

Remarks by the Honorable Ray Mabus
Secretary of the Navy
Energy Innovation and Nation Security: A Conversation
Introduction and Moderator: David Sandalow
Columbia University, New York, New York
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DAVID SANDALOW: Thank you all for coming. My name's David Sandalow. I'm the inaugural fellow at the Center on Global Energy Policy. I want to welcome everybody here, both in the audience here in New York, as well as watching on our livestream, as well as listening by podcast.

We have a tremendous speaker tonight. I want to – I'm going to introduce him in a minute, but before I do that tell you about our upcoming events. Under the leadership of our founding director Jason Bordoff we have a regular series of events on energy policy. And just let me tell you about a few of them that are coming up. On Wednesday April 22nd, that's tomorrow, at 4:30 p.m. over at the Faculty House we have a conversation with the co-chairs of the U.N. climate negotiations, Dan Reifsnyder and Ahmed Djoghlaif, followed by a discussion with Columbia University professors.

Tuesday April 28th, that's next week, at 1:15 p.m. we have our annual global energy summit, with really quite a line-up. We have Gina McCarthy, the administrator at the U.S. EPA, Governor John Hickenlooper of Colorado, Jason Furman, the chair of the White House Council of Economic Advisors and many, many more. So please, come. All right, and on Monday May 4th at 6:00 p.m. we have a presentation by the administrator of the U.S. Energy information Agency, Adam Sieminski, on the annual energy outlook.

Ke Wei, I don't know if Ke's here, and Jesse McCormick, our team that pulls together these events. They do a tremendous job. So for our online audience tonight, if you have a question for our speaker, please tweet @ColumbiaUEnergy and use the hashtag #CGEPEvents – that's Center for Global Energy Events – #CGEPEvents for any questions.

So I am thrilled to be able to welcome to Columbia Navy Secretary Ray Mabus, who is the 75th secretary of the Navy, a position he's held since May 19th, 2009. Secretary Mabus leads the Navy and the Marine Corps. And in doing so, he's responsible for conducting the affairs of the Department of the Navy, including recruiting, organizing, equipping and mobilizing, he oversees the construction and repair of Naval ships, aircraft and facilities, formulates and implements policies and programs consistent with national security policy. So he's got nothing to do.

Secretary Mabus is responsible for an annual budget of \$170 billion and leadership of almost 900,000 people. Upon assuming office and throughout his tenure he's made improving the quality of life of the servicemen and -women who report to him

a top priority. Since taking office, he has traveled – this amazed me when I saw this – over 900,000 miles and to over 100 countries. He’s traveled to Afghanistan on 12 separate occasions.

One of Secretary Mabus’ signature initiatives has been directing the Navy and Marine Corps to change the way they use, product and acquire energy and to set an aggressive goal that no later than 2020 the Navy and Marine Corps obtain at least 50 percent of their energy from alternative sources. In pursuit of that goal, the department has achieved several milestones which I expect we’re going to hear about from the secretary.

Secretary Mabus’ distinguished career did not start at the Navy. He has served as the U.S. ambassador to Saudi Arabia, as the governor of Mississippi, as the CEO of a major manufacturing company. He has a bachelor’s degree from the University of Mississippi, a master’s from John Hopkins, a law degree from Harvard. And he has served in the U.S. Navy. We are thrilled and honored to be able to welcome you here tonight, Secretary Ray Mabus. (Applause.)

SECRETARY RAY MABUS: Well, thank you, David. And we’re going to have to update that resume a little bit. We’re now at a 1,040,000 miles, 132 countries. (Laughter.) In fact, this last month, from the 18th of March to the 18th of April we went 54,000 miles. And I’m still tired.

But thank y’all so much for being here tonight and for having me here. I’ve always admired Columbia. We brought Naval ROTC back here a couple years ago and had a great ceremony on the USS New York when it was in port to do that. And now I have an even more personal reason about Columbia, because my second daughter, 22-year old Annie Mabus, just got accepted to graduate school here. So she’ll be a student here starting in the fall. And I guess I’ll be – become a contributor to – (laughter) – to Columbia. So if there are any scholarships out there, help me.

I’m going to talk about energy tonight, but first I’d like to give you Navy 101. For more than two centuries, the United States Navy has, through experimentation and collaboration and innovation, led the world in changes in technology, changes in operation, changes in the way we do business. And throughout all that time, from 1775 till today, we have been a technologically superior organization.

And I get questions sometimes from Congress, why are you doing this on energy? You’re the secretary of the Navy. This is one question I got directly from a congressman at a hearing. You’re the secretary of the Navy. You’re not secretary of energy. Why are you doing this? Well, Navy has always led in energy. We went from sail to coal in the middle of the 19th century. We went from coal to oil at the beginning of the 20th century. And we pioneered the use of nuclear power for transportation in the middle of the 20th century.

Now, what the Navy and Marine Corps uniquely give America is presence. We are around the globe, around the clock. We are where we need to be in the right place not just at the right time but all the time. We deploy as much in peacetime as we do in wartime. We are never a garrison force. There are never permanent homecomings for sailors and Marines. And the importance of the Navy and the importance of a continuing Navy is enshrined in our Constitution. In Article 1 it says that Congress has the authority to raise an Army, but it is mandated to maintain a Navy.

