ARTICLE

The Green Arms Race: Reorienting the Discussions on Climate Change, Energy Policy, and National Security

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Abstract

In the midst of a shifting international order, the U.S. Department of Defense stands uniquely positioned to intensify global innovation in the energy arena. This Article describes the mechanics by which DoD can ignite a mutually-beneficial green energy "arms race." In this role, the military reprises a historical function of driving technological advancement, combining its operational requirements and legislative prerogatives to grow investment and create consistent demand. The Article also discusses the legal and regulatory regimes that may be enlisted and exported through transgovernmental networks to spread the benefits of the use of alternative fuels and increased energy efficiency, the potential impact of the Green Arms Race on global climate change efforts, and the limits on the impact of greening the force in bringing about positive change. The Green Arms Race has the potential to succeed where existing international and unilateral efforts to encourage efficient energy innovation and address climate change have failed.

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Introduction

As with previous periods of conflict, the war on terrorism[1] is changing the architecture of global governance. In 1648, the Peace of Westphalia ended the Thirty Years War and saw to the demise of the empire and the rise of the state sovereignty.[2] In 1918, the conclusion of the Great War allowed for the creation of international institutions and rules designed to resolve international conflict through politics.[3] After short "interwar" period, World War II erupted across Europe and in the Pacific. After its conclusion in 1945, nations yielded power to international bodies and expert administrators like Dag Hammarskjöld.[4] Working within international institutions, these administrators pulled the levers of control to manage threats to global security and human rights. The conclusion of the Cold War in 1989 led to decolonization, the rebirth of sovereignty, and efforts to reorganize the international system around legal process and adjudication in national and international courts.

The current conflict is drawing new lines. Notions of state sovereignty and responsibility are in flux and individuals act on the international plane alongside institutions. The role of law in war itself is changing; law no longer stands in opposition to war but within it. Purely legal arguments expand executive authority, define the contours of the battlefield, and legitimize the taking of life. Additionally, and importantly for our inquiry, the Long War, and the globe it is designing, is changing the way we think about energy.

The United States Department of Defense is the single largest consumer of energy in the world.[5] The current contingency operations use

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[1] In this article, I will refer to the "war on terrorism," the "Long War," and the "current conflict." Each of these phrases refer to the armed conflict Congress authorized in September 2001. *See* Authorization for Use of Military Force (AUMF), Pub. L. No. 107-40, 115 Stat. 224 (2001).

[2] Treaty of Westphalia: Peace Treaty Between the Holy Roman Emperor and the King of France and Their Respective Allies (Oct. 24, 1648), http://avalon.law.yale.edu/17th_century/westphal.asp.

[3] Covenant of the League of Nations, June 28, 1919, 225 Consol T.S. 188, *available at* http://avalon.law.yale.edu/20th_century/leagcov.asp.

[4] *See* DAG HAMMARSKJÖLD, THE UNITED NATIONS, http://www.un.org/depts/dhl/dag/time1953.htm.

[5] Peter W. Singer, *Fueling the "Balance": A Defense Energy Strategy Primer*, BROOKINGS INST. (Aug. 2009), http://www.brookings.edu/research/papers/2009/08/defense-strategy-

approximately 170,000 barrels of fuel per day.[6] Traditionally, fuel requirements on the battlefield were viewed as unconstrained—military planners anticipating a ready supply of cheap and easily deliverable energy. A decade of war is forcing a reorientation. The logistical and tactical risks involved in delivering fuel to the battlefields in Iraq, Afghanistan, and elsewhere around the globe are high, and costly. As a recent report noted, "The Pentagon . . . spent $17.3 billion on petroleum in fiscal 2011, a 26 percent increase from $13.7 billion the previous year."[7] Mission requirements are driving investment and innovation to make the U.S. military leaner and more efficient. The Pentagon's initiatives to green the force and its business practices are creating, perhaps for the first time, a consistent demand for new technology in the green energy arena.

Managed correctly, this DoD-led push to green the force can be shared to globalize the demand for clean and renewable energy and drive the development of technology and regulation even faster. As the green energy wave builds in the defense sector, our allies, knit together by both formal agreements and informal networks, will be strong partners able to localize the benefits of an energy efficient military. Not wanting to fall behind on the 21st century battlefield, other nations will likely work towards similar gains.

So starts the Green Arms Race.[8]

Global demand and innovation, pulled along by the defense sector, will spill over into the commercial market, making more efficient energy available to private citizens. The progeny of the Green Arms Race, rather than a strategy of mutually assured destruction, will be a more efficient fighting forces, a reduction the worldwide reliance on fossil fuels, new spinoff green energy technologies, and the creation of a new, more stable,

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singer (The Department of Defense uses "more energy in the course of its daily operations than any other private or public organization, as well as more than 100 nations." *Id.*).

[6] Lisa Daniel, *New Office Aims to Reduce Military's Fuel Usage*, AM. FORCES PRESS SERV. (July 22, 2010), http://www.defense.gov/news/newsarticle.aspx?id=60131.

[7] Danielle Ivory, *Pentagon Oil Spending May Snarl Efforts to Trim $490 Billion*, BLOOMBERG GOV'T (Feb. 8, 2012), http://www.bloomberg.com/news/2012-02-08/pentagon-oil-spending-may-snarl-efforts-to-trim-490b.html.

[8] *See generally A Green Arms Race?*, N.Y. TIMES (May 19, 2010), http://ideas.blogs.nytimes.com/2010/05/19/a-green-arms-race/ (noting that China's perceived "edge in developing alternative energy extends to its military, and this, more than ethical considerations, is driving the Pentagon to step up its game, green-wise").

world order—a mutually assured sustenance. The once disparate approaches to address climate change, energy dependence, and national security become one and the same: initiate and win the Green Arms Race.

Part I of this Article examines the mechanics of the coming Race. The arms race of the 20th century united the scientific academy, private industry, and key government actors around building nuclear weapons. The race of the 21st century will do the same in the green energy context, pulling innovation in its wake. Effective regulatory mechanisms and successful technologies will be exported to our allies formally through multilateral treaty mechanisms and informal defense networks. This move will pressure other nations to develop green technologies, or fall behind on the battlefield. Significantly, whether non-allies compete effectively, the United States' push towards the development of energy efficient technologies is the optimal choice, lighting the way to a more efficient military, reduced reliance on fossil fuels, and a more flexible budget and foreign policy.

This domestic policy can be generalized and shared on the international plane. Part II discusses the mechanics of the Green Arms Race as it spreads across the globe. Effective regulatory mechanisms and successful technologies can be exported through formal treaty mechanisms and informal networks. The Green Arms Race, through the networked world, has the ability to unify the interests of key experts from diverse disciplines including the academic, the scientist, and the government bureaucrat.

Part III describes the potential impact of the Green Arms Race on efforts to address climate change. The current multi-lateral and unilateral efforts are limited in their scope and ability to achieve their stated ends. Domestic constraints greatly disadvantage the bargaining positions of negotiators. By aligning the interests of key actors, the Green Arms Race can reorient the discussion, adding the language of national security to environmental concerns, and bypass the problems of both the current United Nations regime and budding unilateral efforts.

Part IV discusses potential limitations of the Green Arms Race to bring about the predicted changes. Nations have attempted several times to change the way they utilized energy. In the United States, Presidents since roughly the middle of last century have initiated various plans. The current DoD-led effort has a chance to succeed where others failed. The national

security mission is driving change within the Pentagon; this has the power to create steady demand for clean energy technology, a consistent force that has never before existed. Alas, money is also a potential critical shortfall. Shrinking federal budgets and world economies limping out of recession may make large-scale and long-term investments in research and development of new technologies (some of which may fail) difficult to justify. That said, a prudent long-view supports investment in energy efficiency.

The nation most able to project power in the future will likely be the one best able to fuel its efforts. Writing in the United States, this point is easy to ignore. The nation currently enjoys the ability fuel the force globally; this may not be true in the future. It is difficult to predict where or when the next Sputnik moment, this time in the energy area, will occur. It may not be here. We must participate and win the Green Arms Race.

Part V concludes by discussing the impact of the green arms race on global governance and the language of energy policy.

I. Greening the Force

"Energy choices can save lives on the battlefield."[9]

In carrying out its mission to "provide the military forces needed to deter war and to protect the security of our country,"[10] the DoD is responsible for just under two percent of the nation's total energy consumption.[11] The immense energy requirements of the combat force are a significant logistics burden and a security challenge both at the strategic and tactical levels.[12] On the strategic level, policy choices are constrained by energy requirements. On the battlefield, whether considering Patton's tanks

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[9] U.S. MARINE CORPS, EXPEDITIONARY ENERGY STRATEGY AND IMPLEMENTATION PLAN 35 (2011), *available at* http://www.marines.mil/unit/hqmc/cmc/Documents/USMC%20Expeditionary%20Energy%20Strategy.pdf (quoting General James T. Conway).

[10] DEP'T OF DEF., MISSION STATEMENT OF THE UNITED STATES DEPARTMENT OF DEFENSE, *available at* http://www.defense.gov/about/ (last visited May 12, 2012).

[11] *Department of Defense Bloggers Roundtable: Operational Security, Energy Security and Operational Energy Needs of the Department of Defense*, (Oct. 14, 2010), *available at* http://www.defense.gov/Blog_files/Blog_assets/20101014_burke_transcript.pdf.

[12] *See generally* CTR. FOR NAVAL ANALYSIS, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (May 2009), *available at* http://www.cna.org/sites/default/files/Powering%20Americas%20Defense.pdf.

during the Second World War, or a service member in on a remote hilltop in Afghanistan with battery operated communications gear, power and energy are critical pieces of the planning cycle. Informed by a decade of hard fighting, Pentagon civilian and military leaders are finding that the force becomes far more agile as energy efficiency increases. General James Amos, the senior officer in our nation's expeditionary force in readiness states, "[t]he goal is to create a more capable force: lighter than today, less dependent on liquid and battery logistics, with greater operational reach at less risk."[13] To save lives and money, the Pentagon is transforming the way the military thinks and speaks about energy.[14]

The current shift in the Pentagon's energy strategy is pulling innovation in its wake and creating a new and steady market for clean energy and alternative fuel technologies. Political support for this innovation, rather than being mired in unproductive arguments about climate science or the distribution of cost, is relatively easy to generate. Local constituencies in the United States and other nations will support this investment because the benefit of a stronger and more efficient military, especially one with a shrinking fuel bill, is direct and measurable.

Luckily, the Pentagon has experience in initiating national energy innovation.

A. Defense Mission Driving Innovation

After the first nuclear weapons were developed, the arms race that developed between the United States and the Soviet Union continued to drive advancements in nuclear technology. In much the same way, a Green Arms Race has the potential to create energetic innovation in the clean energy arena to meet military-related mission requirements.

Throughout its history, military requirements have facilitated countless large-scale technological innovations. In the 19th century, Congress authorized the Navy to build the so-called "ABCD" ships—the Atlanta, Boston, Chicago, and Dolphin—which were the first ships

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[13] William T. Eliason, *Interview with General James F. Amos, Commandant, United States Marine Corps*, JOINT FORCES Q., Jan. 2012, at 12, 16.
[14] Alvin Powell, *Cutting the Military's Energy Tether*, HARV. GAZETTE (Mar. 3, 2011), http://news.harvard.edu/gazette/story/2011/03/cutting-the-military%E2%80%99s-energy-tether/.

constructed completely out of steel.[15] Scientists and engineers not only engineered a way to make steel float, but also moved away from proven technologies to achieve new capabilities.[16] The Navy also showed the same willingness to incur risks when it changed the way ships were powered. In the 1850s, the United States Navy led the transition from wind power to coal, and later in the same century from coal to oil.[17] In the 20th century, the Navy invested heavily to pioneer the science and engineering of nuclear propulsion.[18]

Also in the nuclear arena, the Manhattan Project pushed atomic research during the Second World War.[19] The potential game-changing nature of a weapon that could produce the equivalent of 20,000 tons of TNT in one bomb[20] provided ample incentive to direct government funds and innovation into the successful development of the atomic bomb.[21]

President Roosevelt became aware of the possibility to make an atom bomb in 1939 when he received a letter signed by three physicists: Leo Szilard, Eugene Wigner, and former patent clerk, Albert Einstein.[22] The president acted quickly on this letter and mobilized a two billion dollar top-secret project codenamed the "Manhattan Project." As Yang and Oppenheimer note, "[t]he Manhattan Project had many characteristics that are unique to wartime conditions. The requisite timescale for building the bomb was a few years . . . . The Manhattan Project was top-secret, centrally

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[15] Ray Mabus, Secretary of the Navy, Remarks at the ARPA-e Energy Innovation Summit (Mar. 2, 2011), *available at* http://www.navy.mil/navydata/people/secnav/Mabus/Speech/ARPAe02Mar11.pdf.

