One of the most interesting uses of this enormous computer power is modeling climate change. It is ironic that many of those who oppose additional funding for the national laboratories want a more aggressive stance on the question of climate change and ways to ameliorate it, are the same people who support a House-passed Energy and Water Appropriations bill that would reject more funding for "Roadrunner."

Mr. President, we are in the middle of negotiations on the Energy and Water appropriations bill right now. Adoption of the House-passed bill will not only set back our work on computing power and climate change but will be a disaster for certification of the reliability of our nuclear weapons. I hope that all Members of Congress will read today's article in the Washington Post to get an idea of what is at stake as we set policy in the future.

Mr. President, I ask unanimous consent that the entire article be printed in the RECORD.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

[From the Washington Post, Dec. 3, 2007]

FASTER COMPUTERS ACCELERATE PACE OF DISCOVERY

(by Christopher Lee)

Sometime next year, developers will boot up the next generation of supercomputers, machines whose vast increases in processing power will accelerate the transformation of the scientific method, experts say.

The first "petascale" supercomputer will be capable of 1,000 trillion calculations per second. That's about twice as powerful as today's dominant model, a basketball-court-size beast known as BlueGene/L, at the Energy Department's Lawrence Livermore National Laboratory in California that performs a peak of 596 trillion calculations per second.

The computing muscle of the new petascale machines will be akin to that of more than 100,000 desktop computers combined, experts say. A computation that would take a lifetime for a home PC and that can be completed in about five hours on today's supercomputers will be doable in as little as two hours.

"The difficulty in building the machines is tremendous, and the amount of power these machines require is pretty mind-boggling," said Mark Seager, assistant department head for advanced computing technology at Lawrence Livermore. "But the scientific results that we can get out of them are also mind-boggling and worth every penny and every megawatt it takes to build them."

A leading candidate to become the first petascale machine, the "Roadrunner" supercomputer being developed by IBM in partnership with the Energy Department's Los Alamos National Laboratory, will require about 4 megawatts of power—enough to illuminate 10,000 light bulbs, said John Hopson, program director for advanced simulation and computing at Los Alamos in New Mexico.

But scientists say Roadrunner and its cousins will make possible dramatically improved computer simulations. That will help shed new light on subjects such as climate change, geology, new drug development, dark matter and other secrets of the universe, as well as other fields in which direct experimental observation is time-consuming, costly, dangerous or impossible.

In fact, supercomputers and their simulations are becoming so powerful that they essentially have introduced a new step in the time-honored scientific method that moves from theory to hypothesis to experimental confirmation, some experts contend.

"They are a tool that really helps stimulate the imagination of scientists and engineers in ways that previously weren't possible," said David Turek, vice president of supercomputing at IBM. "You had theory and hypothesis and experimentation. Well, now scientists are admitting that computation is an important part of this, as well."

"Nature is the final arbiter of truth," said Seager, the Lawrence Livermore computer scientist, but "rather than doing experiments, a lot of times now we're actually simulating those experiments and getting the data that way.

"We can now do as much scientific discovery with computational science as we could do before with observational science or theoretical science."

A particularly fruitful area of computer modeling has been the study of global climate change. Ten years ago, experts agreed that humans probably were contributing to global warming. Now, in part because of a 10,000-fold increase computing power and better accuracy in climate simulations, scientists are sure of it.

One result is that computer climate models can now simulate atmospheric and oceanic conditions and, crucially, how changes in each affect the other, experts said. Now the worry is not that computing power is inadequate but that the aging of NASA's weather satellites will lead to a shortage of input data before long, Seager and others said.

Petascale computers also will make it possible to predict, say, the effect of an earthquake on every building in downtown Los Angeles, experts said. Current models cannot yield predictions for areas smaller than a square mile or two. The increased detail could help shape building codes and be a valuable tool in evacuation planning and disaster preparedness.

Computer simulations also help assess the reliability, safety, security and performance of weapons in the U.S. nuclear stockpile, years removed from any real-life nuclear tests. "Nuclear weapons are the quintessential example of something you can't really test anymore, so a lot of it has to be done computationally," said Hopson, the Los Alamos scientist.

Other potential uses of petascale computers include better simulations of what happens when stars explode into supernovas and die, and new and more refined analyses of experimental drugs and their effects on disease and interactions with other medications, experts said.

Still another is the modeling of the bird flu virus and how it might evolve to become more communicable and lethal—knowledge that could help scientists develop a vaccine in time to use it and to inform public health planning. Petascale computers are also expected to lead to more potent models for Wall Street to calculate risk and predict the fate of financial instruments, as well as more advanced digital prototypes of automobiles and jet aircraft, further reducing the need for physical mock-ups.

