Union of Concerned Scientists

{C Catalyst

Volume 14, Spring 2015

A Simple Step Toward a Safer World

Take land-based nuclear missiles off "hair-trigger" alert

Shipping Smarter

What Role for Natural Gas?

[Union of Concerned Scientists

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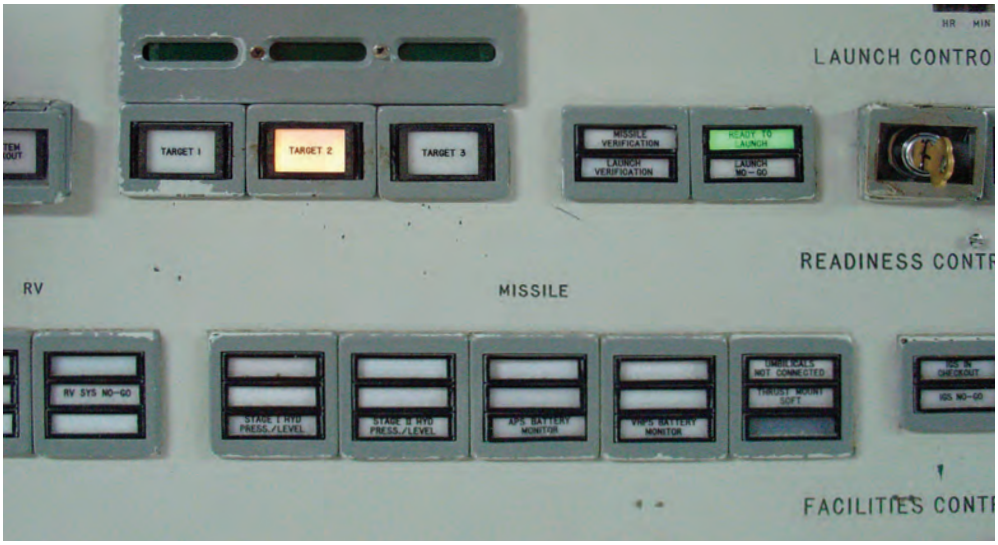
Let's Not Roll the Dice with Nuclear Weapons



By Ken Kimmell

As highlighted in this issue of *Catalyst*, UCS has launched a campaign to take U.S. land-based nuclear missiles off "hair-trigger" alert status—some 450 of them. This defense posture, which allows missiles to be launched within minutes, was intended to foil and therefore deter a feared "first strike" from the former Soviet Union, because our missiles would leave their silos before Soviet missiles could arrive to destroy them. It carries significant risk, however, because it enables nuclear weapons to be fired as a result of a rushed decision-making process and potentially erroneous warning data.

> ***Keeping our missiles on "hair-trigger alert" actually makes us less safe.***

The risk posed by this Cold War relic has no justification now and actually makes us less safe. Even if one were to ignore the fact that the Russians have no reason to fire nuclear weapons at us, we have about 1,000 nuclear warheads in hidden submarines that are a more effective retaliatory force against anyone who might contemplate using nuclear weapons against us.

So why haven't we fixed this? Presidents George W. Bush and Barack Obama have both called for taking our missiles off hair-trigger alert, and a who's who of military experts has joined them. It seems that it hasn't happened because the issue has not been made a high enough priority.

We can change that. UCS is now gathering allies from faith, public health, environmental, and other communities to present the facts on this issue and demand the elimination of this unnecessary and scary risk. {C}

***Ken Kimmell** is president of UCS.*

Photos: © Creative Commons/Jeff Keyzer (Flickr); © Richard Howard (Kenneth Kimmell)

What large-scale initiatives should be undertaken to reduce electricity consumption in the United States?

Change over all traffic lights to LEDs. At any four-way intersection, there are at least four lights on, all the time. Multiply [this] by the number of intersections in the United States, and then by the number of hours in a day, week, month, year. The amount of power [used] is astronomical. Now reduce that number by 85 percent and you can see how much would be saved by using LEDs.

John J. Christiano, PE, Franklin, NJ

Property tax financing! Allowing people to borrow for solar and efficiency, which is paid [back] over decades on property tax, allows someone to invest without worry . . . if they must sell, whoever lives there [continues] paying their share of the upgrade.

Shawn Foster, Kansas City, MO

Cover all the huge blacktop parking lots in front of malls and other high-traffic buildings with scaffolding holding solar panels. [The] electricity generated could be used to run the buildings.

Alice Elshoff, Bend, OR

We could find ways to get relatively pricey LED bulbs into the hands of people. Perhaps food banks or other organizations that serve the poor could hand out LED bulbs to people who come to pick up food. Over time this would not only save people money (especially since these lightbulbs would not need to be replaced for years), but would lower their carbon footprints.

Barbara Bazyn, Chelsea, IA

WE WANT TO KNOW

What approaches have you found to be most effective when communicating with others who might be skeptical about the realities of climate change?

We will publish selected responses (edited for length) in the summer issue of *Catalyst.* You can respond via:
EMAIL: *catalyst@ucsusa.org*
FACEBOOK: *www.ucsusa.org/observations*

Electricity rate structures can have a powerful effect on consumer behavior. By focusing our efforts on the electricity providers that create rate structures, we may be able to influence the behavior and purchasing decisions of many people and thereby reduce electricity consumption.

Mike Lauber, PE, CEM, Fort Mill, SC

Swap out the natural gas water heater, which cannot be run clean and carbon-free, for an electric version that can, either with rooftop solar or grid electricity powered by renewables. Swap out that gasoline car, which cannot be made zero-emissions, for an electric car that can.