[16] *Id.*

[17] *Id.*

[18] Elisabeth Rosenthal, *U.S. Military Orders Less Dependence on Fossil Fuels*, N.Y.TIMES, Oct. 4, 2010, at A1, *available at* http://www.nytimes.com/2010/10/05/science/earth/05fossil.html?_r=1&scp=1&sq=military&st=cse.

[19] Chi-Jen Yang & Michael Oppenheimer, *A "Manhattan Project" for Climate Change?*, 80 CLIMATIC CHANGE 199, 200 (2006), *available at* http://www.princeton.edu/step/people/faculty/michael-oppenheimer/research/Yang-Oppenheimer.pdf.

[20] Sidney Shalett, *First Atomic Bomb Dropped on Japan; Missile is Equal to 20,000 Tons of TNT; Truman Warns For of a 'Rain of Ruin'*, N.Y. TIMES, Aug. 7, 1945, at A1, *available at* http://www.nytimes.com/learning/general/onthisday/big/0806.html#article.

[21] Yang & Oppenheimer, *supra* note 19, at 200.

[22] Margot Norris, *Dividing the Indivisible: The Fissured Story of the Manhattan Project*, 35 CULTURAL CRITIQUE 5, 10 (Winter 1996–97).

planned, high-priority, well-funded, and beyond the reach on Congressional inspection."[23]

The Project successfully united government, private industry, the military, and the scientific academy to achieve a common goal—to develop the atomic bomb.[24] The scientists received autonomy and were granted virtually every request, the government provided funding, and the military carefully constructed plants and laboratories in secret locations (New York, Washington, Tennessee, Illinois, and New Mexico) that would produce and refine the plutonium and uranium for the bombs and provide areas for critical experimentation.[25]

Enrico Fermi conducted the first self-sustaining nuclear chain reaction in a converted squash court under the University of Chicago football stadium and the first nuclear weapons test, code-named Trinity, took place in New Mexico in the lab run by J. Robert Oppenheimer.[26] Three weeks after the test at the Trinity site, Fat Man and Little Boy were unleashed over Nagasaki and Hiroshima.

Shortly thereafter, the war was over.

B. The Cold War—Frenzied Innovation

The success of the Manhattan Project resulted in utter destruction. The resulting human and environmental carnage is not to be celebrated (the destruction prompted Oppenheimer to quote from the *Bhagavad Gita*, "Now, I am become death, the destroyer of worlds"[27]). However, when viewed as a strictly scientific undertaking, the Manhattan Project was a "brilliant

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[23] *Id.*

[24] *Id.* at 14. Though there was great collaboration, there was of course some friction between the scientists, who understood too well the magnitude of their discovery, and the military, who viewed the scientists as being unable to keep their work secret. *See generally id.*

[25] *Id.* at 15–17.

[26] *Id.* at 16–17, 28–29. Reportedly the squash court was chosen because it was the only facility on the campus with ceilings high enough to accommodate the "lattice cube-like structure of graphite bricks embedded with Uranium-235," that served as the first experimental reactor. *See* The University of Chicago Archival Photographic Files, Stagg Field (Old), *available at* http://archival-photofiles.lib.uchicago.edu/db.xqy?keywords= apf2-07646.

[27] Atanu Dey, *Now I am Become Death, the Destroyer of Worlds*, ASIAN CORRESPONDENT, Nov. 1, 2009, http://asiancorrespondent.com/24058/now-i-am-become-death-the-destroyer-of-worlds/ (quoting J. Robert Oppenheimer, Jul. 16, 1945).

success."[28] The then Secretary of War Henry Stimson described it as "the greatest project in the history of the world."[29]

The scientific "success" of the Manhattan Project shifted the balance of power in the world and other nations accelerated their efforts to develop a nuclear weapon. Though American intelligence estimates predicted that the Soviet Union would likely not produce a nuclear weapon until the mid-1950s,[30] the Soviets conducted their first successful test of a nuclear weapon on August 29, 1949.[31] During the subsequent nuclear arms race, states on either side expended billions of dollars on research and development to create newer and more destructive weapons. The research and development community, which included the same players from the Manhattan Project (the academy, military, and private industry), continued to push the ball forward.[32]

In the well-known prisoner's dilemma game that emerged, the dominant strategy for the United States and the Soviet Union, regardless of what the other state did, was to "arm."[33] Though the payoff for a cooperative strategy of mutual disarmament was higher than if both chose to arm, the equilibrium of this disarm strategy was unstable; the highest payoff in the arms race was achieved if one country chose to arm and the other choose to disarm, the country with more weapons having the ability to exercise more power. Given the higher individual payoff to arm, each player had the incentive to defect from their political pronouncements to disarm and unilaterally switch to arm. This would allow the defector to realize the highest possible payoff. The result was a stable equilibrium where both countries choose to arm. This equilibrium sustained the nuclear arms race for nearly forty years.

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[28] Norris, *supra* note 22, at 6.
[29] *Id.*
[30] Memorandum from R. H. Hillenkoetter, Director of Central Intelligence, on the Estimate of the Status of the Russian Atomic Energy Project (Jul. 6, 1948), *available at* http://www.gwu.edu/~nsarchiv/nukevault/ebb286/doc03.PDF.
[31] Memorandum from Doyle Northrup, Air Force Technical Application Center, on the Detection of the First Soviet Nuclear Test on August 29, 1949 (Feb. 1962), *available at* http://www.gwu.edu/~nsarchiv/nukevault/ebb286/doc13.PDF.
[32] *See* Judith Randal, *Global R&D and the Arms Race*, CHANGE, Sept. 1979, at 46.
[33] For a fantastic discussion of the prisoners dilemma and detection strategies in the arms race context see Steven J. Brams, et al., *The Geometry of the Arms Race*, 23 INT'L STUDIES QUARTERLY 567 (1979). The description of the Prisoner's Dilemma and its application to the arms race is summarized briefly from this work.

While nuclear science provided the power advantage in the 20th century, energy will be a crucial element of global power in the 21st century. In fact, scholars and scientists were calling for money to be diverted from the nuclear arms race to fund research and development of renewable energy technologies as early as 1979.[34] Critically important in the coming arms race will be the sustained cooperation between the scientific academy, government, and private industry. In this effort, the DoD will have a critical role.

C. The Green Pentagon

> We are living in challenging times, but are surrounded by opportunities. The widespread use of fossil fuels has long driven the engine of economic growth, and yet our dependence on these fuels severely threatens our national and environmental security due to our growing foreign energy dependence as well as climate change. Business as usual is not an option, as the outcome will be devastating. This is true not only for the US, but also for all nations in this interconnected world. The nation that successfully grows its economy with more efficient energy use, a clean domestic energy supply, and a smart energy infrastructure will lead the global economy of the 21st century. In many cases, we are lagging behind. We as a nation need to change course with *fierce urgency*.[35]

Innovation in energy technology will impact our environmental, economic, and national security.[36] As Michele Flournoy, the former Undersecretary of Defense for Policy, stated in her press briefing on the most recent Quadrennial Defense Review:

> Climate change could increase demand for U.S. forces and humanitarian response, creating a few operating

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[34] *See* Randal, *supra* note 32, at 46.

[35] ARUN MAJUMDAR, WELCOME LETTER, ADVANCED RESEARCH PROJECTS AGENCY—ENERGY, http://arpa-e.energy.gov/WelcomeLetter.aspx (last visited May 12, 2012) (emphasis added).

[36] Arun Majumdar, Director, ARPA-E, Keynote Address at the ARPA-E Technology and Innovation Summit (Mar. 7, 2011), *available at* http://www.youtube.com/user/USdepartmentofenergy#p/u/2/26lGIrrlT8g.

> environment in the Arctic, and requiring adaptation in our own facilities and systems.
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> DoD's enormous dependence of energy makes its operations vulnerable to disruptions in energy flows and to price fluctuations. DoD aims to be a leader in the government to improve sustainability, resource efficiency, increase of renewable energy supplies, and reduction of energy demand to improve operational effectiveness and reduce greenhouse gas emissions.[37]

In his 2012 State of the Union address, President Obama spoke directly on this point. While political differences make compromise on climate change issues difficult, the executive branch can lead the way to create a market for energy innovation. The President, directly addressing the legislators, stated,

> So far, you haven't acted. Well, tonight, I will. I'm directing my administration to allow the development of clean energy on enough public land to power 3 million homes. And I'm proud to announce the that Department of Defense, working with us, the world's largest consumer of energy, will make one of the largest commitments to clean energy in history—with the Navy purchasing enough capacity to power a quarter of a million homes a year.[38]

As the president noted, the Defense Department holds the key. One only has to look as far as the Internet, robotics, GPS, or flat-screen televisions, to see how the Department has been a key player in the development of new technology. The president is directing the same type and scale of innovation in the energy and climate change area. The DoD mission is creating a strong and consistent demand-pull for clean energy technology to meet mission requirements.

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[37] Michele Flournoy, Undersecretary of Defense for Policy, DOD News Briefing With Undersecretary Flournoy and Vice Adm. Stanley (Feb. 1, 2010), *available at* http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4550.

[38] President Barack Obama, Remarks by the President in the State of the Union Address (Jan. 24, 2012), *available at* http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address.

If the Pentagon is successful at developing new clean energy technologies that allow it to increase its ability to accomplish the mission, the arms race of the 21st century will begin. In the Green Arms Race however, similar decision-making will lead to the proliferation of clean energy innovation. This aspect of the Green Arms Race is depicted in Figure 1. As with most depictions of the Prisoner's dilemma game, the choice of a particular strategy by each player results in one of four outcomes, each outcome resulting in a payoff for each player. For the purposes of this game, I assume A_1 is the best payoff for state A, and A_4 is the worst. The same holds for state B; B_1 is the best payoff and B_4 is the worst.

		B	
		non-Green	Green
A	non-Green	(A_3, B_3)	(A_4, B_1)
	Green	(A_1, B_4)	(A_2, B_2)

Figure 1: The Green Arms Race as a Prisoner's Dilemma Game

In the Green Arms race, states have a choice between two strategies with respect to their military forces, "Green" and "non-Green," as shown above. With the strategy of "Green," the military invests in clean energy technology with the expectation that investment will lead to benefits in combat. The "non-Green" strategy is more conservative, the state choosing to rely on current technologies to power their military forces.

For reasons that will become apparent in the sections below, the dominant strategy for each state in this game is the strategy of Green: no matter what the other player does, each player obtains a higher payoff if it chooses Green. The best strategy choice does not depend on what the other player chooses. Experts and schoolboys alike will recognize that there is no real dilemma presented by the Green Arms Race. The equilibrium where both states choose non-Green does not reflect rational choice. In this way, the Green Arms Race works through the "dilemma" of the Cold War by properly incentivizing and increase in combat power through clean energy investment. Whatever the other player chooses, player one should choose to green.

The United States has already played its turn. Generals and scholars note that United States forces deployed around the globe are burdened and imperiled by increasing operational energy requirements.[39] As Sharon Burke finds, "[i]t has become clear in Iraq and Afghanistan that the amount of fuel we consume is a liability."[40] The fuel combat systems utilize comes at a high cost, both in blood and dollars. Lengthy and predictable logistics trains provide high value targets for enemy forces. The Department of the Navy aims to reduce its energy use by 50 percent by 2025.[41] General Amos states:

> Think about this. If you go out on a logistics patrol right now or a convoy resupply, and you leave Camp Leatherneck [Afghanistan] and head to the southern part of Helmand, it's 4 days down and 4 days back—in some cases being interdicted along the way with IEDs while you're hauling stuff. If you could reduce the number of vehicles you have by 50 percent, that's 50 percent fewer young men and women who are exposed. I think that's pretty significant.[42]

Greening the force will reduce (though not eliminate) the size of these logistics tails. Additionally, the fluctuations in the global supply and demand of fossil fuels impose significant pressure on the DoD budget. In 2009, the operational energy bill was $9.4 billion, out of a total fuel bill of $13.4 billion.[43] Approximately 75 percent of the fuel DoD purchased went to support operational requirements across the globe.[44] In this way, energy efficiency, in addition to being an environmental issue, becomes a matter with direct economic and national security impact.