And that no-so-subtle distinction is sort of the distinction between those two great services. A head of navy in Asia told me one time – he said, the difference in soldiers and sailors of that soldiers look down. They look at lines on maps, they look at obstacles. Sailors look up, they look out, they look to the horizon. They don't see any lines and they want to know what comes next. They want to know what's over that horizon. So, to provide that presence, to give that presence – and we are the only global force, the only global Navy in the world – so give that presence to America, to give our leaders options in times of crisis.

I've come up with a construct that – four Ps: People, our sailors and Marines; platforms, our ships, our aircraft, our systems; power, energy; and partnerships, who we deal with around the world, who we deal with in the U.S., who we deal with in industry. So I want to do a quick thing on the first three Ps and then get to power. We have the best force we've ever had in terms of people, but we've put a lot of stress on them. We deploy now very long and pretty often.

And if you notice what's happening off of Yemen right now, the response is maritime. If you look at when the president made a decision to strike ISIS, we had a carrier in place in less than 30 hours. And for 54 days – 54 days the only strike option was that carrier. It wasn't because we didn't have other assets in the region, it was because the countries in the region where we had aircraft would not give us permission to take off. You don't have to get permission to take off from one of our carriers. We can go where we need to be very fast. We can stay on station a long, long time. We can take whatever we need with us. And we don't need anybody's permission.

But by doing that, we put this force – sailors, Marines – under a lot of stress. We push responsibility down further and faster than any organization anywhere. We expect the most junior sailor and the most junior Marines to do a great technical job, but also to understand what their job is and why they're doing it and why they are where they are and what the geopolitical aspects of it are. And we're not disappointed.

And so one of the things that we're trying to do is to change the way we manage the force so that we can continue to attract the very best so that we have a diverse force, because a more diverse force is a stronger force, so what we can have more graduates at Columbia and Harvard and Yale and Princeton, where we've also brought NROTC back, but also at Rutgers and Arizona State, and so that we can have more women in the force. We do not have enough today.

And we're trying to manage that force better. We're trying to give people much more flexibility so you can leave and do other things, but come back in without hurting your career, so that you're not promoted based on year group, which is the way it's done today, but you're promoted based on actual merit, so that you can do the continuing education that we require now. We just named our new Navy admirals – new rear admirals. A thousand records were looked at, 26 people were chosen. Not a single one – not a single one did not have an advanced degree, most had more than one.

But how do you get that? How do you help people do that without harming their career? And under people I've established something called Taskforce Innovation. We've got incredibly creative people throughout the Navy and Marine Corps. What we don't have is a way to harness that creativity. We're pretty by the book in a lot of ways. Check the box, do this, do that. And so we're moving to new things. We're moving to crowdsourcing. We put up a website that – tell us your ideas. Tell us, 3rd class petty officer, what you know that can make the Navy better.

The first 24 hours we had this thing up we got 50 ideas. And we're pursuing several of them. And what we're trying to do is set up a framework so that this becomes normal, so that these ideas get to the leadership, so that there is a structure to get around bureaucracy. Now, it's a little counterintuitive trying to use a part of a bureaucracy to change a bureaucracy, to get a culture of change and innovation. But we're giving it a try. And it's all about risk. It's about taking risk and encouraging people to take risk. And when you take risk, you're going to fail, because otherwise it wouldn't be called risk, it would be called certainty. And to reward people that are willing to take the risk, even if they fail, if they fail trying to do it in a constructive way.

A great example of that happened decades ago, when a young lieutenant ran his ship aground and he was court martialed for it. And his defense was: I'm a destroyer CO. And I'm supposed to be aggressive. I'm supposed to get in as close to shore as I can to support our ground troops. And that's what I was doing. And I hit something I didn't know was there. And so you shouldn't punish me for it. And he was exonerated. The chief of naval operations keeps his fitness report outside of his office. That was Chester Nimitz, commander of Pacific Fleet during World War II, and described as the indispensable person in World War II. If we had had a zero-defect force then, we wouldn't have had Chester Nimitz for World War II. So getting, keeping the right people and getting them to be willing to take risk inside a big fairly bureaucratic organization.

Second, platforms – on 9/11/2001, the U.S. Navy had 316 ships. By 2008, after one of the great military build-ups in our history, we were down to 278 ships and the fleet was shrinking. In the five years before I became secretary, we put 27 ships under contract. That's not enough to halt the slide in the size of the fleet and wasn't enough to keep our shipyards going, our industrial base. In the first five years I've been secretary, we've put 70 ships under contract, with a smaller top line.

We're going to get to 304 ships by the end of this decade, because quantity has a quality all its own. If you're going to relieve some of the stress on the force, you got to

have more ships so that you don't deploy yours as much. If you're going to be in the right place all the time, you got to have those big, gray hulls on the horizon. If you're going to reassure your allies, if you're going to deter people from doing bad things, if you're going to keep the sea lanes open – which is what we've done for 70 years – you got to have those platforms.

And most people don't think of the Navy as a business, but if we were – if we were a private business, we'd be the second biggest in the country in terms of employees – after only Wal-Mart, and with fewer greeters. We would be the third-largest in terms of assets in between Exxon Mobile and Berkshire Hathaway. And we would be the fifth-largest in terms of budget. We've built these far more ships just by using some basic business principles – stuff you learn your first year in economics or whatever – fixed-price contracts, competition, multi-years, economic order quantities.

And I'll give you three very quick examples. We build a ship called the DDG-51 Destroyer. It's the multipurpose ship. We have two shipyards that build them – Bath in Maine and Pascagoula in my home state of Mississippi. And for political and other reasons, we want them both to stay open. And we want them both to do well. But they were building two a year and they were taking it as just an allocation. And so the prices kept going up.