Doug McKenzie, Palo Alto, CA

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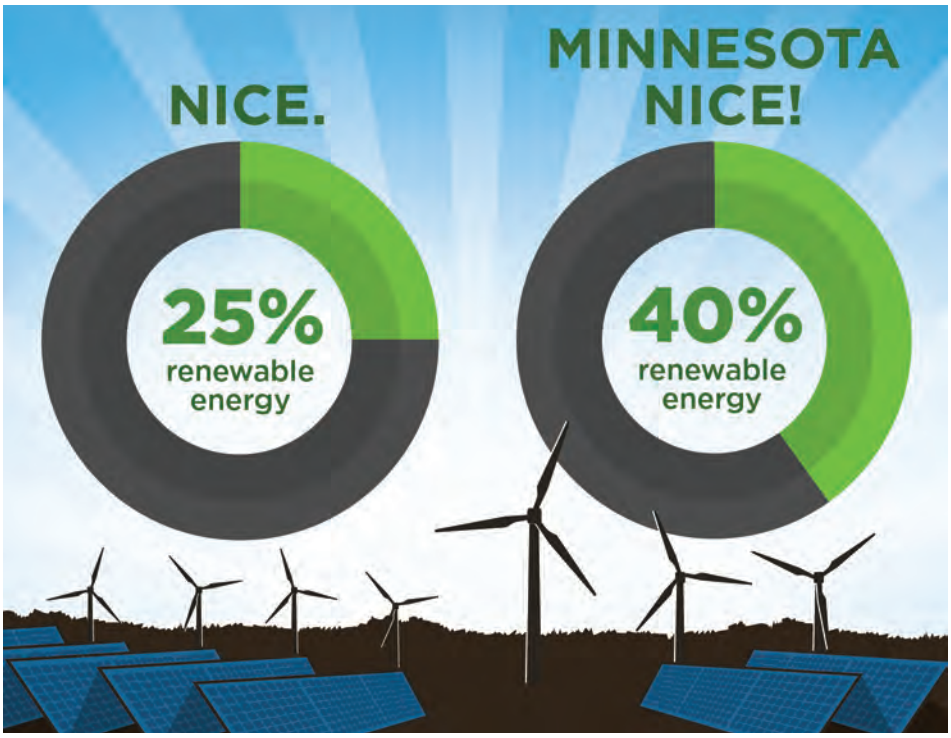
Powering Ahead in Minnesota

Minnesota is already a national clean energy leader, but UCS is putting its expertise into action to help the state go further. Back in 2007, UCS worked with a Democratic legislature and a Republican governor to pass a renewable energy standard requiring Minnesota's utilities to generate 25 percent of their electricity from renewable sources by 2025. Since then, the state has nearly tripled its renewable energy supply, and residents currently receive more than 15 percent of their electricity from resources such as solar and wind power.

Now, UCS is using new analysis to show Minnesota's lawmakers the benefits of increasing their renewable energy standard from 25 percent by 2025 to 40 percent by 2030. The team met with state energy experts at the University of Minnesota in January, explaining that Minnesota could adopt the more aggressive standard at virtually no additional cost to consumers, and with clear economic benefits for communities throughout the state.

Ultimately, our analysis suggests that strengthening the state's renewable energy standard to 40 percent would, by 2030, drive some $6.2 billion in new capital investments, yield more than $14 million in annual tax payments to local governments, and provide $9 million in annual lease payments to landowners. Furthermore, payments to operate and maintain renewable energy facilities in Minnesota would top $150 million annually by 2030. As Steve Frenkel, director of the UCS Midwest office, puts it, "It's an idea we're hoping that officials from both sides of the aisle will work together again to support."



Investing in renewable energy is investing in Minnesota's future. Learn more at www.ucsusa.org/MinnesotaCleanEnergy.

A Victory for Openness on Nuclear Power Safety

Dave Lochbaum, director of the UCS Nuclear Safety Project, was spurred into action last year when he learned that the Nuclear Regulatory Commission (NRC) was withholding information about U.S. nuclear power plants from the public. Lochbaum not only wrote about the problem on our "All Things Nuclear" blog, but also filed Freedom of Information Act requests for all NRC documents related to fire protection and emergency planning at every operating U.S. nuclear plant over the past decade.

As a result of Lochbaum's efforts, the NRC posted the fire-protection-related files—hundreds of them—in its ADAMS online library last October, making them publicly available. Since then, the NRC has also released a cache of emergency planning documents. Now, Lochbaum has formally asked the NRC's inspector general to investigate the commission's withholding of these documents, which appears to have violated several federal regulations. He has also written to the NRC chairman and commissioners to make sure the NRC will not withhold such documents in the future.

Fighting Childhood Obesity with School Lunches

As of 2013, more U.S. children were overweight or obese than ever before—a staggering 30 percent. Childhood obesity rates have tripled since 1970. UCS is fighting back with a report, *Lessons from the Lunchroom: Childhood Obesity, School Lunch, and the Way to a Healthier Future,* that investigates the impact free and reduced-price lunches have on children's diets and health. Among the findings:

- Children who struggle with obesity are 10 times more likely to be obese as adults. And the health consequences of obesity—including heart disease, type 2 diabetes, and some cancers—are serious and costly.
- Low-income and minority children are especially at risk: African-American and Hispanic children are 43 and 59 percent more likely than white children to be obese, respectively.
- Diet plays a big role in the problem: on average, our children consume five times the amount of sugar recommended by the *Dietary Guidelines for Americans*, and only a third of the recommended amount of fruits and vegetables.

Lessons from the Lunchroom found that free and reduced-price school lunches help low-income and minority children consume more healthful foods such as fruits and vegetables, which can, in turn, shape their future diet to be more healthy. And school lunches can be made healthier for *all* children by including more fruits and vegetables.

In 2010, the Healthy, Hunger-Free Kids Act improved nutritional standards for food served in schools, but more needs to be done to provide vulnerable children with nutritious, healthful meals. The act is up for reauthorization this year. Visit *www.ucsusa.org/lunchroomlessons* to find out how you can urge Congress to safeguard our children's health.

Groundbreaking Climate Goals in California

While UCS scientists and members are actively involved across the country in reducing global warming emissions and promoting the adoption of renewable energy, it is also vital to think ahead.

In California, already a national and world leader in renewable energy, UCS has been helping to shape state plans for post-2020 climate reduction strategies at a series of meetings with key legislators and Governor Jerry Brown's senior climate and energy staff. Working in conjunction with other organizations in the state, UCS has encouraged California to set a goal of reducing emissions 80 percent below 1990 levels by 2050.

To move this vision into reality, California State Senator Fran Pavley, working with Senate President Pro Tempore Kevin de Léon, recently introduced legislation that would update the state's AB 32 statute to require 80 percent emissions reductions by 2050. Governor Brown has also pledged that the state will ultimately generate 50 percent of its electricity from renewable energy, and he has adopted the UCS goal of "Half the Oil" (cutting oil use in half by 2030).