The Center for Naval Analysis noted in a recent study that, "[c]limate change, national security, and energy dependence are a related

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[39] CTR. FOR NAVAL ANALYSIS, *supra* note 12, at 7.
[40] Louis Peck, *New Mission for U.S. Military: Breaking its Dependence on Oil*, YALE ENV'T 360, Dec. 8, 2010, http://e360.yale.edu/feature/new_mission_for_us_military_breaking_its_dependence_on_oil/2348/.
[41] Eliason, *supra* note 13, at 16.
[42] *Id.*
[43] Peck, *supra* note 40.
[44] *Id.*

set of global challenges."[45] The President has taken up this problem by making energy policy a centerpiece of his domestic and international agenda. He notes, "[o]ne big area of concern has been the cost and security of our energy. Obviously, the situation in the Middle East implicates our energy security. The situation in Japan leads us to ask questions about our energy sources."[46] As students of history, military and defense leaders know all too well the true costs of inefficient energy utilization.

1. Historical Context for Military Operations—Energy and the Second Afghan War

The British experience during the Second Afghan War, fought from 1878 to 1880, provides an interesting backdrop to enlighten and inform the discussion on the current Afghan conflict, and specifically as it relates to operational energy.[47]

Tensions between Russia and Britain percolating throughout the early part of the 19th century led to war in Central Asia in November 1878.[48] As British and Indian troops pushed into Afghanistan through the Khyber Pass, their supplies continued to flow from the assembly areas in India (an area inside modern day Pakistan).[49] These supply convoys moving through the tight mountain passes became increasingly attractive targets for harassment by local tribes.[50] Early in the campaign, the British took soldiers and reinforcements out of their main body to secure their supply lines. Security in the rear areas was a consistent problem, and forced British troops to consolidate the forces and fall back to rear areas to defend their stocks.[51]

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[45] CTR. FOR NAVAL ANALYSIS, *supra* note 12, at vii.
[46] President Barack Obama, Remarks by the President on America's Energy Security at Georgetown University (Mar. 30, 2011), *available at* http://www.whitehouse.gov/the-press-office/2011/03/30/remarks-president-americas-energy-security.
[47] Notably, Dr. Watson, Sherlock Holmes' friend and trusted companion, is described as having participated in the Second Afghan War, attached to the Fifth Northumberland Fusiliers as assistant surgeon, later reassigned to the Berkshires, and suffering a bullet wound in the fighting during the battle of Maiwand. ARTHUR CONAN DOYLE, A STUDY IN SCARLET 1 (Project Gutenberg Ed. 2008) (1877), http://www.gutenberg.org/files/244/244-h/244-h.htm.
[48] J. H. ANDERSON, THE AFGHAN WAR 1878–1880 5 (R.J. Leach & Co. 1991) (1905).
[49] *Id.* at 17–23.
[50] *Id.* at 21.
[51] *Id.* at 31.

Eventually, the Afghans surrounded the British flanks and engaged their supply trains directly.[52] Under this heavy attack, the isolated British brigade retreated and consolidated in Kandahar; they were promptly surrounded.[53] The General tasked to rescue these British forces, General Roberts, had three brigades, totaling roughly 12,000 men, in Kabul. In order to make the march from Kabul to Kandahar, he planned for and used a long and robust supply train that included 8,500 mules, donkeys, and camels, accompanied by thousands of servants and transport personnel. General Roberts required and purchased 5,000 sheep to feed his men and 15–30 days of essential supplies including vegetables, bread, rum, sugar, and other spices.[54] Though they won the battle for Kandahar, the British lost thousands of these mules, donkeys, and camels on the march, some due to accidents on the treacherous mountain passes, others at the hands of a favored enemy tactic—the Afghan fighters would kill and intimidate local grass cutters who provided the food on which the supply train animals relied.[55]

Forage and supply were a critical vulnerability for the British operating in the harsh conditions of Central Asia. The Afghan fighters were able to harass supply trains, forcing British commanders to redirect combat forces to strengthen the security to the rear of their columns. The numbers of the supply and supporting forces during this campaign was close to that of the actual fighting forces. British military planners 130 years ago appreciated the difficulty of logistics and looked for ways to reduce the burden on military operations.[56]

2. The Current Tether of Fuel

More than 130 years have passed since Major General Roberts led his British forces in battle through the mountains and plains of Afghanistan. Even so, the passage of time has not changed the terrain, logistical burdens, or the critical vulnerability of supply lines on the battlefield. Coalition forces in Afghanistan and their logistics trains travel along many of the same routes through tight mountain passes as their British predecessors once used. Our

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[52] *Id.* at 45.
[53] *Id.* at 45–46.
[54] *Id.* at 51.
[55] *Fuelling Change: Alternative Fuels*, JANE'S DEFENSE WEEKLY, Aug. 7, 2009, *available at* http://articles.janes. com/articles/Janes-Defence-Weekly-2009/Fuelling-change-alternative-fuels.html.
[56] *Id.*

modern forward-deployed vehicles, aircraft, personnel, and facilities are as reliant on petroleum for fuel and electricity as General Roberts' camels were on grass. The Center for Naval Analysis study found:

> Ensuring convoy safety and fuel delivery requires a tremendous show of force. Today, armored vehicles, helicopters, and fixed-wing fighter aircraft protect the movement of supplies. This is an extraordinary commitment of combat resources, and it offers an instructive glimpse of the true costs of energy inefficiency and reliance on oil.[57]

A reliable supply of energy is critical to mission accomplishment.

In 2006, while commanding Marines in the al Anbar Province of Iraq, Major General Richard Zilmer submitted an urgent universal need statement to United States Central Command and the Pentagon.[58] In this request, Major General Zilmer stated that ambushes or roadside bombs could strike at vulnerable American supply lines.[59] He noted, "[r]educing the military's dependence on fuel for power generation could reduce the number of road-bound convoys."[60] Lacking alternative energy systems, "personnel loss rates are likely to continue at their current rate. Continued casualty accumulation exhibits potential to jeopardize mission success."[61] The supply lines upon which United States and other coalition forces rely represent the same critical vulnerability as they did for the British in the late 19th century.

International Security Assistance Force (ISAF) supply lines are routinely targeted in Afghanistan and more recently, in Pakistan, where insurgent groups launched four attacks in as many days in October 2010.[62] In response to the coalition and CIA attacks on their soil, the Pakistani government exacerbated the danger to coalition supply lines by closing the Khyber Pass, further concentrating and channeling supply convoys passing

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[57] CTR. FOR NAVAL ANALYSIS, *supra* note 12, at 7.
[58] *Id.* at 9.
[59] *Id.*
[60] *Id.* at 9, 11.
[61] *Id.* at 11.
[62] Fred Pleitgen, *Attackers in Pakistan Hit Another Convoy Carrying Fuel for NATO Troops*, CNN (Oct. 4, 2010), http://articles.cnn.com/2010-10-04/world/pakistan.supply.route_1_convoy-nato-supply-pakistani-taliban-spokesman?_s=PM:WORLD.

into Afghanistan.[63] Pakistan has since reopened and reclosed the pass;[64] these supply lines continue to pose a significant threat to the U.S. mission in Afghanistan. As the attacks increase, operational commanders are forced to dedicate more resources—time, money, technology, and most critically, manpower—to secure the supplies and fuel vital to the combat mission.[65]

There are no easy solutions. A recent report to the U.S. House of Representatives titled "Warlord, Inc., Extortion and Corruption Along the U.S. Supply Chain in Afghanistan,"[66] found that the DoD, in order to secure safe passage for fuel through Pakistan and Afghanistan, may have indirectly paid millions of dollars to contractors who are actually warlords, corrupt public officials, and the Taliban.[67] It is common knowledge that warlords control many of the key passes between Pakistan and Afghanistan, and between the major cities of Kandahar and Kabul. These warlords operate their own militias and take payment to ensure safe passage. Forward bases need fuel, and warlords control the complex supply lines that lead there.

The Department of Defense represents eighty percent of the total energy use of the Federal government.[68] As noted above, in terms of cost, operational energy, the energy required to train, move, and sustain forces, weapons, and equipment for military operations, accounted for 75 percent of the energy cost of the Department of Defense in 2009.[69] This energy is used by combat and supply aircraft, and heavily armored vehicles like tanks, Mine Resistant Ambush Protected Vehicles (MRAPs), and High-Mobility Multi-purpose Wheeled Vehicles (HMMWVs), among countless others.

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[63] Barbara Starr, *Pakistan Decides to Reopen Major Supply Route for NATO Forces*, CNN (Oct. 9, 2010), http://articles.cnn.com/2010-10-09/world/pakistan.supply.route_1_pakistan-border-outpost-pakistan-airspace-several-times-pakistani-taliban?_s=PM:WORLD.

[64] *Id.* The border crossings in Pakistan remain a crucial choke point. In response to a NATO airstrike that killed Pakistani soldiers, the government of Pakistan once again closed the border crossings into Afghanistan to NATO supply convoys. *See* Rob Crilly & Ben Farmer, *Pakistan Permanently Closes Border to NATO After Air Strike*, THE TELEGRAPH (Nov. 28, 2011), http://www.telegraph.co.uk/news/worldnews/asia/pakistan /8919960/Pakistan-permanently-closes-borders-to-Nato-after-air-strike.html.

[65] CENTER FOR NAVAL ANALYSIS, *supra* note 12, at 7.

[66] MAJORITY STAFF, SUBCOMMITTEE ON NATIONAL SECURITY AND FOREIGN AFFAIRS, COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM, WARLORD, INC., (June 2010), *available at* http://tierney.house.gov/images/stories/hnt_report.pdf.

[67] *Id.* at 2–3.

[68] Powell, *supra* note 14.

[69] Peck, *supra* note 40.

Petroleum is also used to fuel the generators that power the heaters and air conditioners, computers, and communication devices at forward operating bases. All of this energy-hungry equipment requires constant resupply. As Secretary of State Hilary Clinton stated:

> [W]hen we are so dependent upon long supply lines—as in Afghanistan, where everything has to be imported—it's much more difficult than it was in Iraq, where we had Kuwait as a staging ground to go into Iraq. You offload a ship in Karachi. And by the time whatever it is—you know muffins for our soldiers' breakfasts or anti-IED equipment—gets to where we're headed, it goes through a lot of hands. And one of the major sources of funding for the Taliban is the protection money.[70]

The less energy our forces use, the lighter the supply train, and the less influence the so-called warlords will wield. Said differently, our thirst for energy fuels the very enemy we are trying to fight. An increase in energy efficiency and access to more renewable sources of energy is the urgent cry of the counterinsurgent.

3. The Operational Burden

The Department of Defense is currently using approximately 300,000 barrels of oil every day.[71] Though the Pentagon purchases gas at $3.03 per gallon, it costs much more delivered to the places where it is eventually consumed.[72] This "fully burdened" cost of fuel is still unknown, though it is estimated to be as high as $50 a gallon.[73] In 2008 when fuel prices spiked, the Pentagon footed a hefty $20 billion dollar gas bill.[74] Every dollar per barrel increase in the price of oil requires a $30 million increase in the Department of the Navy's fuel budget.[75]

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[70] Walter Pincus, *From Clinton, Plain Talk on Afghanistan*, WASH. POST (Dec. 8, 2009), http://www.washingtonpost.com/wp-dyn/content/article/2009/12/07/AR2009120703844.html.
[71] Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, Remarks at the Navy Energy Forum (Oct. 13, 2010), *available at* http://www.jcs.mil/speech. aspx?id=1472.
[72] Powell, *supra* note 14.
[73] *Id.*
[74] *Id.*
[75] Michael Richardson, *U.S. Armed Forces Wage Campaign to Go Green*, INST. OF S. ASIAN STUD. (Jan. 30, 2012), *available at* http://web1.iseas.edu.sg/?p=6764.