So what we did was instead of bidding on two ships, we bid out three. And we said, the low bid gets the third ship. And, oh by the way, the difference in the high bid and the low bid comes out of the high bidder's profit. So, one of those two shipyards crushed the other one on that first bid. And the next year we bid out nine. And we said the low bid gets five, the high bid gets four. And again, we're taking the difference out of the high bid's profit. The other shipyard won pretty convincingly. So as one of my assistant secretaries said: Business – defense businesses sometimes don't know what competition is, they just know they don't like it. And we've put competition into a line that had none before.

The Virginia-class attack submarines, Navy just signed the largest contract in our history last summer to build 10 Virginia-class attack submarines. And we do it in a very odd way. Half of each submarine is built in Groton, Connecticut, half of each submarine is built in Newport News, Virginia. And they switch which half they build on each submarine. We paid for nine submarines and we're getting 10 because we gave them 10. They can order all the stuff they need. They can plan. They can budget. And it's like having one of those punch cards, you know, at a deli. You buy nine, you get the 10th free. We bought nine submarines, we're getting the 10th \$2 billion sub for nothing.

And finally, littoral combat ship, our newest-type ship. We've got two types. One's built in Mobile, Alabama. One's built in Marinette, Wisconsin. They look very different, but they each bring capacities that we need. The Hill was told in 2002 that these ships were going to cost \$220 million a piece. Well, the first two cost 800 million (dollars) a piece, which got Congress' attention. When I came in, we had one ship of each kind in the water and one ship being built. And we bid out some more and the

prices went up and we couldn't afford it. So while we wanted both, we couldn't afford both.

So I made the decision to make them compete against each other. And the winner was going to get 10 ships over five years and then we were going to take the drawings, the technical package and bid it out to a second yard who was going to get nine ships. Well, over the next year prices started coming down during negotiations. And at the end, we bought both versions. We got 10 ships instead of nine from each. So we got 20 ships instead of 19, and we saved \$3 billion. It's just – those ships now that cost 800 million (dollars) are costing 350 million (dollars) coming off the line today which is, counting inflation, about \$220 million in 2002 dollars.

And third, partnerships – we need partnerships at home and around the globe. And we've got a long history of partnering, as I just talked about, with business. And we've also got a long history of partnering with countries around the world. That's why I travel so much. It's – no matter how big you are, no matter how good you are, you can't do it alone. You can surge equipment. You can surge people. You cannot surge trust.

And finally, to the topic I was invited here for, energy, power. All you got to do is look at the news to see how energy can be used as a weapon. Look what Russia's doing, look what they did in Crimea, look what they're doing in Ukraine, look what they're doing to Europe. And it is a – it is an area that is a military vulnerability. And so, as David said, I set a goal that by no later than 2020 we're going to get half of all our energy from non-fossil fuel sources. And I did it for one reason, and that's to be a better war-fighting force. It's to be better at what we do.

Now, it's got some great side effects. It's got some wonderful side effects. We're better stewards of the environment. Our carbon footprint is lower. We're creating jobs in alternative energy. But it's not the main reason we did it. We're a seagoing service, but we own 3 ½ million acres of land and we have 117,000 buildings. So we buy a lot of power on shore too. We're going to be at 50 percent alternative power by the end of this year. We're going to get there five years early. We will have a gigawatt of alternative power by the end of 2015. And we've done it all with public-private partnerships where we're doing solar, we're doing wind, we're doing geothermal, hydrothermal, we're doing municipal waste.

The president in 2011 ordered Navy, Energy and Agriculture to create a nationwide biofuel industry. We brought something to the table called the Defense Production Act, which says if you got something we need for defense that we're not getting enough of or it's not at scale, we can invest in it. So we've got three biofuel refineries either being built or being retrofitted. And we don't care what the feedstock is. One's getting it from municipal waste. One's getting it from agriculture waste. And one's getting it from used cooking oil.

We only have three requirements for biofuels: One, that it be a drop-in fuel. And biofuels is what we're using for our ships and our aircraft. We're not changing our ships. We're not changing our aircraft. And we're not changing the engines. So the engine can't notice a difference. Second, it can't take any land out of food production. So we're not buying ethanol. And third, it's got to be price competitive. And even in this time of plunging oil and gas prices, it's remained pretty competitive.

And you look at the volatility of the fossil fuel market. And in the first few years I was secretary, we were presented with a several billion-dollar unanticipated bill because the price of oil kept going up. There are not many places to get that kind of money, even in the Pentagon. You can get it from one of two places. One, you can train less, steam less, fly less. Or, if the bill gets too big, you have fewer ships or fewer aircraft because you can't afford to fuel them. And even though the price has dropped off dramatically, you look at the historic price of oil and gas and it's going in one direction. It's got a – sort of a sine wave along it, but it's going in one direction and that direction is up. And there are price shocks and there are also supply shocks. We didn't want to be a recipient of either one of those.

So for fleet-based energy, we've now certified all our aircraft, all our ships on biofuels. We've demonstrated something called the Great Green Fleet. It was a conscious play on Great White Fleet. And we demonstrated that in 2012 at Rim of the Pacific, the largest naval exercise in the world every two years. We had a carrier strike group. The carrier is nuclear. Every ship in the strike group is steaming on marine diesel and biofuel. Every aircraft that took off was a 50/50 blend of aviation gas and biofuels.