One Elite Group We're Proud to Be In

UCS works hard to be inclusive and to reach out to diverse stakeholders on all the issues we address. But there's one exclusive club we're happy to be a member of: for the *seventh* consecutive year, Charity Navigator, the nation's largest independent evaluator, has given UCS a four-star rating. That's a distinction achieved by fewer than 2 percent of nonprofit organizations.

UCS received high marks for accountability and transparency and the fact that 85 percent of the donations we receive go directly to fund our program work. Thanks to all our members for your continued support—this recognition helps confirm that UCS is putting your donations to good use.

Photo: © USDA

UCS Activists Pressure Fast Food Giants

Over the past year, UCS has been working hard to push fast food conglomerates to commit to using only deforestation-free palm oil in their products. Palm oil is a fast food staple, but its production often destroys tropical forests, wipes out habitats for endangered species, and contributes to climate change.

A social media campaign targeting McDonald's on National Fast Food Day (November 16) reached nearly 5 million Twitter users, and more than 13,000 Twitter users took action: sharing the message with their followers, sending letters via *www.ucsusa.org/mcdonalds*, and tweeting @McDonalds directly to ask the fast food giant to use deforestation-free palm oil.

As a result, McDonald's representatives are now working with UCS on developing stronger palm oil policies. And on the day after National Fast Food Day, Yum! Brands—which operates more than 40,000 Taco Bells, KFCs, and Pizza Huts around the world—also agreed to meet with UCS to talk about sustainable, deforestation-free palm oil. If you missed out on our National Fast Food Day efforts, you can still tell the nine largest American fast food companies to commit to deforestation-free palm oil at *www.ucsusa.org/fastfood*.

Building Support for International Climate Action

Alden Meyer (left), director of strategy and policy at UCS, talks with French Foreign Minister Laurent Fabius (right) at the United Nations' climate change negotiating session in Geneva, Switzerland, in February 2015. Fabius will preside over the next global climate summit in Paris this December, where a new post-2020 climate agreement is expected to be adopted. Also shown is Dean Bialek, an experienced climate negotiator who serves on the Marshall Islands delegation.

Photo: IISD/ENB (www.iisd.ca/climate/adp/adp2-8/9feb.html)

A SIMPLE STEP *toward a* SAFER WORLD

UCS calls for President Obama to take nuclear missiles off hair-trigger alert.

BY ELLIOTT NEGIN

In September 1983, one of the most tense periods of the Cold War, Lieutenant Colonel Stanislav Petrov was in a bunker just outside of Moscow, monitoring the Soviet Union's early warning satellite system. It was Petrov's job to report a nuclear attack to his superiors, who would send the message up the chain of command until it reached Soviet leader Yuri Andropov, who would then decide whether to retaliate. They would have only an 8- to 10-minute window to respond. Just after midnight, alarms went off. . . .

One of the satellites had detected five U.S. intercontinental ballistic missiles (ICBMs) heading toward the Soviet Union. Repeated checks confirmed the satellite was working correctly.

Petrov was skeptical that the attack was real. He figured that if the United States had actually launched a nuclear attack it would likely involve hundreds, if not thousands, of nuclear missiles attempting to wipe out Soviet forces, not five. Moreover, Soviet ground-based radar had not yet detected any missiles. He told his superiors it was a false alarm, but with no hard evidence to back up his decision.

Petrov's hunch proved correct—and saved the world from nuclear disaster. Later it was discovered that the early warning system had mistaken the reflection of the sun on the tops of clouds for a missile launch. That's what fooled the system.

TOO MANY MALFUNCTIONS

It is terrifying to consider that something as innocuous as the sun's reflection on clouds could have resulted in a nuclear debacle. But that incident is just one example of technical glitches and human errors in both Russia and the United States that could have triggered a nuclear launch over the last few decades. A civilian scientific rocket, a failed computer chip, and an improperly installed circuit card are just some of the culprits.

That's why, to significantly reduce the possibility of something going horribly wrong, the Union of Concerned Scientists has identified one vital step President Obama can take immediately and without congressional approval to make the world a safer place: remove U.S. land-based missiles from "hair-trigger" alert status to reduce the chance of an accidental, erroneous, or unauthorized launch.

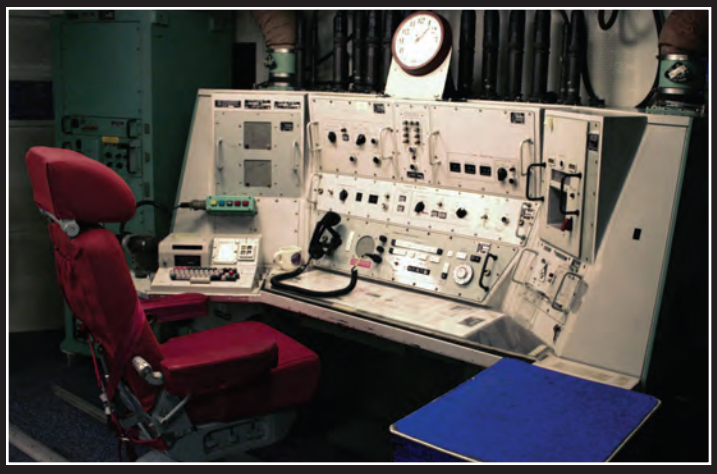
"We're pressuring the Obama administration to act now to take U.S. land-based nuclear missiles off hair-trigger alert," says David Wright, co-director of the Global Security Program at UCS. "It's long past time to abandon this dangerous policy."

Two U.S. Air Force missile maintenance crewmen perform an electrical check on a Minuteman III intercontinental ballistic missile in its silo at Whiteman Air Force Base in Missouri.

A DANGEROUS RELIC OF THE COLD WAR

The policy of keeping U.S. land-based missiles on a hair trigger dates to the Cold War era. Back then, military strategists on both sides feared a surprise first-strike nuclear attack not only on cities and industrial sites but also on their land-based

As Simple as Flipping a Switch



There are many ways to take U.S. land-based nuclear missiles off hair-trigger alert, but one is particularly straightforward. The Air Force could use the safety switches designed to prevent a missile launch during routine silo maintenance. Doing so would electronically isolate the missile from outside launch signals, and it could not be launched until a maintenance crew member physically entered each silo to turn it back on. While unlikely to ever be necessary, the entire U.S. ICBM force could be returned to hair-trigger alert status within two days.