Petroleum is not the only fuel utilized by forward deployed military forces. Soldiers and Marines on a typical three-day patrol carry between ten and twenty-five pounds of batteries.[76] These batteries are used to power vital communication assets, mine detectors, flashlights, night vision goggles, and similar high-tech gear.[77] When included in the total combat load of nearly 130 pounds—including water, food, ammunition, armor, and batteries—the burden of even a few additional pounds of batteries or other sources of power reduces mobility significantly.[78]

The environmental and climate-control requirements in an operational environment are especially vexing and costly. In the Iraqi theater, a large tent housing a gym required six generators to run the air conditioning units.[79] Even on full blast, these air conditioners only reduced the temperature inside the structure to ninety degrees Fahrenheit, both because of the extreme outside temperature and the fact that the tent was not properly insulated.[80] Convoys were travelling on deadly roads to deliver fuel that was being used to power air conditioners that vented cool air into the scorching desert air.[81]

Marine Corps[82] assault planning predicts the consumption of approximately 500,000 gallons of fuel per day for a brigade-sized element (approximately 5,000 Marines strong).[83] Of that fuel, the air combat element uses 73 percent, roughly 17 percent goes to fuel logistics operations,

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[76] Powell, *supra* note 14; *see also* CTR. FOR NAVAL ANALYSIS, *supra* note 12, at 9.
[77] Powell, *supra* note 14.
[78] CTR. FOR NAVAL ANALYSIS, *supra* note 12, at 9.
[79] Powell, *supra* note 14.
[80] *Id.*
[81] *Id.*
[82] The Marine Corps provides an especially relevant case study in the operational energy context. Even though it is the smallest service in terms of budget and personnel, it has a disproportionately large impact on combat operations. For 6.5 percent of the baseline 2010 Defense budget, the Marine Corps provides 17 percent of the Nation's active ground combat maneuver units, 12 percent of the Nation's fixed wing tactical aircraft, and 19 percent of the Nation's attack helicopters. *See* General James T. Conway, U.S. Marine Corps, Commandant of the Marine Corps, Statement before the House Armed Services Committee on the 2010 Posture of the United States Marine Corps (Feb. 24, 2010) *available at* http://www.quantico.usmc.mil/Sentry/StoryView.aspx?SID=3884.
[83] General James T. Conway, U.S. Marine Corps, Commandant of the Marine Corps, Remarks at the Marine Corps Energy Summit, Aug. 13, 2009, at 7 (on file with Harvard National Security Journal).

and about 10 percent goes to the ground combat element.[84] Breaking down these figures further, it turns out that approximately 90 percent of the fuel was being used for combat service support missions, those that supply and sustain the combat forces.[85] Of the Army's top ten fuel-consuming vehicles, only two were combat weapon platforms.[86] In other words, less than ten percent of fuel was being used in to fuel actual combat operations.[87]

Close to 80 percent of all coalition casualties in Afghanistan occur as a result of improvised explosive devices, roadside bombs.[88] A full ten percent of those casualties occur on the road during resupply convoy runs.[89] An Army study found that for every 24 fuel convoys on the road, one soldier or civilian engaged in fuel transport was killed.[90] The human cost of our fuel consumption is real. Our ability to accomplish the mission is greatly affected by the way deployed forces consume energy. Ray Mabus, the Secretary of the Navy, characterized movement towards change as, at its core, practical.[91] He noted, "[f]ossil fuel is the No. 1 thing we import to Afghanistan and guarding that fuel is keeping the troops from doing what they were sent there to do, to fight or engage local people."[92] The push for greater combat effectiveness is driving the greening of the Pentagon.

4. Legislation and Regulation—Indicia of Support

In spite of recent backsliding,[93] support for energy reform legislation has been inconsistent in all areas but one: national defense.[94] If we attribute

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[84] *Id.*
[85] *Id.*
[86] Ray Mabus, Secretary of the Navy, Remarks at the Marine Corps Energy Summit (Aug. 13, 2009) (on file with Harvard National Security Journal).
[87] Conway, *supra* note 83, at 7.
[88] *Id.* at 8.
[89] *Id.*
[90] Rosenthal, *supra* note 18.
[91] *Id.*
[92] *Id.*
[93] Annie Snider, *Defense: Senate Panel Follows House in Blocking DoD Biofuels Program*, ENERGY & ENV'T. DAILY (May 25, 2012), http://www.eenews.net/eed/2012/5/25.
[94] There are several pieces of legislation, dating back to the Energy Policy Act of 1992, that address energy and national defense. *See e.g.,* Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2007); Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005); National Defense Authorization Act of 2002, Pub. L. No. 107-107, 115 Stat. 1012 (2002); Energy Conservation and Reauthorization Act of 1998, Pub. L. No.105-338, 112 Stat. 3477 (1998); Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (1992).

recent legislative activity aimed to block investment in biofuel as election-year posturing, Congress has noticed the critical threat posed to our nation by our current reliance on fossil fuels. Congress has promulgated laws to shape the Department of Defense into a leaner, more energy efficient agency.

In the first major effort to move the federal government towards energy efficiency, the Energy Independence and Security Act (EISA 2007) strengthened the mandates for energy efficient procurement and required the reduction of petroleum and increased the alternative fuel use.[95] That same year, Congress included similar provisions in the defense authorization act.

The John Warner National Defense Authorization Act of 2007 speaks directly to energy efficiency in weapons platforms mandating,

> It shall be the policy of the Department of Defense to improve the fuel efficiency of weapons platforms, consistent with mission requirements in order to—(1) enhance platform performance; (2) reduce the size of fuel logistics systems; (3) reduce the burden high fuel consumption places of agility; (4) reduce operating costs; and (5) dampen the financial impact of volatile oil prices.[96]

This authorization act also mandates renewable energy investment. Congress has continued pressing for more progress in the operational environment, the 2009 authorization act mandating additional changes to the Department of Defense.

In the National Defense Authorization Act for fiscal year 2009, Congress added additional requirements in the force planning and acquisition to force the inclusion of energy variables into the planning process. The 2009 Act requires that:

(1) Analysis and force planning processes consider the requirements for, and vulnerability of, fuel logistics;

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[95] Energy Independence and Security Act of 2007 § 142.

[96] John Warner National Defense Authorization Act for Fiscal Year 2007, Pub. L. No. 109-364, § 360, 120 Stat. 2083 (2006) (codified as amended in various sections of 10 U.S.C.).

(2) A fuel efficiency key performance parameter in the requirements development process for modification of existing or development of new fuel-consuming systems; and,

(3) The life-cycle cost analysis for new capabilities include the fully burdened cost of fuel during the analysis of alternatives and evaluation of alternatives in acquisition program design trades.[97]

The 2009 Act also defines the fully burdened cost of fuel as the "commodity price for fuel plus the total cost of all personnel and assets required to move and, when necessary, protect the fuel for the point at which the fuel is received from the commercial supplier to the point of use" and necessitates its use in various planning decisions.[98]

This Act also added structure to the Office of the Secretary of Defense. With legislative authorization, the Department of Defense created a Secretariat for Operational Energy Plans and Programs.[99] The mission of this office is to strengthen the energy security of military operations by "improv[ing] military capabilities, cut[ting] costs, and lower[ing] operational and strategic risk though better energy accounting, planning, management, and innovation."[100] Congress also created the position of the Assistant Secretary of Defense for Operational Energy Plans and Programs (ASD),[101] who advises the Secretary of Defense and Deputy Secretary of Defense on issues related to operational energy plans and programs. The ASD is the principal policy official in charge of operational energy plans and programs.[102] As a part of this responsibility, the ASD has oversight over all operational energy plans and programs within the Department of Defense, Army, Air Force, Navy, and Marine Corps.[103] The ASD's purview cuts across several diverse areas of responsibility including strategic planning, requirements generation, acquisition, budgeting, research and

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[97] Duncan Hunter National Defense Authorization Act of 2009, Pub. L. No. 110-417, § 332, 122 Stat. 4356, *amended by* 10 U.S.C. § 139b (2011).
[98] *Id.* § 332(g).
[99] 10 U.S.C § 139b (2011).
[100] OFFICE OF THE ASSISTANT SEC'Y OF DEF. FOR OPERATIONAL ENERGY PLANS AND PROGRAMS, http://energy.defense.gov/ (last visited May 13, 2012).
[101] National Defense Authorization Act of 2009, § 901, *amended by* 10 U.S.C. § 139b (2011).
[102] *Id.*
[103] *Id.*

development, and general oversight of all operational energy initiatives within the Department.[104]

One of the top priorities of the Operational Energy office is to "improve the capabilities, force protection, effectiveness, and efficiency of deployed forces in Iraq, Afghanistan, and global operations against terrorist organizations."[105] The ASD also has significant responsibilities outside of the Pentagon within the executive branch. Notably, the ASD will work with the Department of Energy (and its Advanced Research Projects Agency – Energy (ARPA-E)) to develop new technologies to meet operational energy requirements.[106] Partnerships with the Department of Energy will speed up research and development efforts to create new energy efficient technologies and shorten the time from discovery to utilization of efficient energy solutions.[107]

Legislation and internal regulations grant the ASD broad authority to accomplish her mission. She has the ability to lead and oversee operational energy programs within the Department, establish an operational energy strategy, and coordinate the planning and program activities of the military services as they relate to operational energy.

The executive branch has also taken action in this area. President Obama signed Executive Order 13514, entitled Federal Leadership in Environmental, Energy, and Economic Performance.[108] This Executive Order mandated that executive agencies "increase energy efficiency" and "measure, report, and reduce their greenhouse gas emissions."[109] It also contains significant mandates for installations within the continental United States, including mandates for sustainable acquisition (excepting weapon systems) and strategic sustainability performance planning, sustainable federal building design, construction, operation, and management,

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[104] *Id.*
[105] Sharon Burke, Advance Questions for Sharon Burke, Nominee to be Director of Operational Energy Plans and Programs, 10 (Mar. 23, 2010), *available at* http://armed-services.senate.gov/statemnt/2010/03%20March/Burke%2003-23-10.pdf.
[106] *Id.* at 10.
[107] *Id.* at 10–11.
[108] Exec. Order No. 13,514, 3 C.F.R. 13514 (Oct. 5, 2009).
[109] *Id.* § 1.

greenhouse gas management, water efficiency, and a reduction in the petroleum consumption in the non-tactical federal vehicle fleet.[110]

Importantly, this order directs several steps to ensure accountability and transparency. These steps include: directing executive agency heads to designate a senior management official to serve as senior sustainability officer, accountable for agency compliance; ordering the disclosure of outcomes on publically available websites; and appointing the Office of Management and Budget to create publically available scorecards to evaluate agency compliance.[111]

Recognizing the close connection between climate change, the environment, and national security, energy plays a prominent role in the current United States National Security Strategy.[112] This strategy calls for an $80 billion investment in clean energy, to include the largest-ever investment in renewable energy.[113] As the Administration states, "this demonstrates our commitment to lead in the production of new sources of energy that can create new jobs and enhance our energy security in the 21st century."[114] The strategy also includes increases in efficiency standards for cars, trucks, and appliances, and continues to encourage the creation of a cap and trade policy.[115]

The Pentagon has adapted its internal regulations to meet and implement these mandates. Department of Defense Instruction 5000.02 governs the operation of the Defense Acquisition System.[116] This Instruction was revised in 2008 to include a section directing the assessment of alternative procedures, consideration of alternative ways to improve the

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[110] *Id.* § 2. *See also* Carol Rosenberg, *The Greening of Guantanamo*, MIAMI HERALD, Feb. 9, 2012, at 1 (relating the Navy's efforts to reduce the $100,000 per day fuel bill at the Guantanamo Bay Naval Base, Cuba, by experimenting with energy efficient technologies including solar panels, windmills, and bicycles).

[111] 3 C.F.R. 13514 § 7.

[112] *See* Office of the Press Secretary, *Advancing Our Interests: Actions in Support of the President's National Security Strategy*, THE WHITE HOUSE (May 27, 2010), http://www.whitehouse.gov/the-press-office/advancing-our-interests-actions-support-presidents-national-security-strategy.

[113] *Id.*

[114] *Id.*

[115] *Id.*

[116] *See* U.S. DEP'T OF DEF., INSTRUCTION 5000.02: OPERATION OF THE DEFENSE ACQUISITION SYSTEM 12 (Dec. 8, 2008), *available at* http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf.

energy efficiency of DoD tactical systems, "with end items that create a demand for energy, consistent with mission requirements and cost effectiveness."[117] This instruction also incorporates the fully burdened cost of fuel in trade-off analyses, conducted for all DoD tactical systems with end items that create a demand for energy.[118] The Chairman of the Joint Chiefs of Staff updated the manual governing the Joint Capabilities Integration and Development System in 2009 with similar provisions requiring the consideration energy efficiency and fuel costs in procurement decisions.[119]

The 2010 Quadrennial Defense Review (QDR) took up energy efficiency as well. The QDR is a legislatively-mandated review of Department of Defense Strategy that sets the long-term course for the Department as it assesses the threats and challenges that the nation faces. The QDR re-balances the Department's strategies, capabilities, and forces to address today's conflicts and tomorrow's threats. Importantly, the 2010 QDR directly addressed the need to craft a strategic approach to climate change and energy requirements, and again emphasized the importance of implementing energy efficiency as a key performance parameter, and the fully burdened cost of fuel as a consideration in procurement decisions.[120] This was the first QDR to address energy and climate issues.