We had the Australian head of the fleet that came over to sign a biofuel sharing agreement. And the press asked him – he came over to the Nimitz, the carrier that we were on. And they said: Is Australia committed to this program? And he said, well, I'm about to get on that helicopter that just got refueled with biofuels. So I'd say, yeah, we're pretty committed to this whole thing. We're going to take that Great Green Fleet and we're going to deploy it next year in normal deployment, eight or nine months around the world. And we've been working with Chile and Australia and we've been working with Singapore, Korea, Italy to make sure that we have the biofuels where we need it and when we need it.

We're also lowering the amount of energy that we use. If you change the light bulbs on a ship and put in LEDs, it saves you about 2 percent of all the power on that ship, and the light's better, and you don't have to get up on scaffolding to change them every six months, like you do with incandescent. At that same Rim of the Pacific I went on a cruiser, the Princeton. And it had two helo houses – it had two helicopters and one in each. One had LEDs. The overhead is 30 feet above the deck. One had LEDs, one had incandescent. The mechanics would not work on a helicopter under the incandescent. They said they couldn't see well enough. So they moved the helicopters around. And they didn't have to put scaffolding up when they needed to change the light bulbs because the LEDs would last for seven or eight years.

So we're doing that. We're doing hull coatings. We're doing stern flaps. We're doing voyage planning – you know, going back to the age of sail, following the currents and the wind instead of going against them. We're building what Tom Freidman called the Prius of the seas. We've got two big-deck amphibious ships. These are big ships. They are the second biggest in the Navy, after only carriers.

And now we've got hybrid drives on them. So for speeds under 12 knots, they have an electric drive, speeds over 12 knots, normal diesel. The first one we sent out, the Makin Island on an eight-month mainly to the Middle East, came back with almost half its fuel budget unspent because of that. So now we're beginning to retrofit our destroyers with these hybrid drives. And we're building a new class of destroyer, the Zumwalt, the DDG-1000, that's all electric. It has no – that's the only source of power that the entire ship has. And all our weapons systems are becoming power hogs. And we need more and more power and we're having to find it in more efficient and better ways.

And finally, I got to say a word about the Marines. When you think of Marines, you don't usually think of ardent environmentalists. As my Marine aide one time said: We like to blow things up. But the Marines have embraced alternative energy and making energy where they are, more than any other service. We were losing a Marine, killed or wounded, for every 50 convoys of fuel into Afghanistan. That's too high a price to pay.

So Marines began doing things like solar power for their radios and GPSs and with solar blankets, about this big. They roll them up, put them in their pack. And not only did they not have to be resupplied, but it saved them 700 pounds of batteries per company. So they didn't have to lug 700 pounds and they didn't have to be resupplied with batteries. They are doing stuff like wind, solar on their bases in Afghanistan or wherever they are. We have a SEAL team that is pretty close to net zero both in terms of power and water. They've got a device that makes purified water with solar power and wind that they can carry around with them. So they never have to be resupplied and they can stay in the field for a long, long time.

At Navy, we're big enough. We can bring them architecture. And we're changing the way that alternative fuels are being used in this country. And we're sending the demand signal out. And so besides meeting with shipbuilders and things, I go to Silicon Valley a lot. I go to investment firms a lot. Here's what we need. Here's what we're willing to do. We're willing to sign 20-year offtake contracts on alternative energy if you'll build it. We'll give you the land. You can put it on our base, if you will – if you'll put the capital upfront. And we'll give you a fair return over the life of that – over the life of that program.

We have always been on the cutting edge of energy. We're going to continue to be on the cutting edge of energy. Every single time we've changed energy in the Navy – every single time, there have been naysayers. You can't do this. This is stupid. When we went from sail to coal it was you're trading something that's free, the wind, for something that costs money, coal. When we went from coal to oil, wait a minute, you've

got coaling stations all around the world. What about that infrastructure? And when we pioneered nuclear, you could never make it small enough or safe enough to put it in a submarine or a carrier. Every single time – every single time those naysayers were proved wrong. They're going to be proved wrong again this time.

As David said, I was the ambassador to Saudi Arabia. The oil minister there in the '80s, Zaki Yamani, had a very famous quote. He said: The Stone Age didn't end because we ran out of stones. It ended because we invited something better. That's what we're doing today. So from the Navy, Semper Fortis, Forever Courageous. And from the Marines, Semper Fidelis, Forever Faithful. Thank you all very much. (Applause.)

MR. SANDALOW: Thank you, Mr. Secretary. Those were inspiring remarks.

You make it sound so obvious. (Laughter.) I just wanted to – I wanted to start with a kind of personal question. How did you decide to take on this energy mission as so central to your service as Navy secretary? I mean, is this something you decided before getting the job, at the beginning your job? What led you to do it?

SEC. MABUS: Well, a couple things. I was ambassador to Saudi Arabia and I saw what oil did and how the price of oil and the availability of oil could be used. But second, the great strength I brought as secretary was I had no idea what the Navy needed. I had been in the Navy from '69 to '72, long before the parents of most the people in this room met.

And I had very little contact with the Navy from '72 until '09. And so when I – when I went into the Navy, I didn't know what they needed. But the Pentagon does a very good job of getting you ready for your hearing, for your confirmation. So for about six weeks in a windowless room I got briefings an hour long from 8:00 in the morning until 5:00 in the afternoon, every day.