Photo: Department of Defense (silo) ; © Wikimedia Commons/Chitrapa (missileer chair)

Taking U.S. land-based nuclear missiles off hair-trigger alert can significantly reduce the risk of an accidental or unauthorized launch.

nuclear missiles and bombers. To ensure that they would maintain the capability to counterattack, both countries kept their land-based nuclear weapons on hair-trigger alert so they could be launched within minutes and avoid being destroyed on the ground.

This "use 'em or lose 'em" policy may have sounded logical to some military leaders years ago, but it doesn't anymore. Just ask Lieutentant General James Kowalski, who became deputy commander of the U.S. Strategic Command in October 2013. Before taking that job, he oversaw U.S. ICBMs and nuclear bombers. He says the notion of a Russian first strike at this point is "hardly worth discussing." He says other, much more likely things worry him far more.

"The greatest risk to my force is an accident," Kowalski said at a July 2013 forum in Washington, DC. "The greatest risk to my force is doing something stupid. That puts my force at risk, more so than almost anything out there I can think of."

Kowalski wasn't directly referring to hair-trigger alert, but a number of high-ranking military officers and government officials have singled out the policy as one that could most easily lead to a devastating accident.

For instance, James Cartwright, a retired four-star Marine Corps general who served as commander of the U.S. Strategic Command and vice chairman of the Joint Chiefs of Staff, was the lead author of a 2012 study that called on the U.S. government to end hair-trigger alert. One of Cartwright's co-authors was former Defense Secretary Chuck Hagel.

"The current postures of launch-ready nuclear forces that provide minutes and seconds of warning and decision time should be replaced by postures that allow 24 to 72 hours on which to assess threats and exercise national direction over the employment of nuclear forces," the report stated. "This change would greatly reduce the risks of mistaken, ill-considered and accidental launch."

The recommendations from Cartwright and his co-authors echoed one made by former Secretaries of State Henry Kissinger and George Shultz, former Defense Secretary William Perry, and former Senator Sam Nunn, who proposed a series of steps to establish a foundation for a nuclear-free world in a January 2007 *Wall Street Journal* column. Their very first suggestion was to modify "the Cold War posture of deployed nuclear weapons to increase warning time and thereby reduce the danger of an accidental or unauthorized use of a nuclear weapon."

Not long after that column ran, presidential candidate Barack Obama promised to work with Russia to take nuclear weapons off hair-trigger alert. "Keeping nuclear weapons ready to launch on a moment's notice is a dangerous relic of the Cold War," he told *Arms Control Today*. Such policies increase the risk of catastrophic accidents or miscalculation," he said. "I believe that we must address this dangerous situation."

In a speech on April 5, 2009, in the Czech Republic capital of Prague, U.S. President Barack Obama committed to the goal of eliminating nuclear weapons and reducing the threat posed by existing nuclear arsenals.

THE TIME IS NOW, MR. PRESIDENT

We're now into the third year of President Obama's second term. So why are U.S. ballistic missiles still on high alert? The short answer is that no one in the administration has yet made this a high enough priority. UCS is working to change that.

To those who worry about U.S. vulnerability with such a move, UCS Senior Analyst Stephen Young points out that the majority of U.S. nuclear forces are on submarines, which, by virtue of the fact they are constantly moving and difficult to detect, would survive any effort to take them out with a first strike. "Our subs represent a supremely capable response to nuclear attack," Young says, "more than what would be required for any purpose. They make the readiness level of our ICBMs irrelevant, even in a crisis."

Of course, the world would be even safer if Russia also took its missiles off hair-trigger alert. A U.S. decision to do so will encourage Russia to reciprocate. Either way, with widespread agreement that taking U.S. land-based nuclear missiles off hair-trigger alert would significantly reduce the risk of an accidental or unauthorized launch, the time is now for the United States to lead by example, especially when the advantages are obvious and the disadvantages are negligible.

Accidents happen. Let's make sure they aren't nuclear. {C}

Photo: © Associated Press/Pablo Martinez Monsivais

We Can Reduce the Nuclear Threat

Investigative journalist Eric Schlosser documents the history of accidents and near-misses in the U.S. arsenal.

Eric Schlosser explores nuclear weapons and the illusion of safety in his latest book *Command and Control* (Penguin 2013); he is also the author of the *New York Times* best sellers *Fast Food Nation* and *Reefer Madness*. His work has appeared in the *Atlantic Monthly*, *New Yorker*, and *Rolling Stone*, among other publications.

You spent six years researching Command and Control. *Given what you uncovered, how worried should we be about the possibility of a nuclear accident or inadvertent nuclear launch?*

ES: I think the danger posed by the world's nuclear arsenals is the single greatest national security threat we face. I'm not apocalyptic. I'm not predicting there'll be a nuclear detonation tomorrow at 3 p.m. But there's been remarkably little public discussion and attention paid to this issue considering what's at stake.

Today I'm more worried about an unauthorized launch than an accidental detonation—something going wrong in the system itself so that a launch either happens by mistake or someone who shouldn't have access to things gets access. It takes constant vigilance to make sure that doesn't happen. And, while the nuclear weapons we have today are much safer than the ones we had in the 1970s and 1980s, our nuclear infrastructure is also aging and a lot of the equipment is outdated. So accidents absolutely are possible. The probability is greater than zero. There's no question about that.

The Union of Concerned Scientists is now calling for the United States to take its land-based nuclear missiles off hair-trigger alert. How helpful do you think this step would be for our safety here at home?

ES: I support the idea of taking our land-based missiles off of hair-trigger alert. Our land-based missiles are really only useful for attacking Russia. And to take them off of hair-trigger alert is to signal to Russia that we're not going to have a first strike with our land-based missiles. It would be great to see a similar effort on Russia's part because there's much more we can do in a partnership to reduce the danger. But I believe we need to do everything we can to prevent accidents with our nuclear arsenal and this seems like a sensible and important first step.