The remarkable advances in computing power of recent decades are frequently attributed to the tenet known as Moore's Law, named for Intel co-founder Gordon E. Moore, which says that progress in building chips doubles the power of microprocessors about every 18 months. But that alone does not explain the leaps in supercomputing, scientists said.

Today's supercomputers rely not only on better "compute nodes" (made up of faster chips and more memory), but also on scientists' ability to "gang" hundreds of thousands of those nodes together in a single machine and to devise better ways of having them communicate with one another and divide up the work of complex problem solving.

"If you ran today's code on yesterday's computers, they would be much faster," said Raymond Bair, director of the Argonne Leadership Computing Facility at the Energy Department's Argonne National Laboratory near Chicago. "People have figured out how to solve the problems faster."

Even before a petascale computer is a reality, scientists are anticipating the next big milestone, the exascale machine—a thousand times more powerful still, and capable of 1 million trillion calculations per second. But they'll have to wait. That one isn't expected until about 2018.

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HONORING OUR ARMED FORCES

NATHAN GOOD IRON

Mr. DORGAN. Mr. President, I wish to offer a brief statement in tribute to Nathan Good Iron.

Nathan J. Good Iron was a high school basketball star, a college student, a new father. This young man of promise died in an enemy attack in Afghanistan a year ago while serving with a unit of the North Dakota National Guard, the 188th Air Defense Artillery. His family learned the terrible news on Thanksgiving Day of 2006.

Nathan was a Hidatsa Indian, a member of the Three Affiliated Tribes of Mandan, Hidatsa and Arikara of the Fort Berthold Reservation. For more than a thousand years, the Hidatsa people have lived in just a single place, along the banks of the Missouri River in North Dakota. Always a pastoral people, they resided in sizeable cities, cultivating extensive, lush gardens along the river, hunting buffalo and other game in the prairies around them. When white adventurers and traders began showing up, the Hidatsa were welcoming and friendly. Their villages, and those of their nearby allies— the Mandan and Arikara—were centers of trade and exploration.

But when it was necessary, when enemies invaded their homeland, the Hidatsa proved themselves strong and valiant warriors, establishing a long, epic history of courage and valor on the battlefield.

Such traits are not easily lost by a civilization. They persist through the generations. And the Hidatsa now have a new symbol of bravery, Nathan Good Iron.

Nathan was recently honored by a 3-day powwow in his memory. Powwows, which have long and rich traditions, are always events of high pageantry and symbolism. Soldiers and veterans receive special recognition at these powerful exhibitions and so it is appropriate that Nathan was honored with this noteworthy memorial powwow.

That powwow was an occasion for remembrance and joy for Nathan's 25 years of life, a proud memorial for his youthful sacrifice, and recognition of his patriotism, his championship of democracy, and his courageous willingness to put himself in harm's way when America called.

Please allow me, on behalf of the American people, to send my most respectful and admiring salute.

RETIREMENT OF SANDRA COOK

Mr. KENNEDY. Mr. President, I welcome this opportunity to pay tribute to Sandra Cook who retired last week from the Department of Education. For almost 20 years, Sandra has worked in the Office of Legislative and Congressional Affairs at the Department, providing invaluable and dedicated service. She will be missed by all who worked with her, both at the Department and in Congress.

Improving education for each and every child in this country is one of the most important priorities for our Nation, and Sandra has been committed to that priority throughout her dedicated service. Her commitment to education began in the classroom in Indiana as a teacher of history and language arts. She came to Washington to work in Congress and then moved to the Department of Education. From there she has provided constant guidance and support to us as we work to improve Federal education policy. She has been an indispensable part of the past two reauthorizations of the Elementary and Secondary Education Act—the Improving America's Schools Act and the No Child Left Behind Act, as well as many other Federal education bills.

We all owe Sandra an immense debt of gratitude for her outstanding work. She knows the education laws inside and out, and she always goes the extra mile. She has always been able to work in a truly bipartisan way with Members of both parties. She doesn't just get the job done—she gets it done well, and with grace. We have been fortunate to have her.

As Sandra retires to Illinois, I know her colleagues at the Department of Education will miss her. Her knowledge and skills will be difficult to replace. Certainly, all of us in Congress and our staffs who have had the privilege of working with her will miss her assistance and support. I wish her a long and happy and healthy retirement. She has certainly earned it.

IN MEMORIAM: AUGUSTUS HAWKINS

Mrs. BOXER. Mr. President, I am honored to remember former Member of the House of Representatives Augustus Hawkins, who passed away on November 10, 2007, at the age of 100.