The Pentagon is changing its energy policy from its high-level business procedures to the tactical inputs at the ground level to adapt to the growing problem of climate change and energy scarcity. This new mission is driving change and creating innovation to meet current and future requirements.

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[117] *Id.* at 59.

[118] *Id.*

[119] *See generally* CHAIRMAN OF THE JOINT CHIEFS OF STAFF, MANUAL FOR THE OPERATION OF THE JOINT CAPABILITIES INTEGRATION AND DEVELOPMENT SYSTEM (Jan. 19, 2012 ed.) (2009), *available at* https://acc.dau.mil/adl/en-US/267116/file/41245/JCIDS%20Manual%20(final)%20updated%2031%20January%202011.pdf .

[120] U.S. DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW REPORT 84–88 (Feb. 2010). The QDR states in summary: "Climate change and energy will play significant roles in the future security environment. The Department is developing policies and plans to manage the effects of climate change on its operating environment, missions, and facilities." *Id.* at xv.

5. Effect on Domestic Politics and Parlance

Domestic constituencies are wary of incurring high costs associated with effective domestic and international climate change mechanisms. Though the House passed a climate change bill, none have come close to passing in the Senate.[121] The American Clean Energy and Security Act of 2009, commonly referred to as the Waxman-Markey Bill, sought to establish a carbon tariff and a modest cap-and-trade regime.[122] This proposed regime was considered modest because it imposed relatively low emissions targets for domestic industries. This legislation was attacked from both the right and left sides of the aisle, and also included some negative commentary from European leaders.[123] Advocates from the left argued that the bill sent the wrong message to the international community, that the United States was not ready to make large sacrifices to combat climate change.[124] They worried that the proposed legislation would set the anchor too modestly making a more stringent international agreement nearly impossible to negotiate. Notably, even this modest bill failed to clear the Senate.[125]

The Lieberman-Warner Climate Security Act originated in the Senate and also contained a cap-and-trade program to regulate and limit greenhouse gas emissions.[126] This bill also proposed a carbon-tariff scheme, but was stricter than its House counterpart[127] The Lieberman-Warner Bill would impose tariffs on all imports from countries that failed to meet U.S. standards for greenhouse gas emissions.[128] The Waxman-Markey Bill by

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[121] *See* Tom Doggett, *Senate Not Seen as Passing Climate Bill in 2010*, REUTERS (Jan. 19, 2010), *available at* http://www.reuters.com/article/2010/01/19/us-senate-climate-idUSTRE60I3NA20100119.

[122] *See* American Clean Energy and Security Act, H.R. 2454, 111th Cong. (2009) *available at* http://www.gpo.gov/fdsys/pkg/BILLS-111hr2454pcs/pdf/BILLS-111hr2454pcs.pdf.

[123] Rachel Brewster, *Stepping Stone or Stumbling Block: Incrementalism and National Climate Change Legislation*, 28 YALE L. & POL'Y REV. 245, 280 (2010).

[124] *Id.*

[125] *Bill Summary & Status, H.R. 2454, American Clean Energy and Security Act of 2009*, LIBRARY OF CONGRESS, http://thomas.loc.gov/cgi-bin/bdquery/z?d111:H.R.2454: (last visited May 14, 2012).

[126] America's Climate Security Act of 2007, S. 2191, 110th Cong. §§ 1201–03, 2101–04 (2007).

[127] *See* Eric Pooley, *Why the Climate Bill Failed*, TIME (Jun. 9, 2008), http://www.time.com/time/nation/article/0,8599,1812836,00.html.

[128] Brewster, *supra* note 123, at 297–98.

contrast would apply sector by sector: only imposing tariffs on imports from those particular industries that failed to meet their set targets.[129]

Both the Waxman-Markey and Lieberman-Warner bills failed.[130] Domestic support for climate change legislation is weak. This lack of domestic support within the United States has a direct and negative effect on international efforts to reduce greenhouse gas emissions.[131]

Even in light of these legislative failures in the climate change arena, the Department of Defense is pressing forward at full speed to pursue clean energy reforms and projects. The National Defense Authorization Acts for the past several years have included support and structure for green reforms. The Energy Independence and Security Act of 2007 is discussed and written in the parlance of national defense. The title itself is grounded rhetorically in national "security." The animating force driving political support is also national security.

6. The Green Force—Future Planning

The Department of Defense must have the energy it needs to accomplish its mission. As a result, the Department is, as it has done countless times in the past, adapting to ensure the military will have the capabilities they need to accomplish the mission with "less risk and lower cost."[132] At the center of this strategy is the acknowledgement of the growing global demand for oil.[133] This presents "geostrategic and strategic concerns" for the military.[134] As Assistant Secretary of Defense Burke notes, "Energy shapes and will shape U.S. military missions in a variety of ways."[135]

The asymmetric nature of the battlefield is changing the way war is waged. There is no longer a front line. Just as the British supply positions

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[129] *Id.* at 297.
[130] *See* Pooley, *supra* note 127.
[131] *Obama Warns Recession Makes Climate Change Fight Harder*, CNN (Sept. 22, 2009), http://articles.cnn.com/2009-09-22/politics/obama.climate.change_1_climate-change-climate-challenge-greenhouse-gas-emissions?_s=PM:POLITICS.
[132] Sharon E. Burke, Navy Energy Forum Remarks 3 (Oct. 12, 2010), *available at* http://www.dtic. mil/ndia/2010navy/BurkeS_Remarks.pdf.
[133] *Id.*
[134] *Id.*
[135] *Id.* at 4.

were engaged at the rear of their column, our logistics trains moving supplies and fuel are squarely within the modern battle space. This has required the redistribution of forces to more adequately protect our supply lines, especially in critical danger areas. This redistribution pulls resources away from other combat priorities. The Department's energy requirements affect the mission and vice versa.

Improving the productivity of energy, by both reducing demand and by increasing the breath of supply by focusing on alternative sources of energy through the promotion of research, must be a priority. Promoting research must also be a priority.[136] The ASD has set near, mid-term, and long-term goals.[137] In the near-term, the focus will be on current operations in Afghanistan and reducing the in-theater fuel demand.[138] The first step in this process is to figure out exactly how much it costs to deliver fuel into the theater of operations. Taking up a recommendation of the Defense Science Board report in 2001,[139] the Department is working to accurately measure the use of fuel in theater.[140] As mentioned above, this "fully-burdened" in theater rate of fuel consumption will help the Department orient its efforts to fix inefficiencies.

In the mid-term, upgrades to current platforms will be made to increase efficiency and adaptability.[141] Forward operating bases can become more efficient, perhaps through the use of off-the-shelf technologies.[142] Foam insulation can increase the efficiency of tents and decrease the burden on generators running air conditioning and heating elements.[143] Efficiency

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[136] *Id.* at 5.
[137] *Id.* at 5–6.
[138] *Id* at 5.
[139] DEF. SCI. BD., MORE CAPABLE WARFIGHTING THROUGH REDUCED FUEL BURDEN 14 (May 2001), *available at* http://www.acq.osd.mil/dsb/reports/ADA392666.pdf.
[140] Chris DiPetto, Office of the Undersecretary of Defense for Acquisition & Technology, Testimony Before the United States House Committee of Armed Service Readiness Subcommittee (Mar. 13, 2008), *available at* http://www.dod.mil/dodgc/olc/docs/testDipetto080313.pdf.
[141] Burke, *supra* note 132, at 5.
[142] Geoff S. Fein, *ONR, Marine Corps Save Dollars and Lives with Alternative Energy at Forward Operating Bases*, OFFICE OF NAVAL RESEARCH (2011), *available at* http://www.onr.navy.mil/Media-Center/Press-Releases/2011/Forward-Operating-Base-Marine.aspx.
[143] *Talk of the Nation: Military Goes Green for An edge on the Battlefield* (NPR radio broadcast Dec. 3, 2010), *available at* http://www.npr.org/2010/12/03/131785448/Military-Goes-Green-For-An-Edge-On-The-Battlefield.

and renewable energy sources like solar and wind-power can help reduce the resupply requirements of forward bases.[144] Any such reduction will take convoys off the road. Small changes add up and make the force as a whole more efficient, lighter, and more lethal, having the ability to push further and faster on to objectives. The Secretary of the Navy reoriented the Department of the Navy around green energy, "mak[ing] energy reform a way of doing business."[145]

Providing the best trained and equipped Marine units to Afghanistan is the Commandant's top priority.[146] Immediately following is the goal to rebalance the Corps to prepare for future conflicts by aggressively experimenting with and implementing new capabilities and organizations; expeditionary energy efficiency and reducing energy consumption falls here.[147] The Commandant tasked the newly created Expeditionary Energy Office with the goals of "reducing energy demand in our platforms and systems, increasing the use of renewable energy, and instilling an ethos of energy and water efficiency in every Marine."[148] General Amos added further, "Our priority is force protection—saving lives by reducing the number of Marines at risk on the road hauling fuel and water. We also aim to help Marines travel lighter and move faster through the reduction in size and amount of equipment and the dependence on bulk supplies."[149] These energy efficiency capabilities will make Marine units more self-sufficient, and ultimately more combat effective.

Recently, the Marine Corps deployed the Expeditionary Forward Operating Base, equipped with efficient energy and renewable technologies, to the battlefield in Helmand Province, Afghanistan.[150] India Company, 3d Battalion, 5th Marines, is the first company to deploy renewable technology

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[144] *Id.*

[145] Ray Mabus, Secretary of the Navy, Remarks at the Naval Energy Forum, (Oct. 14, 2009), *available at* http://www.navy.mil/navydata/people/secnav/Mabus/Speech/SECNAV%20Energy%20Forum%2014%20Oct%2009%20Rel1.pdf.

[146] JAMES F. AMOS, 2011 REPORT TO CONGRESS ON THE POSTURE OF THE UNITED STATES MARINE CORPS 4 (2011), *available at* http://www.usmc.mil/unit/hqmc/cmc/Documents/FY-12%20USMC%20Posture%20Statement_Generic.pdf.

[147] *Id.* at 15.

[148] *Id.*

[149] *Id.*

[150] Rosenthal, *supra* note 18.

and utilize it on the battlefield.[151] These Marines are utilizing portable solar panels that fold up into boxes, energy-conserving lights, solar tent shields that provide light and electricity, and solar-powered battery chargers for computers and other communications equipment.[152] The Marine Corps continues to devote more resources to achieve their goals for increased energy efficiency and combat effectiveness.[153] Feedback from the battlefield is positive. As the Commandant of the Marine Corps stated, "Energy efficiency will increase our combat effectiveness and save lives."[154]

These aforementioned instances show that the Pentagon is indeed capable of providing domestic support and power that can drive global innovation in the clean energy context. The question now turns toward how to harness this power to affect global change. Informal transgovernmental networks and the expert lawyers, scientists, and government bureaucrats who operate the levers of power within them are the chief means of enabling this transformation. The next section globalizes the demand for green energy.

II: Globalization Through Networks

This part of the Article describes how globalizing demand for green energy will kick-start the Green Arms Race. The first section below digresses briefly to introduce the mechanics of transgovernmental networks and the experts that operate within them. In the coming arms race, these powerful and largely anonymous structures will be utilized to transfer technology and regulation in the absence of a formal multilateral

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[151] *Id.*

[152] *Id.*

[153] AMOS, *supra* note 146, at 15.

[154] UNITED STATES MARINE CORPS, EXPEDITIONARY ENERGY STRATEGY AND IMPLEMENTATION PLAN 2 (n.d.), *available at* http://www.marines.mil/community/Documents/USMC%20Expeditionary%20Energy%20Strategy%20%20Implementation%20Planning%20Guidance.pdf. The current commander of the International Security Assistance Force / United States Forces-Afghanistan, General John Allen, concurs. He states, "Some have seen operational energy programs as efforts 'just to save money.' Not so. While we must be good stewards of our resources, Operational Energy in the battle space is about improving combat effectiveness. It's about increasing our forces' endurance, being more lethal, and reducing the number of men and women risking their lives moving fuel." JOHN R. ALLEN, SUPPORTING THE MISSION WITH OPERATIONAL ENERGY, (Dec. 11, 2011), *available at* http://energy.defense.gov/Memorandum_Supporting_The_Mission_with_Operational_Energy.pdf.

agreement. Though, understudied until recently, these networks have played a central role in global governance. Solutions to international problems like the proliferation of weapons of mass destruction and climate change necessitate a global reach. Transgovernmental networks have the horsepower to operate and affect solutions to these critical problems.

The next section discusses experts and their role in these informal networks. Networks, either informal or formal, organized around key disciplines or among subject matter experts, are alliances between domestic actors and their counterparts from other states. These networks hold the key to initiate the Green Arms Race.