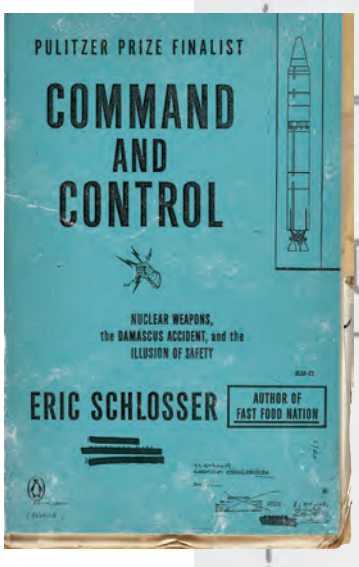
Back in the 1980s, a million people gathered in Central Park to call for a nuclear freeze. Why do you think the public seems to be paying such comparatively little attention to the subject now?

ES: The prospect of a nuclear war was a source of tremendous anxiety during the Cold War. And the collapse of the Soviet Union was so sudden and unexpected that I think everyone just breathed a sigh of relief. People started to believe that the danger ended with the end of the Cold War. And of course, the risk of nuclear war was greatly reduced. The nuclear arsenals in the United States and in Russia have declined in size by about 80 or 90 percent. That's terrific. But the danger never fully went away. The danger is still with us. And, unfortunately, I think people are pretty much in denial about it.

Photo: © Kodiak Greenwood

> ***"I support the idea of taking our land-based missiles off of hair-trigger alert. We need to do everything we can to prevent accidents with our nuclear arsenal."***

By explaining in detail how close we've come on a number of occasions to an accidental nuclear cataclysm, your book is a terrifying read. What has the reception been like since it was published?



ES: My aim with this book has been to provoke discussion about this issue. And I'm very gratified that there seems to have been a significant uptick in attention to the issue since the book was published. This is the first book I've written that seems to have been read by people in power—people in the Air Force, people at the weapons labs. And, to some extent, I think it is encouraging a discussion about the safety of our nuclear infrastructure and I'm very glad about that. I'm also happy to be speaking about this with the Union of Concerned Scientists—an organization that has played an important leadership role on this issue for the past 40 years.

At UCS, we're encouraging our members to get more involved and take action on the safety of our nuclear arsenal. What would you say to encourage them?

ES: Well, first of all, in the coming years, Congress will be discussing the modernization of our nuclear arsenal and infrastructure. Much of this debate will take place in secret with very little public input. There will be some people proposing to spend about $1 trillion to upgrade our nuclear weapon capabilities. So I think it is vital to learn about these issues. People need to get involved, and this country needs a vigorous, informed public debate about this spending and its goals.

Today we are witnessing the beginning of an international discussion—a serious discussion—about the abolition of nuclear weapons. From a humanitarian perspective, these weapons do not discriminate between civilians and military targets. And there are many who are making the argument that nuclear weapons should be abolished on those grounds alone. You know, we banned land mines and chemical weapons and cluster munitions. A growing number of people are working toward the abolition of nuclear weapons as well.

The key point I want to make is that we can reduce the threat posed by our existing nuclear arsenals. There are all kinds of things we can do. Taking our land-based missiles off of hair-trigger alert is certainly one such thing. But, in order to meaningfully reduce the threat, we absolutely need to start talking about it—and stop living in denial. {C}

SHIPPING SMARTER

Cleaning up the nation's trucking fleets can deliver huge savings—in dollars, gas, and emissions.

by Pamela Worth

Don't look now, but there's an elephant in your shopping cart—something you may not think much about when you buy food, household goods, clothes, electronics, or nearly anything else you can use or consume. It's the oil that it took to get these products to the store.

As a conscientious shopper, you may have wondered: How did that box of pasta or jar of sauce arrive on my grocer's shelves? Where was my laptop shipped from before I bought it? Where did those winter boots I ordered online actually travel from after I clicked the "Confirm Purchase" button?

Unless you buy from a local farm, the eggs you eat travel hundreds of miles to make it into your omelet. The bed you slept in last night, the slippers on your feet, the cup of coffee from the neighborhood café, the flan on your dessert plate at the new tapas spot, the dessert plate itself: each arrives with a side of fossil fuel.

The national "shop local" movement has helped bring long-overdue attention to the environmental costs of long-range shipping. But even conscientious shoppers buy groceries at supermarkets, upgrade their smartphones, purchase furniture, eat at restaurants, and shop online. And the majority of these goods—totaling more than $10 trillion each year—are shipped long distances by oil-swilling trucks.

According to the new Union of Concerned Scientists report *Engines for Change: From Cell Phones to Sodas, How New Truck Standards Can Improve the Way America Ships Goods*, the shipment and delivery of the products we use and consume every day are responsible for an oversized share of global warming emissions. The good news: Consumers can make a difference right now—not only by shopping local, but by pushing American trucking fleets to ship smarter.

Photo: © Creative Commons/Truck PR (Flickr)

HEAVY-DUTY POLLUTERS

Box trucks, refrigerated trucks, mail trucks, 18-wheelers, vans: each is categorized as a heavy-duty vehicle. These vehicles pick up and deliver more than 10 billion tons of freight around the country each year, carrying goods from ports to warehouses and distribution centers, then on to stores and Americans' doors.

If you've been stuck in traffic with heavy-duty vehicles, perhaps on a warm day with your windows down, you know they're also heavy-duty emissions machines. On average, American trucking fleets consume more than 21 billion gallons of oil each year, and produce hundreds of millions of tons of global warming emissions. Although heavy-duty vehicles only represent 7 percent of all vehicles on our roads, they consume more than 25 percent of the fuel used to travel these roads, burning up more than 1 million barrels of oil every single day.

Under the direction of President Obama, the Environmental Protection Agency (EPA) is drafting new standards for trucks that, if adopted, will cut their fuel consumption and global warming emissions dramatically. Dave Cooke, lead author of *Engines for Change*, estimates that the standards could reduce truck emissions by 40 percent, shrink the cost of shipping by more than $30 billion each year, and cut petroleum consumption from goods movement by more than 570,000 barrels of oil a day—more than the daily production of the entire state of Alaska.