And one thing kept emerging, and that was energy, that it was a vulnerability, that it was something that – because of price, because of supply, because of being used as a weapon – it's the major source of conflict. You could make a pretty good argument that World War II was fought over energy in the Pacific, going down into Indonesia after the oil fields there. And that the reason that Germany invaded Russia was the oil fields in the Caucasus.

And a lot of conflict has sprung up over energy and over sources of energy. And you know, you look now in the Arctic where there are great sources of energy and potential for conflict there. You look in the Western Pacific, you know, all over – the potential conflict over some rocks and water. It's not those rocks in the water it's what's underneath – with the minerals and the oil and gas under there. And I just thought the U.S. Navy didn't need to be – didn't need to be subject to that.

MR. SANDALOW: I want to come back to some of those hotspots that you mentioned in a minute, but in addition to making it sound obvious you also made it sound

easy in some ways. And you know, the metaphor for something that takes a long time to change and we're all used to is changing the ocean liner or changing the direction of an aircraft carrier. And you seem to be doing that with the Navy. You must be inspiring people. Just do you have any – we've got people here who are either current managers or going to be future managers. Any advice to them about how to get big organizations to change over time?

SEC. MABUS: A couple of things. One is, when I was governor of Mississippi – Mississippi's the poorest state in the union. Every day I went to work there were about a thousand things I could do to make things better. If I tried all thousand, nothing would have worked. So you got to really narrow your focus. And it's hard. Three or four is about all you can affect. And you're really good if you can do three or four things.

If you get something – a carrier or whatever – going this way and you really work at it, you can probably change it like that. You can't change it like that, it's almost impossible. But if you change it like this, in 30 years from now that's a huge change down the road. So one is just focusing on those four things, that's all I focus on. And it's hard. It's hard because you got to let some things go that are important.

It's also hard because people get really sick of you talking about the same thing day after day after day. But the second thing is, you got to show them it's – you have to show people that it's not just about what we change for change's sake, or it's not just your pet project. That it's actually going to make them better at what they do. And you got to let people do that for themselves.

I mean, the Marines – as I said, you don't think about Marines saying, damn, we need to get on this alternative energy thing. But when you start talking to them about you're losing people, you're getting Marines killed guarding fuel convoys that struck a chord. When you say, you're not going to have to carry 700 pounds of batteries into combat.

And we gave these energy – new energy devices to 2nd Battalion – or, 7th Battalion, 2nd Marines when they were going into Afghanistan into some of the hottest fighting we had there in Sangin. And we didn't train them. We just sort of said, here you go, give this a try going in. And I know those Marines were like, yeah, right. Come one, we're going into fight. We're not going into test your energy stuff.

But when they got there, and they started charging their radios using solar blankets, when they – when they were able to make energy from the sun and turn off the generators, all of a sudden they didn't have a target on them, all of a sudden they could hear somebody trying to sneak up on them, all of a sudden they weren't advertising, hey, yo, we're over here, come get us. And so that helped a lot.

You send the – you send ships out and you say: Try this and you'll save some fuel. And then this crowdsourcing we're trying, and the idea is because the Makin Island, which is the hybrid ship, the first one we had, I visited it. And the engineering officer

said: You know, we saved a lot of money because we got this hybrid drive. He said, we saved more because everybody on this ship decided to see – it became a competition, what can we do to use less energy? How can we do it?

So now what we're trying to do is have those – give those ideas a way to bubble up and also to reward people either with recognition or with more tangible sorts of rewards, that if we use your idea we're going to reward you. And if you are good at this, coming up with these new ideas, we're going to promote you faster than we ordinarily would.

MR. SANDALOW: There's a lot of interest here on campus on climate change, big negotiations coming up this year in Paris, and there was a big march on the streets of New York last year. What – is it – in your opinion, is climate change a national security issue?

SEC. MABUS: Oh, it's absolutely a national security issue. Where sea levels are rising, instability follows. More than half the world lives within 70 kilometers of the ocean. As you're particularly in developing countries, as sea levels rise you have instability. And we're the first responders. The Navy and Marine Corps are the people that anticipate having to go in there. The Arctic is melting now. It's ice-free for parts of the summer.

All of a sudden we got, you know, potential conflict over you can drill for oil and gas, you can go after minerals that you couldn't before. We've got ships now – commercial ships that are going the fabled northwest passage. We got Russia saying that's an internal passage to us, that's not an international strait – which is wrong. But somebody's got to enforce that. Somebody's got to make sure that there's freedom of the seas for everybody there.

You know, Kiribati, the island in the Pacific, is less than a meter above sea level on average. I met with the president there and he said his main goal was to get people to move before they disappear. This is an existential thing. We're going to lose a nation. How can you do that? And closer to home, we're the Navy. We tend to have bases next to the sea. You know, sea level rises, Norfolk's in trouble. San Diego is in trouble. Already you're seeing in Miami, you know, extreme high tides, is what they're calling them. It's just sea level rising.

And it's – it is an absolute national security issue. Climate change and the things driving climate change have the potential to be very disruptive and have the potential to draw our military into conflicts that otherwise they wouldn't be in.

MR. SANDALOW: I have a few more questions on some regional issues, and then I want to invite people from the crowd. We have a lot of expertise in this audience. But you mentioned the South China Sea and the Chinese military –

SEC. MABUS: Actually, I mentioned the Western Pacific.

MR. SANDALOW: Ah, OK.