A. Transgovernmental Networks

Instead of the liberal international ideal, a "new world order" has emerged.[155] States are still the primary actors on the international plane, but their power has been disaggregated into their constituent parts. These actors are negotiating with their foreign counterparts directly with no need for inter-state negotiation. Transgovernmental networks are widespread and provide effective mechanisms for global governance.[156]

Transgovernmental relations were first defined as "sets of direct interactions among sub-units of different governments that are not controlled by the politics of the cabinets or chief executives of those governments."[157] Scholars argued that transgovernmental relationships strengthened traditional international organizations by facilitating discussions between key governmental actors.[158] By allowing for informal agreement between expert communities within the state, international agreement became easier and more legitimate.

These informal network relationships have increased in frequency and strength as communications technology has improved.[159] Peers from across the globe are able to discuss critical areas of mutual concern outside of the traditional international organizations, and without the strict

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[155] ANNE-MARIE SLAUGHTER, A NEW WORLD ORDER 15 (2004).
[156] *Id.* at 16.
[157] Robert O. Keohane & Joseph S. Nye, *Transgovernmental Relations and International Organizations*, 27 WORLD POL. 39, 43 (1974).
[158] *Id.* at 42–45.
[159] Kal Raustiala, *The Architecture of International Cooperation: Transgovernmental Networks and the Future of International Law*, 43 VA. J. INT'L L. 1, 12 (2002).

procedure of state-to-state negotiations. Regulators have entered into numerous non-binding Memoranda of Understanding to create frameworks within which to share information, technology, and ideas.[160] Flexibility is a key benefit to transgovernmental relations. Regulators and experts are able to experiment and share innovations that can eventually to establish best practices.[161]

Taking up from Keohane and Nye, Anne-Marie Slaughter argues that network relationships form the "new world order." Professor Slaughter states,

> Disaggregating the state into its functional components makes it possible to create networks of institutions engaged in a common enterprise even as they represent distinct national interests. Moreover, they can work with their subnational and supranational counterparts, creating a genuinely new world order in which networked institutions perform the functions of a world-government—legislation, administration, and adjudication—without form.[162]

In this way, interaction within the network strengthens domestic institutions and international organizations.

Direct interaction between regulators across the globe facilitates the spread of effective regulatory mechanisms between jurisdictions. Effective mechanisms, whether in the banking industry or the environmental arena, help the respective agencies accomplish their goals. A change in a particular regulatory structure occurs through persuasion rather than coercion, the new model simply working more effectively than the old one.[163] Additionally, less advanced economies can benefit more easily from the experimentation of more advanced nations. Cooperation through networks is achieved through the convergence of best practices fostered through repeated interaction and emulation.[164] This convergence in regulation, policy, and thought could lead the way to new international agreements.

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[160] *Id.* at 22.
[161] *Id.* at 24.
[162] Anne-Marie Slaughter, *The Real New World Order*, FOREIGN AFFAIRS, Sept.-Oct. 1997, at 183, 195.
[163] Raustiala, *supra* note 159, at 52–55.
[164] *Id.* at 52.

Networks provide the venue for this interaction and information transfer between subject matter experts.

Networks can constitute themselves in many contexts. They can appear within international organizations.[165] Though the executives sign the foundational agreements, the bulk of the work is done by the bureaucrats who are tasked with running the organization. These network interactions within international organizations have been characterized as clubs.[166] These clubs exist in many areas of mutual state interest including trade ministers in the General Agreement on Tariffs and Trade (GATT), finance ministers in the International Monetary Fund (IMF), defense and foreign ministers in NATO, and so on.[167] Networks also form, interestingly, outside of international organizations.

Executive agreements between heads of state form additional frameworks within which networks govern.[168] Examples of these networks include agreements between the President of the United States and the European Union, like the Transatlantic Declaration of 1990 and the Transatlantic Economic Partnership.[169] Foreign and trade ministers handle the bulk of the work under these agreements and make the majority of decisions within these organizations, setting standards and policy, only engaging the chief executives when necessary.

Finally, networks are created through informal agreements between interested bureaucrats themselves.[170] Memoranda of Understanding can informally delineate the modes and frequency of cooperation between two agencies. These networks can be created quickly and are especially prevalent in the law enforcement arena, assisting efforts to combat international criminal activities like money laundering.[171]

The work of these transgovernmental networks is also apparent in the securities and environmental arenas. The Securities and Exchange Commission has entered into numerous Memoranda of Understanding with foreign regulators to create frameworks for cooperation and facilitate the

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[165] SLAUGHTER, *supra* note 155, at 45.
[166] *Id.* at 46.
[167] *Id.*
[168] *Id.* at 46–48.
[169] *Id.* at 47.
[170] *Id.* at 48–49.
[171] *Id.* at 49.

transfer of United States securities regulation procedures abroad.[172] The Environmental Protection Agency (EPA) has taken similar action.[173] Through the International Network for Environmental Compliance and Enforcement, the EPA offers courses for foreign environmental regulators on environmental regulation and enforcement, along with many other topics that may provide mutual benefit.[174] Executive agencies provide significant technical assistance to their foreign counterparts, and in so doing, facilitate the export of the United States' regulatory strategies.[175] This not only assists the requesting state, but also extends the reach of American regulators, easing future interactions with their foreign counterparts. This regulatory export can and does work in both directions.

Transgovernmental networks, in addition to strengthening existing regulatory frameworks, fills gaps in the international system, "permitting cooperation in situations of asymmetric regulatory power, such as securities regulation, where liberal internationalism cannot flourish or is unlikely to provide a lasting solution."[176] Networks can encourage cooperation in the absence of a treaty, or pave the way for a new agreement by creating an international convergence around successful and effective regulatory policies over time.[177] Perhaps most importantly, however, informally, such networks facilitate the multilateral sharing of knowledge and ideas between nations. These information networks are incredibly useful for distilling best practices to solve problems of mutual interest.[178] Networks also focus on assisting national regulators to enforce existing laws and rules.[179] Networks operating in the enforcement capacity share intelligence in specific cases.

The International Police Network, or INTERPOL, is a prime example of this type of network. Information on domestic and international criminal activity is shared through computer and human interaction to support local law enforcement efforts. INTERPOL also holds meetings, training seminars, and offers expert analysis and forensic assistance.[180] INTERPOL is the second largest international organization (behind the

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[172] *See* Raustiala, *supra* note 159, at 29.
[173] SLAUGHTER, *supra* note 155, at 172.
[174] *Id.* at 173.
[175] *Id.* at 174.
[176] Raustiala, *supra* note 159, at 92.
[177] SLAUGHTER, *supra* note 155, at 53.
[178] *Id.*
[179] *Id.* at 55.
[180] *Id.* at 56.

United Nations), which is especially interesting because it was not founded by a treaty.[181]

This international cooperation and coordination occurs within networks of bureaucrats, the subject matter experts operating in the background spaces of government to influence and inform key policy determinations. A brief study of their location and function is critical to the discussion because they will be the actors in the Green Arms Race.

B. The Role of Experts

The preceding paragraphs have discussed networks, and the bureaucrats who operate them. It is to these experts that we now turn our focus. Professor David Kennedy, Director of the Institute for Global Law and Policy at Harvard Law School, states, "We will need to learn the professional vocabularies of these background experts and enter the quotidian places of their deployment, contesting the norms, institutions, and understandings which influence their objectives and bargaining power."[182] The people making the bulk of the decisions that frame and shape policy, both domestic and foreign, are the experts who operate in the shadows of government.

The world is governed by experts. International lawyers, scientists, policy advisors, and other experts in the executive branch have a special place working behind the actors in the foreground to shape policy in the new world order. "In our world, power lies in the capillaries of social and economic life,"[183] says Professor Kennedy. Experts fulfill several key functions within the American executive branch, one of which is to advise the President. In this advisory role, they filter and frame information.

Put differently, the bulk of the decisions that shape any given policy are made not by the foreground actor, but by the expert operating outside of the limelight. Professor Kennedy:

> Increasingly the decisions which allocate stakes in global society . . . . are taken by experts, managing norms and

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[181] *Id.*

[182] DAVID KENNEDY, THE DARK SIDES OF VIRTUE 349 (2004).

[183] David Kennedy, *Challenging the Expert Rule: The Politics of Global Governance*, 27 SYDNEY J. INT'L L. 1, 3 (2005).

> institutions in the background of this public spectacle—legal norms and private institutions, decisions rendered in technical vocabularies. They are taken not by the state, but by thousands of decision makers in the economy.[184]

Background actors also, in making their decisions, have the ability to frame the contours of possible positions presented for review by their superiors, especially if the chief executive has proposed a vague or overly broad inquiry.

In the United States, the President provides broad policy guidance for all of the sub-agencies in the executive branch. Some subordinate offices, like the Department of Defense or the Department of Justice, may warrant more daily attention than others. Even so, each executive agency conducts its work with relative autonomy, making thousands of decisions and filtering material without the need to send volumes of information up the chain of command for decision.

The same is true of the secretary of defense. He sits atop the Defense Department, an agency that operates and maintains several hundred thousand buildings at more than five thousand locations across the globe. The secretary commands more than three million employees, including both uniformed service members and civilian personnel.[185] The secretary's principal staff officers assist him in the exercise of policy development,

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[184] KENNEDY, *supra* note 182, at 349.

[185] *Department of Defense 101*, U.S. DEP'T OF DEF., http://www.defense.gov/about/dod101.aspx (last visited May 17, 2012). According to their website:

> In terms of people and operations, we're busier than just about all of the nation's largest private sector companies. The Department of Defense has a budget of four hundred nineteen point three billion dollars and more than three million employees; Wal-Mart has a budget of about two hundred twenty-seven billion dollars and employs about one-point-three million people; Exxon-Mobil has a budget of two hundred billion dollars and employs almost ninety-eight thousand; the GM company budget equals one hundred eighty-one billion dollars, it has a workforce of three-hundred sixty-five thousand people; and Ford has a budget of one-hundred sixty billion dollars, and employs three-hundred fifty-four thousand, four hundred people.

Id.

planning, resource management, fiscal, and program evaluation responsibilities.[186] The Office of the Secretary of Defense includes hundreds of experts that shape action and make decisions within the powers delegated from the secretary.

Just as network interactions strengthened relationships and regulations in the banking, securities, and environmental areas, so too in the defense context. The globalization that occurred after the end of the Cold War posed significant challenges for national defense. Notably, the breakup of the Soviet Union caused problems for the international mechanisms in place to combat the proliferation of nuclear and other unconventional weapons.

This decentralization of power from the former Soviet Union, in combination with the weak economies of the newly created states, opened a dynamic new market for weapons of mass destruction not subject to the cold-war era non-proliferation agreements. The network of A.Q. Khan, the former head of Pakistan's nuclear program, exemplifies the type of illicit global network aimed at facilitating the cross-border flow of technology, material, and weapons.[187] Khan's network provided critical information and components for nuclear, biological and chemical weapons to Iran, North Korea, and possibly Syria.[188] In response to this threat to nuclear non-proliferation, states looked to strengthen multilateral export control mechanisms.[189]

Several coordination mechanisms emerged to affect non-proliferation strategies. The Proliferation Security Initiative (PSI) provides an apt case study.

PSI, established in 2003, is a transgovernmental network solution aimed at solving the problem of proliferation-related trade. President Bush announced the creation of this initiative in 2003. PSI facilitates global interaction between agencies interested in preventing the proliferation of weapons of mass destruction. Notably, it does not create a new legal

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[186] *Office of the Secretary of Defense*, U.S. DEP'T OF DEF., www.defense.gov/osd/ (last visited May 17, 2012).

[187] *See* William Langewiesche, *The Wrath of Khan*, THE ATLANTIC (Nov. 2005), http://www.theatlantic.com/magazine/archive/2005/11/the-wrath-of-khan/4333/.