"President Obama and the EPA have recognized that we can do better," says Cooke. "Our analysis shows that the average new truck could become 40 percent more efficient by 2025."

Not only would this reduction in gas consumption save money—savings that could be passed on to consumers—it would keep more than 110 million tons of global warming emissions from being released each year. That's the equivalent of shutting down 30 coal-fired power plants.

> *Trucks represent only 7 percent of all vehicles on our roads, but they consume more than 25 percent of the fuel used on these roads.*

PUTTING TRUCKS ON A LOW-OIL DIET

Under government standards, all cars sold in the United States next year are mandated to average nearly 25 miles per gallon (mpg), up from 20 mpg a decade ago. But according to our report, heavy-duty trucks average just *six* miles per gallon—a statistic that hasn't improved much since the 1970s.

The fuel economy of heavy-duty trucks went completely unregulated until 2011, when the EPA and National Highway Traffic Safety Administration issued the industry's first-ever fuel economy and global warming emissions standards. These standards, many of them implemented this year, represent an excellent first step toward cutting global warming emissions, says Cooke. But, he adds, we can—and should—push for more.

"Manufacturers have already demonstrated the technologies necessary to put much cleaner trucks on the road," Cooke explains. "We could be saving a lot in both emissions and fuel costs. The next phase of truck standards needs to be really strong to make sure we can get there."

Fuel-Efficient TRUCKS

Taking an important step toward smarter shipping, President Obama called on the EPA last year to draft a policy setting stricter fuel economy standards for heavy-duty vehicles, to be finalized by 2016. These new standards could improve trucks' fuel efficiency by nearly 70 percent. As *Catalyst* went to press, the EPA was still deliberating these standards—and there will likely be resistance from trucking fleets.

When the EPA issued its first round of standards, some private fleet owners applauded the measures and pressed for more. Large corporations such as Coca-Cola, PepsiCo, and Walmart own fleets of delivery vehicles so they can control the quality and efficiency of their shipments. These companies own hundreds of thousands of delivery vehicles that consume millions of gallons of fuel each year—a huge expense. New fuel economy standards would offer these behemoths the incentive of saving millions in shipping expenses.

However, for other carriers that contract to ship and deliver goods, built-in fuel surcharges offer protection from volatility in diesel prices. These surcharges are simply passed on to the consumer—you—meaning there is less incentive for such companies to comply with the EPA's new standards. If the price of diesel rises by two dollars per gallon again, as it did between 2009 and 2011, trucking companies won't take the full hit: you'll just get charged more for shipping. Implementing new standards for fleets will cost money and take time, and with reliability such a critical factor, risk-averse fleet owners will not always consider the long-term benefits.

But right now, American consumers have the opportunity to support the enforcement of these standards. We can take action to put our heavy-duty vehicles on a low-oil diet, dramatically reducing their consumption of fuel and cutting their global warming emissions.

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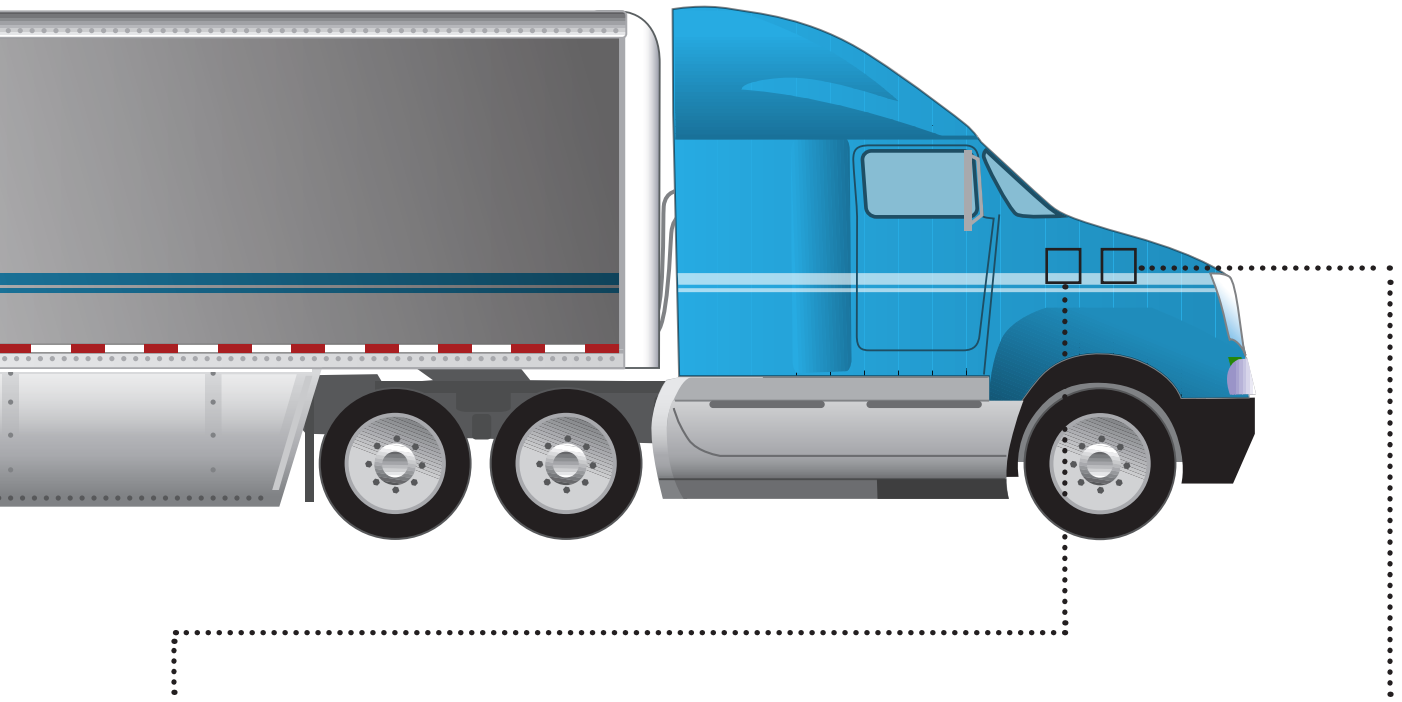
AERODYNAMICS

Rolling resistance: Reducing the weight and rolling resistance (i.e., the friction between the rolling tire and ground) of trailers through more efficient tire and axle design helps reduce the amount of fuel needed to pull freight.