SEC. MABUS: I didn't use the term. (Laughter.)

MR. SANDALOW: Well, then I'll mention the South China Sea. I stand corrected. Any reflections upon the Chinese military and the U.S. military and how we – as the Chinese military grows and how we manage that?

SEC. MABUS: Yeah. China's obviously building a much bigger navy, more capable navy. We would like for them to be more transparent – what are you up to? We engage them in a lot of ways because what we don't want to do is have a misunderstanding turn into something much bigger. We did a thing called CUES, Conduct Underway something at Sea – Encounters at Sea so that we got some rules of the road to go by.

And I'll give you the best example. We fly intelligence-gathering flights along the coast of China. We do it in international airspace. We also do collections at sea. And when you visit China or when you talk with Chinese leadership, they always have their talking points that you got to quit this. This is terrible. You shouldn't be doing this.

And the point that I made was, well, you must think it's pretty good because at the Rim of the Pacific, that big naval exercise in 2012, you slipped an intelligence-collection ship to shadow us to collect on it. So our response was to invite you to the next Rim of the Pacific, not to try to keep you away but say, come on, be a part of it. Be a responsible power. Be a responsible – be responsible as your size indicates that you ought to be. Be that responsible.

And the interesting that happened was, they did. They came. They sent four ships. Guess what else came? That intel collection ship. So we're not sure who they were collecting on, but we – but our – we want to have as much engagement as we can. We want to have as many exchanges as we can. We want to get to know each other as well as we can.

But we're also – you know, we do not believe in unilateral changes in the status quo. We don't believe in might makes right in any part of the world. And we think that freedom of navigation, freedom of the seas – we're the only country that's ever been a dominant Naval power that's kept freedom of navigation open for everybody and not just ships flying our own flag or flying the flags of our allies. And Asia is doing as well as it is economically because of the United States Navy, because we have kept those sea lanes open for now seven decades.

MR. SANDALOW: Yemen's in the news, and the news reporting about aircraft carrier heading that way. And so any comments that you're able to make about that, Mr. Secretary?

SEC. MABUS: Yeah. We got a – we got a bunch of ships there. But that's a part of presence. That's a part of being in the right place at the right time, and being in the right place all the time. And you know, operationally I can't comment on what we're – what we're up to down there, but the fact that regardless of where it happens in the world we are – we're there very fast and we can stay as long as we need to.

MR. SANDALOW: Let me just circle back to energy, while I invite people from the audience up. We have microphones right here and we have a great crowd. I actually want to recognize, at the risk of embarrassing him, a member from our advisory board, Ted Roosevelt is here. Thank you very much for being here, Ted.

SEC. MABUS: Well, that's a pretty famous Navy name, Ted Roosevelt.

MR. SANDALOW: It's an honor to have you here for this.

SEC. MABUS: A president by a similar name was assistant secretary of the Navy, and so was his cousin Franklin. Neither one got the job that I got.

MR. SANDALOW: So reporting to your job.

SEC. MABUS: Right. (Laughter.)

MR. SANDALOW: While we're doing this, let me just – well, I know. I want to ask you as this gentleman gets ready now, because I just can't resist, that you've got 132 countries. Most of those are on Navy aircraft, I take it, right? So the Navy have a frequent flyer program?

SEC. MABUS: (Laughs.) No, but they've done me up a very nice ride.

MR. SANDALOW: (Laughs.) Oh, that's good. OK. Yes, sir.

Q: You mentioned the – opening the Arctic and summer opening the Arctic. The Russians have these large nuclear-powered ice breakers that can punch their way to the North Pole. They do it almost every year. We have a lot of oil interests, resource interests. Do we have the ability to defend it with current naval power? And if – are there plans to extend our presence in our own Arctic? We own that Arctic too.

SEC. MABUS: A short answer is yes. But we've got a thing called the Arctic Road Map that we put out in 2009. We updated it last year in terms of what we're going to do near term, which is till – now to 2020 and then from 2020 to 2030 in the Arctic.

We don't have the ice breaking capabilities that a lot of countries do, not just Russia but several others. Navy doesn't have ice breakers. Our Coast Guard does. But both – they only have two and they're both getting pretty old. So that's something that we as a nation have got to think about investing in, is that capability.

But we've got a lot of presence there. And that presence is increasing. We're the chair of the Arctic Council this year. There are five nations, as you know, that touch the Arctic. There are several more that are observer status, China being one of them. And what we're – what we're trying to do is keep down conflict, keep down the irritants, the things that could blossom into other things.

And one more thing: We're the only country – major country – one of the few countries period that hasn't ratified the Law of the Sea Treaty. Every president, every secretary of the Navy, every secretary of defense, every chief of Naval operations and virtually every business leader has said we need to do that because it gives us a much firmer legal footing to do some of the things that we do. And we can't even get a vote in Congress. So that's something that would help us dramatically.

Q: Hi. Thank you so much for being with us. I really –

MR. SANDALOW: Please introduce yourself.

Q: My name is Jamie Hutson. I'm a student here at Columbia, grad student at SIPA.

I wanted to ask you a little more about the electric engines that were powering some of these hybrid drives. I haven't really –

SEC. MABUS: Now, you're talking to an English major here, OK?

Q: (Laughs.) Well, I'm a policy student, so I don't think I can understand too technical.

SEC. MABUS: (Laughs.) OK.