[188] *Id.*

[189] *See* Michael Lipson, *Transgovernmental Networks and Nonproliferation: International Security and the Future of Global Governance*, 61 INT'L J. 179, 187 (2005).

framework to address proliferation but used existing authorities and international law to accomplish its goals.[190] PSI aimed to fill existing gaps in international law by encouraging international cooperation for interdiction.[191]

PSI is an informal intergovernmental agreement that coordinates the efforts of national militaries, police, customs and border officials and intelligence experts.[192] Eleven nations joined the initiative as core members and Russia, Canada, Denmark, and Singapore joined soon after.[193] Currently, over ninety countries have endorsed PSI's statement of principles and many of those have participated in exercises to practice maritime and air interdiction techniques.[194]

PSI has no formal secretariat, no offices, no databases, no reporting requirements, and most interestingly, no funding.[195] Nonetheless, members developed a structure to encourage coordination and met to discuss member concerns and plan future cooperation.[196] Each one of these interactions increases national capacities to interdict the shipment of WMD. PSI provides national security agencies a broad range of legal, diplomatic, economic, military and other tools to combat WMD proliferation and trafficking.[197] PSI is credited with preventing 11 WMD-related transactions from 2004 to 2005 and more than 24 from 2005 to 2006.[198]

Global transgovernmental networks, because of their flexibility, speed, and influence, are especially strong in the defense context. Military leaders travel abroad frequently, meeting with their military peers and intelligence counterparts, along with foreign ministers, diplomats, and heads of state. Post-Cold War peacekeeping missions, along with current counter-insurgency operations in the Middle East, have necessitated an increased uniformed presence in the diplomatic and political arenas. Generals, and

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[190] *See* MARY BETH NIKITIN, CONG. RESEARCH SERV., RL 34327, PROLIFERATION SECURITY INITIATIVE 1–2 (Feb. 4, 2008).
[191] *Id.*
[192] Lipson, *supra* note 189, at 197.
[193] *Id.*
[194] *Proliferation Security Initiative*, U.S. STATE DEP'T, http://www.state.gov/t/isn/c10390.htm (last visited May 17, 2012).
[195] NIKITIN, *supra* note 190, at 2.
[196] *Id.*
[197] *See Proliferation Security Initiative*, *supra* note 194.
[198] NIKITIN, *supra* note 190, at 3.

even the junior troops serving under them, have political power and are able to wield it strategically within global networks.

C. The Levers of the Green Arms Race

Networks facilitate the transfer of knowledge and ideas through the repeated interaction of experts, discussing techniques and brainstorming new approaches to solve common problems. The resulting "best practices" make domestic regulation more efficient and international cooperation more durable. Information networks between defense experts can create "convergence through technical assistance and training."[199] The bureaucrats control the levers. The Defense Department's efforts to meet mission requirements, through an in-depth revision of structural and regulatory frameworks, to create more efficient fighting force, can and will be exported to our international partners through defense networks.

There is currently a tremendous volume of information on the dangers of climate change and an even greater amount of opinion regarding the best way to solve the problem. There, however, is no consensus as to which course to take. The United States wields the most powerful military force on the globe. Based on this reputation, a change in a United States military practice that makes our military forces more efficient and lethal will garner attention and have immediate credibility among foreign experts. These changes in law and regulation will cue similar changes foreign military forces. In this way, experts will be able to operate both independently through defense networks and through existing treaty-based organizations to spread the demand for green energy.

The United States can facilitate these changes by providing guidance to allied militaries through formal treaty alliances like the NATO, the Australia, New Zealand, United States Security Treaty (ANZUS), Rio Treaty, Republic of Korea Treaty, and similar organizations.[200] Regulatory export, the transfer of regulation across borders, through these formal organizations will help the United States by making allied military forces stronger and more efficient. Their respective domestic constituencies, experiencing localized benefits for their investment, will likely support defense and other political leaders in the adoption of these policies. These

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[199] SLAUGHTER, *supra* note 155, at 171–72.

[200] *U.S. Collective Defense Arrangements*, U.S. STATE DEP'T, http://www.state.gov/s/l/treaty/collectivedefense/ (last visited May 17, 2012).

interactions horizontally across informal networks will also provide feedback for the United States' regulatory scheme, and may uncover new and more efficient methods to facilitate clean energy development, and technologies that increase military efficiency.

Secretary Mabus notes, "[i]f the Navy comes knocking, they will build it. The price will come down and the infrastructure will be created."[201] This effect will be increased as the practices, technologies, and the demand for green energy are shared throughout the world. Regulatory export of successful efficient energy provisions will create global requirements for clean energy technologies. New customers from diverse jurisdictions will engage as nations reshape their military forces around a more efficient paradigm. This global buying power will create new markets which in turn may make renewable energy more affordable for commercial uses.[202]

The United Kingdom has begun to take action to green their Defense sector. The Ministry of Defence (MoD) has launched an aggressive campaign to reduce energy consumption.[203] Though focusing primarily on installation energy usage, the MoD has reduced its energy consumption across the Defence estate by 12.5 percent, 2 years ahead of the state mandate.[204] MoD could transfer its successful regulatory techniques and technologies across the Atlantic and through other defense networks to increase the efficiency of allied military installations. In the same way, operational energy policies and programs can be shared to increase combat efficiency.

As domestic constituencies continue to enjoy the local benefits of this shift in defense policy, they will be increasingly willing to incur more capital investment to develop more efficient and clean technologies. Mechanisms and networks already exist for the transfer of military technology to allied nations. The Defense Security Cooperation Agency (DSCA) administers state-to-state sales of U.S. defense equipment, services, and training.[205] Congress granted authority and funding for the program run jointly by the

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[201] Rosenthal, *supra* note 18.
[202] *Id.*
[203] *See MOD Reaches Energy Reduction Milestone*, DEFENCE NEWS (Dec. 23, 2009), http://www.mod.uk/DefenceInternet/DefenceNews/EstateAndEnvironment/ModReachesEnergyReductionMilestone.htm.
[204] *Id.*
[205] *Foreign Military Sales*, DEF. SEC. COOPERATION AGENCY, http://www.dsca.osd.mil/home/foreign_military_sales.htm (last visited May 17. 2012).

Departments of Defense and State.[206] The chief of the diplomatic mission typically provides oversight and management of each recipient nation's security assistance program and coordinates with the regional combatant commander and the military leadership in Washington to facilitate the sales.[207] These established programs also prevent free-riding by imposing transaction costs on the transfer of technology and goods.

The benefits of foreign military sales largely mirror those discussed regarding networks generally. According to the DSCA:

> Responsible arms sales further national security and foreign policy objectives by strengthening bilateral defense relations, supporting coalition building, and enhancing interoperability between U.S. forces and militaries of friends and allies. These sales also contribute to American prosperity by improving the U.S. balance of trade position, sustaining highly skilled jobs in the defense industrial base, and extending production lines and lowering unit costs for key weapon systems.[208]

As technology improves to meet the growing demand of allied nations, innovation can be shared through these existing mechanisms. The DSCA and its foreign customers can increase the availability of green energy technologies to further assist allied nations to build more efficient military forces. This process will be dynamic as information and technology continuously flow back and forth through decentralized defense networks. Further, innovations in one jurisdiction can be transferred to other nations through flexible security assistance agreements and other similar mechanisms.

D. The Green Arms Race Realized

In light of the eventual policy convergence and military efficiency within the United States and allied nations, non-allies will seek to gain similar efficiencies in their own defense establishments. The Cold War drove research and innovation. Soviet efforts led to the first satellite, Sputnik, which showed the world that it was possible to deliver a nuclear

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[206] *Frequently Asked Questions*, DEF. SEC. COOPERATION AGENCY, http://www.dsca.osd.mil/pressreleases/faq.htm (last visited May 17, 2012).
[207] *Id.*
[208] *Foreign Military Sales*, *supra* note 205.

warhead anywhere on the planet. Governments spent massive amounts of resources to develop more sophisticated weapons. Both the United States and Soviet Union succeeded, developing the capability to launch a nuclear attack even after sustaining a nuclear assault from the other side. This strategy of Mutually Assured Destruction ensured a fragile balance of power, avoiding direct military confrontation between the two superpowers.

President Obama, in his 2011 State of the Union address, harnessed this very rhetoric to urge Americans to seize this generation's "Sputnik Moment," to encourage American innovation, and reinvent the nation's energy policy.[209]

> Half a century ago, when the Soviets beat us into space with the launch of a satellite called Sputnik, we had no idea how we would beat them to the moon. The science wasn't even there yet. NASA didn't exist. But after investing in better research and education, we didn't just surpass the Soviets; we unleashed a wave of innovation that created new industries and millions of new jobs.
>
> This is our generation's Sputnik moment. Two years ago, I said that we needed to reach a level of research and development we haven't seen since the height of the Space Race. And in a few weeks, I will be sending a budget to Congress that helps us meet that goal. We'll invest in biomedical research, information technology, and especially clean energy technology, an investment that will strengthen our security, protect our planet, and create countless new jobs for our people.[210]

Research and development into clean energy technologies in the military context will lead to innovation and competition across the globe. One problem in the clean energy arena has been the lack of consistent demand, consumers favoring cheaper conventional sources of fuel. The Green Arms Race will continue to drive innovation as long as countries seek more capable and efficient fighting forces. This innovation will also create

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[209] President Barack Obama, Remarks by the President in State of the Union Address (Jan. 25, 2011), *available at* http://www.whitehouse.gov/the-press-office/2011/01/25/remarks-president-state-union-address.
[210] *Id.*

jobs, lower energy costs (clean and conventional), and finally, unleash America from the tether of foreign sources of fuel.

Critical to the initiation and sustainment of this 21st century arms race will be the experts who not only drive the innovation, but also facilitate the regulatory and technology transfer across the globe to stoke its fire. It also will require international lawyers to develop and operate the systems and pull the levers of global governance. Transnational Legal Process may provide a good model. The theory was developed by Harold Koh, currently the Legal Adviser to the U.S. Department of State and Professor at Yale Law School. It encourages

> states to become more law-abiding by incorporating international law into their domestic legal and political structures. When such a state violates international law, that violation creates frictions and contradictions that disrupt its ongoing participation in the transnational legal process. Transnational public law litigation brought by non-governmental organizations is designed precisely to provoke judicial action that will create such frictions, thereby helping shape the normative direction of governmental policies.[211]

In the same way, international lawyers charged with facilitating the Green Arms Race can use networks precisely to benefit allied military powers and provoke non-allies to pursue similar energy efficiencies that lead to greater lethality. Our closest non-allied military force is also the largest emitter of greenhouse gases in terms of volume.[212] China, detecting clean energy investment and the corresponding increase in combat effectiveness, will chose to arm and purse a similar clean energy strategy. India will follow suit, as will countless other nations from the developing world. The U.S. Defense and State Departments, and their constant interactions with their counterparts across the globe, will play a vital role as the initiators and sustainers of the Green Arms Race. In the end, the net benefit will be a change in the global conception of energy, shifting focus from petroleum-based sources of energy to new, cheaper, and more efficient sources and uses. The involvement of other nations, whether allied or not, will further

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[211] Harold Hongju Koh, The 1994 Roscoe Pound Lecture, *Transnational Legal Process*, 75 NEB. L. REV. 181, 206–07 (1996) (internal citations omitted).

[212] *China Overtakes U.S. in Greenhouse Gas Emissions*, N.Y. TIMES, Jun. 20, 2007, *at http://www.nytimes.com/2007/06/20/business/worldbusiness/20iht-emit.1.6227564.html.*

increase global demand for green energy and change the discourse on climate change.

III: The Failure of the Climate Change Regime

> The more instability increases, the more pressure there will be to use our military. That's the issue with climate change. The U.S. is all about preventing big wars by managing instability. But as populations get more desperate, the likelihood of military conflicts will go up. We'll have to cope with the ill-effects of climate change.[213]

Even the minimum predicted shifts in global climate are likely to be significant and disruptive to global security and political stability.[214] The predicted increase in global temperature of 1.8 to 4.0 degrees Celsius by 2100 will likely cause sea levels to rise, an increase in the frequency and severity of storms, and more frequent flooding of coastal areas and drought in inland areas.[215] Further, the Intergovernmental Panel on Climate Change (IPCC) predicts that the doubling of greenhouse gas concentrations in the atmosphere will cause a 1.5 to 3.5 percent reduction in global GDP by 2100, with developing nations that rely heavily on agriculture to sustain their economies taking the brunt of the loss.[216] This economic decline will further destabilize the already fragile political situation in these poorer countries, especially in the littoral population centers, causing an increase in threats to regional and global security.

The multilateral approach to untying the "Gordian knot" at the heart of the climate change problem,[217] while in some ways effective, is not doing enough to change the trajectory of global warming. This Part will consider the key international mechanisms and the domestic measures that have emerged to address the problem of climate change. In contrast to the

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[213] CENTER FOR NAVAL ANALYSIS, *supra* note 12, at 28 (quoting General Robert Magnus, USMC (Ret.)).

[214] *Feeling the Heat: Climate Science and the Basis of the Convention*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (2012), http://unfccc.int/essential_background/the_science/items/6064.php.