Trailer skirts: Pockets of air turbulence develop beneath trailers, increasing drag. The addition of a "trailer skirt" can improve a tractor-trailer's fuel efficiency as much as 5 percent by reducing drag under the trailer and pushing the air around the trailer wheels.

Boat-tails: This aerodynamic equipment fitted to the back of a trailer can add additional fuel savings by reducing turbulence in the wake of air behind the vehicle. Undertrays and rear fairings, such as those you see on Formula One race cars, also direct air flow.

Many existing fuel-saving technologies could dramatically increase the fuel efficiency of America's heavy-duty vehicles—cutting oil use and global warming emissions in the process. New standards proposed by the Environmental Protection Agency would help advance the adoption of these technologies across today's trucking fleets. Here are some of the key changes that, together, can add up to big savings.



ELECTRICITY

Battery-powered accessories and equipment: Accessories such as air conditioning and external equipment such as lifts and refrigeration units often run on diesel generators or power from a truck's engine. Converting the power source for these accessories and equipment to battery power can save fuel by avoiding the need for truckers to idle their engines while parked.

Hybrid-electric trucks: These vehicles increase fuel efficiency by combining a conventional internal-combustion engine with an electric motor, batteries, and braking-energy capture (known as regenerative braking).

Fuel cell electric trucks: These vehicles are powered by fuel cells, which convert hydrogen and air into electricity while emitting only water vapor.

Battery-electric trucks: With no internal combustion engine, these vehicles are instead propelled by an electric motor powered by onboard batteries. The range of a current battery-electric truck varies from 50 to 100 miles per charge.

ENGINE ADJUSTMENTS

Transmissions: Improvements in transmissions that reduce friction and keep the engine operating at maximum efficiency can improve the fuel consumption of all trucks.

Heat exhaust recycling: Heat from the engine is usually wasted as exhaust, but could be captured and used to improve the engine's power output.

Breakfast with a Side of Oil

MILK
3 ½ CUPS FUEL

FRUIT JUICE
½ CUP FUEL

BREAD
½ CUP FUEL

CEREAL
½ CUP FUEL

EGGS
½ CUP FUEL

Of items shipped by truck, food accounts for the greatest fuel use–some 2.5 billion gallons in total annually. Listed above are the fuel amounts required per person to ship a given food item, based on annual per capita consumption. For the full list of food items analyzed in our report, visit www.ucsusa.org/enginesforchange.

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CURRENT FUEL-SAVING TECHNOLOGIES

The technologies to help save all this fuel exist already, says Cooke. Sleeker, aerodynamic designs that reduce wind drag, engines that convert waste heat into reusable energy, low-rolling-resistance tires with efficient axle designs, and accessories that operate on electric power are all improvements that fleets could make today (see "How It Works," p. 14). If truck manufacturers and fleets are required to implement these new standards, more fuel-saving technologies will be developed and made available at a faster rate, owing to increased demand. And although updating trucking fleets will require an initial investment, everyone in the shipping chain—including fleet owners, truck drivers, and consumers—will ultimately save money.

Taking into account the up-front costs for different types of trucks, Cooke's research shows that a brand-new, fuel-efficient, regulation-meeting tractor-trailer entering the market would save about $170,000 over the vehicle's lifetime, compared with what current trucks cost their owners.

> *Heavy-duty trucks average just* six *miles per gallon—a number that hasn't improved much since the 1970s.*

The typical truck driver would save about $30,000 each year in fuel costs; the enormous fuel savings overall could work out to somewhere between $135 to $400 per American household each year. Plus, as fuel costs decline, fuel surcharges will too, and product prices will become less susceptible to fluctuations in diesel prices.

We have the opportunity not only to save ourselves money, but also to cut oil consumption and reduce global warming emissions from the delivery of the goods we use every day. For the conscientious consumer, there is no downside to the implementation of these EPA standards.

"It might not cross your mind how far the book you ordered from Amazon.com had to travel to reach you, or how the milk in the dairy case arrived at the store," Cooke says, "but we have a historic opportunity to reduce the global warming impact of freight delivery. So we want to make the most of it." {C}

Delivering the Goods: How You Can Help

More than $10 trillion in goods are shipped via truck each year, with significant environmental consequences. Right now, you can push companies to ship smarter by eliminating tons of global warming emissions from their heavy-duty vehicles.

Some trucking fleet owners will push back against the EPA's more stringent fuel economy and emissions standards. You can take action to show these companies you care how your goods are delivered—and that you support improved fuel economy, less global warming pollution, and lower fuel and product prices.

To learn more about our campaign, visit *www.ucsusa.org/enginesforchange*, where you can read the *Engines for Change* report and get involved by urging our largest shipping companies to adopt the EPA's new standards. Trucks can deliver our goods without consuming as much oil—and you can help make it happen.

Measles Vaccinations: Progress in Baltimore

By Deborah Bailin

Measles was declared eradicated in the United States in 2000 but, since then, the number of U.S. cases has increased. Imported from abroad and fueled by misinformation from a fraudulent study linking vaccines to autism, measles outbreaks have grown among unvaccinated and under-vaccinated populations. In 2014 there were 644 documented cases in 27 states, and there will likely be more in 2015.

Fortunately, science-based policies have helped some cities like Baltimore, MD, buck the trend. After an outbreak in the 1990s sickened hundreds (nationwide, thousands became ill and 41 died), Maryland policy makers knew something needed to change. Since then, the city of Baltimore and the state of Maryland have made important policy changes and engaged with the public to help residents protect themselves and their communities. Access to immunizations has improved: clinics have added extra hours, walk-in appointments have been encouraged, the city lifted its requirement of a pre-vaccination physical exam, and vaccines are offered free of charge. Today, the vaccination rate for Baltimore schoolchildren is 99 percent.

VULNERABLE GAINS

As Baltimore Health Commissioner Dr. Leana S. Wen notes, however, "Baltimore is not an island." All 50 states and the District of Columbia allow medical exemptions, which are necessary for children under one year of age, those with compromised immune systems, and those with certain allergies. These individuals must rely on the vast majority of those around them being immunized. Yet 48 states including Maryland have religious exemptions, and 19 also permit "personal belief" exemptions, which makes it easy for vaccine skeptics to put not only their own children at risk but also others who cannot be vaccinated.