Augustus Freeman Hawkins was the first African American from California to be elected to Congress. He was a champion of workers, fair housing, and civil rights, and Hawkins represented south Los Angeles, first in the State legislature and then in Congress, for more than half a century.

Augustus was born in Shreveport, LA, on Aug. 31, 1907, the youngest of five children of Nyanza and Hattie Helena Hawkins. His family arrived in Los Angeles soon after World War I when Hawkins was 11. He attended Jefferson High School and earned a degree from UCLA in 1931.

He began his public service career in an era that was far less congenial to minority politicians, serving as a State assemblyman from 1935 until 1962, when he won election to the U.S. House of Representatives, as the civil rights movement was taking center stage. He served in the House from 1963 to 1991, and I was proud to serve with him.

While soft-spoken, Hawkins was fiery in defense of his constituents. At the time of the 1965 Watts riots in his district, he declared that police had been "abusive and arrogant and have attempted to control things by force, not by more modern methods of control."

When Hawkins retired at 83, he was widely praised for his unflagging legislative efforts to help bring those who had been left out of the system into the mainstream.

His legislative legacy includes a key role in shaping Federal statutes, most importantly as sponsor of the section of the landmark 1964 Civil Rights Act that created the Equal Employment Opportunity Commission. Hawkins fought with President after President for minimum-wage increases and, with Senator Hubert Humphrey, wrote the Humphrey-Hawkins Act of 1978 that was designed to reduce unemployment and inflation.

He is survived by two stepdaughters, Barbara A. Hammond and Brenda L. Stevenson; a stepson, Michael A. Taylor; two grandchildren; and one great-grandchild.

Our Nation lost an amazing public servant and mentor with the passing of Augustus Freeman Hawkins, but his legacy to the people of south Los Angeles, the State of California, and all of America should be remembered.

(At the request of Mr. REID, the following statement was ordered to be printed in the RECORD.)

RUSSIAN PARLIAMENTARY ELECTIONS

● Mr. OBAMA. Mr. President, I commend Russian citizens for turning out in large numbers to vote in yesterday's parliamentary elections. For 16 years, Russia's citizens have exercised their right to vote, which is so essential to democracy.

Unfortunately, Russia's leaders have been working to make that vote more and more meaningless by creating an imitation democracy instead of a real one.

Well before the campaign even began, several Russian political parties and politicians were banned from participating in the election. During the campaign, President Putin and his party, United Russia, enjoyed virtually unlimited positive television air-time on Kremlin-controlled networks, while opposition parties had their ads removed and their campaign materials con-fiscated. The Russian authorities have prevented opposition parties from campaigning fairly, imprisoning opposition leaders, intimidating activists, and preventing them from making their case to Russia's voters. Russian voters have reported that they have been pressured to vote for the Kremlin's party, United Russia, by employers and local officials. In Chechnya, 99.2 percent of voters allegedly turned out to vote and 99.3 percent of these voters allegedly cast their ballot for United Russia. Several other regions have reported similar results for Putin's party, making a mockery of this vote as a free and fair election. Yesterday's elections were the least free and fair in the 16 years of Russia's modern history as an independent country.

We have to work with the Russian leadership in the coming years to deal with vital foreign policy issues, including securing nuclear materials and preventing Iran from acquiring nuclear weapons. Nuclear weapons security is a high priority, and the United States and Russia need to work together to prevent proliferation of nuclear weapons or materials.

But in doing so, we do not have to turn a blind eye to the erosion of Russian democracy. We must be clear-eyed on Russia's political direction, which in the long run is not favorable for Russia's own political stability or economic prosperity. By engaging Russia honestly, we will remain friends of the Russian people as they continue to try to build for themselves a better country and future.●

ADDITIONAL STATEMENTS

HONORING PATROL OFFICER JOHN PAUL MILLER

● Mrs. BOXER. Mr. President, I ask my colleagues to join me in honoring the memory of a dedicated public servant, Officer John Paul Miller of the California Highway Patrol. On the evening of November 16, 2007, while searching for a reported reckless drunk driver, Officer Miller's life was tragically cut short in the line of duty when his patrol vehicle struck a tree on a rural road near Livermore.

Officer Miller graduated from the California Highway Patrol Academy in March 2007 and joined the Dublin CHP office soon afterward. Officer Miller dutifully served the citizens and communities of Contra Costa County. Although his time in the uniform was all too short, Officer Miller demonstrated a passion for law enforcement and commitment to helping others, qualities that enabled him to become a respected member of the California Highway Patrol. Officer Miller's colleagues shall always remember him for his gregarious nature and devotion to serving the public.

Officer Miller is survived by his wife Stephanie and children, Chandler and Reese. When he was not on duty or