. If we're talking about the dialog we need to have, and maybe in this room for a while, so that people are emboldened to make the kinds of comments in our national debate. Because the things we're talking about now will not occur—and I think Admiral Truly is correct—it's that portfolio. It's a whole mass of things that the Department of Defense can do, and all the rest of the Departments and the State governments, the people that we work with. And, in my own judgment, it will not happen without there being a comprehensive leadership package.

Now, even then, that leadership may find the going is tough through the legislative process, through the administrative process, through the bureaucracy that we all inherit. But without there

being that kind of very large charge at the top, no one—the Chinese, the Indians, the rest—will be impressed, and we have the sort of difficulties you express.

So, thank you very much for your good counsel, and I would agree with the chairman, we look forward to your return.

The CHAIRMAN. If you'd excuse the reference to a parochial issue—in my home State, I was showing the Senator, on the front page of our State's largest newspaper, there is a quote, saying, "The PSC"—the Public Service Commission that's—controls utilities—"endorses offshore wind farm with gas backup for Delmarva"—the Delmarva Peninsula, as it. And it goes on to talk about how the energy companies, Delmarva Power Company, said, "We're not going to be part of this, we're not going to provide any backup for this. We understand—you guys want to go out and build these"—I'm paraphrasing—"build these windmills, you can go tilt at them. And we all know they're not going to work very much—very well, unless there's a backup on those days the wind's not blowing." But, guess what? The Public Service Commission—fairly conservative outfit—unanimously said, "We're going to build them." In 2 days, the largest power company in the State said, "Well, you know, maybe we will. Maybe we will provide that backup."

I think that's kind of what we're talking about here. And hopefully you are the catalyst of some of that change.

I thank you very much, gentlemen.

The hearing is adjourned.

[Whereupon, at 11:48 a.m., the hearing was adjourned.]

STATEMENT SUBMITTED FOR THE RECORD BY SENATOR OBAMA

I thank each of you for coming here today to highlight the relationship between national security, energy security, and climate change. And I thank Chairman Biden for holding this hearing.

Our Nation's Achilles heel is our addiction to oil. We fuel our needs by sending $800 million a day to some of the most volatile regions in the world. But our addiction to oil also threatens our planet. Admiral Truly, in the report recently released by the Military Advisory Board, talks poetically about how, as an astronaut, he was able to see our planet as few have. He said that while orbiting the earth "you look at the earth's horizon, you see an incredibly beautiful, but very, very thin line . . . That thin line is our atmosphere. And the real fragility of our atmosphere is that there's so little of it."

We need to protect the atmosphere, just as we protect what lies below it. We need to have both a comprehensive policy that leads to energy independence, and a policy to cope with climate change. Because the implications of climate change go far beyond the environmental devastation—the loss of the polar ice caps, the number of plants and wildlife being endangered each year. As the report of the Military Advisory Board concludes, climate change has serious implications for our national security. By increasing the likelihood of extreme weather, such as flood and droughts, climate change can lead to massive migrations, increased border tensions, and greater disputes over water and food. These byproducts of climate change will necessitate greater relief and evacuation efforts by the U.S. military, but they also fuel the kind of desperation that leads to extremism and terrorism. Rising sea levels could also threaten military bases currently located on our coasts.

As we look to rebuild a military already stretched to its limits as a result of the war in Iraq, we need to consider the wide array of challenges that our troops will face. Climate change is a very real problem that our military planners much take into account.

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