Vaccine skeptics have existed as long as vaccines, but their gripes were more legitimate a century ago. Prior to the Biologics Control Act of 1902, safeguards we now take for granted like inspection and labeling did not exist, and contamination was common. Since then, however, a strong set of protections has evolved to make vaccines remarkably safe and effective thanks to rigorous risk-benefit analyses; strict testing to assess safety, purity, potency, and effectiveness; multi-stage clinical trials; and adverse event reporting.

> ***Today, the vaccination rate for Baltimore schoolchildren is 99 percent.***

It's important to remember that smallpox, before it was eradicated, killed more people in the twentieth century than both world wars combined. Today, no one dies from smallpox. The extraordinary success of vaccines against many devastating diseases has opened the door to distorted risk perceptions, outdated misconceptions, and misinformation. This complacency threatens the progress being made in cities like Baltimore. As Dr. Wen rightly notes, "We've come too far to let that happen." {C}

Deborah Bailin *is a democracy analyst in the Center for Science and Democracy at the Union of Concerned Scientists. Read more from Deborah on our blog,* The Equation*, at* http://blog.ucsusa.org.

Exemplifying Change at the Local Level

An internship at the Union of Concerned Scientists changed the trajectory of UCS National Advisory Board member Kim Stone's life.

In college, Stone planned to become an artist. But after becoming involved with educational programs on climate change and safer nuclear technologies at UCS, she chose to pursue her passion for environmental issues, earning a master's degree in public policy and working for nonprofit organizations.

Now a city councilwoman in Highland Park, IL, Stone is creating a local culture of conservation. She cares deeply about energy efficiency, minimizing global warming emissions, and reducing waste. At home, her family of four puts out just one barrel of trash every few weeks. But in her work she says she is careful not to appear sanctimonious to constituents and colleagues.

"I'm very conscious of figuring out how to get people on board and to take action without making them feel guilty. I try to come up with positive ideas and suggestions," she says.

THE START OF A MOVEMENT?

Her strategy has proved successful: since her election, Stone has facilitated the purchase of energy-efficient equipment for Highland Park municipal buildings and helped bring car sharing to the Chicago suburb. Next, she hopes to update local building codes to incentivize energy-efficient improvements. "Solar, wind power, green roofs: these technologies are difficult to implement right now because of the codes," she says.

Stone says she ran for office to help accelerate the pace of change on environmental issues, and encourages other UCS members to take similar action in their communities. She has even volunteered to share her experience and skills with *Catalyst* readers considering a run for local office.

"We need more people with environmental expertise to be involved in elected offices," she says. "If we effect change at the local level, we'll set an example that others will follow."

Readers can connect with Kim Stone by emailing *member@ucsusa.org*.

Doubling Down on Natural Gas Is Not the Answer

By Jeff Deyette

As the U.S. electricity system retires more and more aging and polluting coal-fired generators, natural gas has become the primary fuel of choice for many power producers. Florida, for instance, the third-largest electricity producer in the United States, now generates 62 percent of its electricity from natural gas—up from 44 percent just a few years ago. All told, 16 states generated more than one-third of their electricity from natural gas in 2013. This growth in gas-fired electricity is driving near-term reductions in air pollution and global warming emissions, and providing an economic boost to some regions of the country.

However, as good as these near-term benefits might sound, the latest UCS analysis reveals that this growing reliance on natural gas carries with it complex risks that should not be ignored. For example, even though natural gas supplies have grown markedly, prices continue to be volatile. Price spikes not only harm consumers and the economy, but can also create perverse incentives for utilities to switch back to using old and polluting coal plants. And while natural gas plants' smokestack emissions are significantly cleaner than those of coal plants, the extraction, distribution, and combustion of natural gas result in the leakage of methane, which presents serious environmental, public health, and climate change challenges. (Methane is 34 times stronger than carbon dioxide at trapping heat in the atmosphere.)

> ***By making smart energy choices today, we can reduce emissions and transition to a more resilient electricity system.***

Instead of doubling down on natural gas to replace coal and meet our growing electricity demand, we should prioritize investments in renewable energy and energy efficiency. UCS analysis shows that this strategy would result in numerous benefits including natural gas prices that are 2 percent lower by 2040—a boon for both the electricity sector and other domestic and industrial consumers of natural gas. Even by 2020, we found the net societal benefits from the emissions reductions under this scenario add up to $36 billion. By 2040, the annual benefits grow to nearly $170 billion.

The choice is clear. As the nation moves away from coal, setting course toward a diverse supply of low-carbon power sources (composed primarily of renewable energy and energy efficiency with a balanced role for natural gas) is far preferable to a wholesale switch to natural gas. By making smart energy choices today, we can transition to a more consumer-friendly and resilient electricity system, achieve cost-effective reductions in global warming emissions, and face fewer risks from an overreliance on natural gas. {C}

Jeff Deyette *is assistant director of energy research and analysis in the UCS Climate and Energy Program. Read more from Jeff on our blog,* The Equation*, at* http://blog.ucsusa.org.

Increasing our reliance on natural gas is a risky proposition. Visit *www.ucsusa.org/naturalgasgamble* to learn more.

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In partnership with members like you, the Union of Concerned Scientists uses rigorous, independent science to develop solutions to our planet's most pressing problems, and advocates tirelessly on behalf of these solutions. With a legacy gift, you can help us keep doing this work for generations to come.

A simple gift from your estate

A gift from your estate—naming UCS as a beneficiary of your will, trust, IRA, or other retirement plan—is easy to set up, and can be revised at any time. Estate gifts in any amount are welcomed, and will make a lasting difference.

A gift that can increase your income

A charitable gift annuity can provide you or a loved one with income for life, and offers tax savings as well. Support UCS and receive a guaranteed stream of income, unaffected by the volatility of the stock market.

If you are interested in learning more about giving from your estate, or charitable gift annuities, please contact Ken Dolbashian at (617) 301-8014 or **kdolbashian@ucsusa.org.**