Q: But yeah, I was wondering if you could talk more about the strategy and what the Navy was thinking in moving that direction versus a nuclear – you know, exactly how that technology works and maybe some of the strategic thought in that.

SEC. MABUS: OK. Well, first on nuclear, we used to put nuclear propulsion on cruisers in the '70s – '70s and '80s we put some on cruisers. It's very expensive. All our subs are nuclear, all our carriers are nuclear. But oil has to be consistently probably around \$200 a barrel to make nuclear make economic sense on surface combatants. And one of the – I mean, I'm building the fleet, but ships are expensive. And we simply don't have the capital to pay for things like that.

So this is an alternative in a lot of ways. I mean, the electric drives, when the diesel is running it charges the batteries for the electric drives and then they pull that power off when they use it. We're looking at a lot of other technologies to do similar things – fuel cells. I'm sort of neutral about the technology that we use. It's just that it needs to – it needs to use less energy and come for a source that is more stable.

But the things we're bringing into the fleet – I mean, we got a laser weapon now that's on a ship in the Arabian Gulf today. It uses a lot of power. And it's a small one and they're going to scale up. And we've got a thing called a rail gun, which shoots things so fast that you don't have to have high explosives at the end. It just – it goes eight or nine times the speed of sound. And you've got to have energy that charges up very quickly and releases instantly and then charges back up very quickly. And so right now the limiting factor on a lot of things are batteries, storage power. And it's true for our bases too.

But that's the reason we went that way. I mean, there's research being done for nuclear power – small nuclear power on bases. We may get there. But you know, an example is civilian nuclear power gets refueled about every two years. Nuclear power on our carriers gets refueled every 25 years – you refuel a carrier once during its life. For subs that we're building today, it's life of the hull. So the nuclear power is going to last for 40 years. And so it's a very different technology than a nuclear plant that's out there, and that's what we're struggling with.

Q: My name is Craig Rosenthal (sp). Thank you for coming out today.

I was wondering in general if you could address contributions to submarine technology in warfare currently by the Japanese, Germans and Italians, the former major players in that field.

SEC. MABUS: All three of those countries – particularly the first two, Japan and Germany – are building very capable, very quiet conventionally powered submarines. They're very good submarines. And – but they're not the only ones doing it. The technology has moved pretty far and pretty fast. Air independent propulsion, which means they don't have to come up and charge the batteries, they can stay under for a couple of weeks. And they're quiet – they're very quiet.

And it's made counter-submarine operations more challenging. But those three that you named are very close allies of ours. But Germany, in particular, is selling its submarines. Israel uses German submarines. A lot of countries around the world use German and Japanese submarines.

Q: Thank you.

MR. SANDALOW: Please. For those listening on podcast, we're here with Navy Secretary Ray Mabus. Please, sir.

Q: Yes, sir. My name is Tim Hodge (sp). I'm a student here at SIPA. My question for you is, if we're expanding the shipbuilding programs up to, I think you said, 304, given that cruise missiles are getting cheaper, conventional subs are getting cheaper, what are the chances we end up with a very large, very expensive, very easily countered stick in the Western Pacific?

SEC. MABUS: Well, number one, there's not much alternative. I mean, if we're going to keep that presence, we got to have those grey hulls. Number two, you're always going to have – offense and defense is always going to move along. And number three, I'm pretty comfortable where we are today. And I'd way rather be where we are than where anybody else is today.

Now, we have a technological edge in a lot of different things – some of which I can talk about, some of which I can't. But we are at risk of losing that technological edge simply because of budgets. And it's not so much the amount of money, although that's important, it's things like sequestration, which just says cut the same amount out of everything, don't protect anything, don't put money against strategy, don't put money into science and technology, don't put money into research and development to counter some of these – some of these things.

I'll use a technical term on you. Sequestration is dumb. It's just dumb. But right now it's going to kick back in, unless Congress does something by the start of '16. So right now we've got a technological edge. We can basically go where we need to go and do what we need to do in various ways. Nobody else is sitting still, though, nobody. And that technological edge is fragile and it can be lost. And it can be lost in a fairly short period of time. And it's one of the reasons that, besides shipbuilding, I've also protected S&T and R&D monies – science and technology.

And if you – I mean, I'll give you one quick example I gave last week. I held up a – I mean, one of the focuses that I have is unmanned vehicles, because that's the future. And you know, we've got an unmanned vehicle that's about this big. You can print it on a 3-D printer onboard ship. You can put thousands of them out there. They cost a couple hundred bucks each. They're one-way. You put them out; you don't expect them to come back. But they can set up their own networks. They can either use them defensively to create paths through jamming or you can use them offensively to jam other people. So our technology is today unmatched, but we have to – if you ever stop, you lose.

Q: Thank you very much, sir.

MR. SANDALOW: Mr. Secretary, we hear about DARPA, the Defense Advanced Research Projects Agency. And when you do research, is the Navy working with DARPA, or do you have your own research units? How does that work institutionally?

SEC. MABUS: We have a – we have a thing called Office of Naval Research that – it's pretty astounding. I get a report every week on the patents they have filed. And I don't understand about 90 percent of them, but they are pretty incredible patents. We got a couple Nobel Prize-winners that work at ONR. But they work collaboratively with DARPA. DARPA usually – DARPA's usually a little more of the science lab stuff. But then to get things operationally and bring it into a service, it's not always the case,

but both DARPA and ONR are just incredible for just what I was talking about, risk taking, trying things because a bunch of the stuff just never gets out of the lab or it just doesn't work.

MR. SANDALOW: So we have six minutes and I see three people standing here, which with my advanced mathematics, I believe that comes down to two minutes per person. Why don't I suggest – why don't each of you introduce yourself, ask a question just in a row, and then we'll let the secretary answer the questions and give some concluding remarks.

Q: Hi there. My name is Chris Mozaire (sp). I work with Artis Media (sp). I'll be brief.

Just a question I wanted to ask: Navy's goal to reduce alternative energy – or increase alternative energy 50 percent by 2020, to what extent will biofuels play into that?

SEC. MABUS: It will be pretty nearly all of what we do at sea in both ships and aircraft. On shore, it's stuff like solar and wind and geothermal, hydrothermal, things like that. But at sea, it's – biofuel is about the only thing we've got.

Q: Hi. I'm Amber Miller. I'm the dean of science here at Columbia.

SEC. MABUS: And I just did something you told me not to. (Laughter.)

Q: So you're setting a really incredible example, both in the way of thinking and also development of technologies and techniques. And I'm just wondering – I mean, I can image the way that you're thinking about how to develop these new technologies being incredibly helpful for cities, for big companies, technologies for shipping, for trucking. What are your thoughts about how to get those ideas out so that other people adopt them?

SEC. MABUS: Well, the military has a lot of times been the first users, immediate adopters, early adopters. I mean, flat-screen TVs, GPS, internet. And usually what happens is we take the risk, we can spend more on doing that. And for example, on stuff like alternative energy, if we put it on our bases, pretty soon it spreads to the surrounding community. If we show that it's economically viable, business is right behind us. And as I said about the alternative energy that we're using on our bases, we're doing it all public-private partnerships. So we've got those companies, and they're companies you would not think – people like the Southern Company, Georgia, Florida, Alabama, Mississippi are great partners in this.

Q: Thank you for everything you're doing. Very impressive.

SEC. MABUS: Thank you.

Q: Last question. My name's Lindsay Ashby from the World Energy Forum.

And my brother actually works for Raytheon. He's a senior assistance engineer. And it still surprises me, when people find out they still ask, you know, how does he work in a war-making industry, you know? So it still shocks me when people ask that question. But thank you for your service.

And along that line, he said that the last time anyone ever did air-to-air combat with the United States was Desert Storm. And is the United States and the Navy and the Air Force are they still in that general direction, kind of going on your comment earlier about if you stop you lose?

SEC. MABUS: Yeah, we – a bunch of things. I mean, they – you've got to be prepared for irregular warfare, which is what we've been doing for more than a decade now, against people who don't have the traditional air-to-air stuff. But you've also got to be thinking of near-peer competitors that do. You've – we also – we don't ever want one generation of aircraft on our carriers. I think a carrier is just a platform to carry stuff. And the thing that we're heading toward is on land. I mean, we've landed an unmanned aircraft on a carrier. We refueled – we've refueled it, it's refueled other things.

Now, I went out to watch it land on the carrier. It wasn't being flown by anybody – nobody. It was programs in Patuxent River, Maryland to go find the carrier and land. And it did. You watch manned aircraft coming into a carrier, and they're always adjusting – you know, human nature. You watch this thing it was like it was coming down on a string. It always hit within a foot of the flight deck. I mean, bam, every time – every time.

And so now it can be used for, in Pentagonese, ISR, intelligence, surveillance, reconnaissance. It can also be used as a refueling platform. But where you're heading is autonomous – you send it out, you tell it what to do, and it makes the decisions. So, and your brother's doing good service.

MR. SANDALOW: Well, in our closing minutes, Mr. Secretary, any thoughts on anything you'd like. But I know that there'd be interest here in career advice generally from students who are just leaving. And look at what you've managed to accomplish. Just any thoughts or guidance about what they should be thinking as they go forward?

SEC. MABUS: Well, two things. One is I'll give a plug for Navy. And I spent three years in the Navy many years ago. And I – and I had a very short, very undistinguished career. In fact, the most surprised people that I got this job were the people on my ship. (Laughter.) And they still are. But whatever success I've had, I'm not sure it would have happened without being in the Navy. It teaches you leadership. It teaches you responsibility. You grow up very fast. And we push it down very hard and very far.

But I'll give you the advice I give – I do a lot of commencement speeches. You don't have to join the military. You don't have to run for office. But do something that's bigger than yourself. Do something that does not help you financially. There is nothing wrong with making money, nothing at all – and a lot right about taking care of yourself and your family. But at the end of your life, you're probably going to remember the money you made, but you are going to remember the people you touched, you are going to remember the lives you made right, or you're going to remember the futures that you affected.

Do something that nobody knows you're doing. Do something that you won't ever get any credit for. Do something to help this amazing country we live in and this world. And whether it's in energy or whatever – be involved in the issues of your day and do something about it. Don't be passive. And you know, whether civilian or in uniform, if you're a scientist, if you're interested in energy, we can give you a heck of a job.

But even if we can't, even if you don't want to do that – and fewer than a half of percent of America does it today, we need your – we need your brains, but more than that we need your hearts to make us continue to do the right thing and to keep the United States military connected to the people it defends, because there's a danger with an all-volunteer force that it will become disconnected from the people that it protects. You're the thing that can keep that from happening.

MR. SANDALOW: Well, thank you for that. Thank you for all you're doing. Please join me in giving Secretary Mabus a big hand. (Applause.)