[215] Jason Bordoff et al., *Understanding the Interaction Between Energy Security and Climate Change Policy*, *in* ENERGY SECURITY 211 (Carlos Pascual & Jonathan Elkind, eds. 2010).

[216] *Id.*

[217] Michael Shellenberger, et al., *Reshaping the Global Warming Debate: Fast, Clean, and Cheap: Cutting Global Warming's Gordian Knot*, 2 HARV. L & POL'Y REV 93, 94 (2008).

potential of the Green Arms Race to create an effective global solution to the problem of climate change, these approaches have little hope for lasting success.

A. Climate Change and its Impact on National Security

Over the past several decades, the work of the United Nations to combat climate change and encourage energy reform has highlighted, with increasing intensity, the dangerous effects of rising temperatures on Earth.[218] Today, as a result of these efforts, the fact that the temperature within the earth's atmosphere is rising is no longer seriously questioned.[219] Though controversy has surrounded the research into the human contributions to climate change over the past few years,[220] there is nonetheless growing consensus that our consumption of fossil fuels has led to the acceleration of global warming over the past 150 years.[221] The difficult issues we are facing, and will continue to face in the future as a result of this trend, cut across disciplinary boundaries, involving problems for the

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[218] *See generally World Meteorological Organization: Environmental Mandate*, UNITED NATIONS ENVIRONMENTAL PROGRAMME, http://www.unep.org/un-env/default.asp?gegid=40 (last visited May 17, 2012). The World Meteorological Organization is the UN system's "voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources." *Id*. *See also* Intergovernmental Panel on Climate Change, Organization, http://www.ipcc.ch/organization/ organization.shtml. The Intergovernmental Panel on Climate Change was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to "provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts." *IPCC Reports*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, http://www.ipcc.ch/publications_and_data/publications_and_ data.shtml (last visited May 17, 2012). The Intergovernmental Panel on Climate Change publishes regular assessment reports on the state of knowledge with respect to climate change. *See id*.

[219] Richard B. Alley et al., *Summary for Policy Makers*, *in* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 93, 100 (Susan Solomon et al., eds., 2007), *available at* http://www.ipcc.ch/ publications_and_data/ar4/wg1/en/spm.html.

[220] *See, e.g.*, Lauren Seifert, *Getting Hot and Bothered Over "Climate-Gate"*, CBS NEWS (Dec. 9, 2009),

[221] *See* Seth Borensterin, et al., *Climategate: Science Not Faked, But Not Pretty*, ASSOC. PRESS (Dec. 12, 2009), http://www.usnews.com/news/energy/articles/2009/12/12/climategate-science-not-faked-but-not-pretty. *See also* green.view, *Climategate's Culture*, THE ECONOMIST, Mar. 31, 2010, *available at* http://www.economist.com/node/ 15826384 (noting that the Parliamentary investigation cleared "climategate" participants of wrongdoing but urged them to hold their work, so important to policy, to higher standards of transparency).

environment, science, economics, law, international relations and development, and national defense.

The prevailing view among most experts is that the best way to solve the problem of climate change is through multilateral agreement.[222] Such a solution ensures coordinated action across states on several key issues, including the distribution of greenhouse gas emissions and global reduction of carbon emissions. There is little to show for the past thirty years of effort; a new approach is necessary.

In the United States, though climate change legislation has enjoyed support from both the Republican and Democratic sides of the aisle,[223] passage has proven impossible. Voters are unsure about both the general cost and benefit analysis of and the overall effect of climate change legislation on energy prices and congressional leaders are wary of losing local support.[224] While agreement on climate change legislation has proven impossible, climate change is increasingly being discussed and addressed in the national security context. As a Center for Naval Analysis study found,

> The best approaches to energy, climate change, and national security may be one in the same:
>
> - Projected impacts of climate change pose a serious threat to American's national security.
> - Climate change acted as a threat multiplier for instability in some of the most volatile regions of the world.
> - Projected impacts of climate change will add to tensions even in stable regions of the world.
> - Climate change, national, security, and energy dependence are a related set of global challenges.[225]

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[222] *See* Brewster, *supra* note 123, at 246 (discussing the consensus that the only effective solution to the problem of climate change will be a multilateral agreement); Gary Coglianese and Jocelyn D'Ambrosio, *Policymaking Under Pressure: The Perils of Incremental Responses to Climate Change* 3 (Scholarship at Penn Law, Paper 232, 2008), *available at* http://lsr.nellco.org/upenn_wps/232 (arguing that reversing the trajectory and effects of greenhouse gas emissions requires a comprehensive global solution).

[223] The Lieberman-Warner Act was sponsored by Senators Joe Lieberman (I-CT) and John Warner (R-VA).

[224] Pooley, *supra* note 127.

[225] CTR. FOR NAVAL ANALYSIS, *supra* note 12, at i, 21.

Climate change will create instability in stable regions and increase instability in areas of tension.[226] These changing conditions will create conflicts in the Arctic and in the littoral regions, where the vast majority of the world's population currently live, especially as resources become scarce.[227] These new global conflicts will further stretch American and allied military forces.

B. Multilateral Framework

The creation of an international regime to address climate change began in the late 1970s, when the World Meteorological Organization (WMO) convened the First World Climate Conference to discuss the science of global climate change.[228] With the support of world leaders, the United Nations organized an Earth Summit in Rio de Janeiro, Brazil. Here, in 1992, countries were able to reach consensus and sign the United Nations Framework Convention on Climate Change (UNFCCC). This framework aimed to "stabilize greenhouse gas concentrations in the atmosphere" at a level that would prevent climate change.[229]

Though it did not contain timelines or concrete emissions targets, the UNFCCC contained provisions that required periodic evaluations to ensure that the general objectives of the Convention were being met.[230] The parties returned to the negotiating table to develop a new protocol, with timelines and binding targets. In 1997, multilateral negotiations for the Kyoto Protocol to the UNFCCC were concluded.[231]

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[226] *Id.* at 23–24. The Arctic region provides a good example. Once a highly stable region, nations are asserting claims to important strategic areas as the ocean becomes progressively more navigable. *Id.*

[227] *Id.* at 24.

[228] WORLD METEOROLOGICAL ORG., THE WORLD METEOROLOGICAL ORGANIZATION AT A GLANCE 26 (2009), *available at* http://www.wmo.int/pages/about/documents/WMO990.pdf . Interestingly, the development of the science behind climate change tracked closely with the power of the computer. As computers became about to handle more information, climate models became more complex and increasingly able to credibly predict trends in the global climate. *See* Daniel Bodanski, *The United Nations Framework Convention on Climate Change: A Commentary*, 18 YALE J. INT'L L. 451, 459 (1993).

[229] United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107.

[230] *Id.* art. 2.

[231] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22.

The Kyoto Protocol came into effect in 2005[232] and contained more powerful measures and binding targets.[233] It also included three market-based provisions that were designed to assist countries in meeting their goals. These provisions included: an emissions trading regime; a clean development mechanism, and regulations mandating joint implementation.[234] The emissions trading regime, a carbon market, is in effect today.[235] Nations are tracking and trading emissions reductions (or removals) amongst each other like any other commodity.[236]

Perhaps even without regard for the actual effect of the deal at the latest conference in Durban, the political signal delivered by the deal itself is strong.[237] As Chris Huhne, the United Kingdom's Energy and Climate Secretary, noted, "[f]or the first time we've seen major economies, normally cautious, commit to take the action demanded by science." [238] Even with this progress, the emission of greenhouse gases across the globe continues at unsustainable levels.[239] Unfortunately, and critically, the largest polluters from the industrialized and developing world have not yet ratified the Kyoto Protocol.[240] Domestic constituencies in these nations constrain the negotiators. There are several possible reasons for this difficulty, some seemingly intractable.

First, though there is consensus that industrialized nations are primarily responsible for the current levels of greenhouse gases in the atmosphere, there is little agreement on how to apportion the costs of reform moving forward. Nations do not even agree on the proper method of measuring state contributions to greenhouse gas emissions.

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[232] *Id.*
[233] *Id.*
[234] *Id.* arts. 3, 12, 17.
[235] *Id.* art. 17.
[236] *Id. See also Emissions Trading*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited May 17, 2012).
[237] Environment Editor, *Durban Climate Deal: The Verdict*, THE GUARDIAN (Dec. 12, 2011), http://www.guardian.co.uk/environment/2011/dec/12/durban-climate-deal-verdict.
[238] *Id.*
[239] *See Greenhouse Gas Data*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php (last visited May 17, 2012).
[240] Kyoto Protocol, *supra* note 231.

Second, the purely local benefits from the adoption of particular emissions mitigation measures are difficult to identify or accurately quantify.[241] A reduction in greenhouse gas concentrations is a global good, but the costs are born locally and are disproportionate to the local benefits.[242] The inability to fence-in benefits of reform creates a commons problem, creating disincentives for individuals to bear the costs for a global good.[243] As a result, domestic constituencies are hesitant to support effective reforms aimed at reducing greenhouse gas emissions, whatever the costs might be.[244]

Third, constituencies from developing nations are generally unwilling to constrain their ability to grow, deciding instead to utilize means that industrialized nations historically enjoyed without restraint.[245] Similarly, constituencies in industrialized nations are unwilling to pay more than their current share of the burden, though they arguably benefited from past pollution at the expense of the global community.[246] Given these domestic political constraints in both developing and industrialized states, negotiators are unable to resolve the most difficult issues and are driven towards generalized, non-binding accords.

Frustrated by these problems, individual states and their domestic constituencies have increasingly turned to unilateral action to limit greenhouse gas emissions and encourage investment in clean technologies.

C. Unilateral Measures

Individual states within the United States have started to develop domestic mechanisms to combat climate change.[247] In the United States,

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[241] Brewster, *supra* note 123, at 247.
[242] Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565, 1572–73 (2008).
[243] *See* Garrett Hardin, *The Tragedy of the Commons*, SCIENCE, Dec. 13, 1968, at 1243, 1245, *available at* http://www.sciencemag.org/content/162/3859/1243.full.
[244] The tort analysis employed by Posner and Sunstein is instructive here. Corrective justice, since it is backwards looking would "force many people who have not acted wrongfully to provide a remedy to many people who have not been victimized." *See* Posner & Sunstein, *supra* note 24242, at 1591–603.
[245] Daniel Bodansky, *Current Development: The Copenhagen Climate Change Conference: A Postmortem*, 104 AM. J. INT'L L. 230, 232 (2010).
[246] *Id.* at 231–32.
[247] *See* Brewster, *supra* note 123, at 247.

the federal government and some state and local governments have taken action. At the state level, governments have created environmental pacts and other similar ad hoc arrangements with their regional neighbors, aimed at limiting greenhouse gas emissions.[248] This democratic and decentralized fix to climate change has some value and appeal. Incremental progress, no matter how small, is often viewed as being better than no progress at all. Some argue further that these local and regional measures will cause more experimentation across the country until a consensus, or best practice program, is identified.[249] Additionally, relatively conservative, incremental measures insulate local populations from the larger programmatic expenses of a national program and the costs of a potential catastrophic failure of a nationwide scheme. These local programs can have impacts both within a particular nation and internationally.

1. Domestic Experimentation and Its Overall Impact

While domestic regulation, in the absence of coordinated international action, cannot solve the problem of climate change,[250] there are significant reasons for nations to pursue unilateral action. A shift in a nation's energy policy could improve its national security, economic stability, global position as a technological leader, and the overall health of its population.[251] At the national level, climate change measures include two primary mechanisms, carbon taxes and regional cap-and-trade mechanisms. The carbon tax, as the name suggests, taxes the burning of fossil fuels in proportion to the carbon content.[252] A cap-and-trade system limits greenhouse gas emissions and then allocates or sells credits to regulated entities, which they in turn may utilize or trade to other regulated firms.[253] In theory, a cap-and-trade system causes reductions in emissions from actors who are able to reduce their carbon emissions more cheaply than buying emissions credits on the market. Both systems encourage investment in

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[248] Coglianese & D'Ambrosio, *supra* note 222, at 1. *See also* Keith Schneider, *Regional Climate Pact's Lesson: Avoid Big Giveaways to Industry*, YALE ENV. 360 (May 21, 2009), http://e360.yale.edu/content/feature.msp?id=2155.

[249] Coglianese & D'Ambrosio, *supra* note 222, at 2.

[250] Posner & Sunstein, *supra* note 24342, at 1600–01.

[251] Jody Freeman & Andrew Guzman, *Climate Change and U.S. Interests*, 109 COLUM. L. REV. 1531, 1601 (2009) (noting that "[w]hatever others do, the United States should move aggressively to reduce global GHG emissions.").

[252] CHRIS WOLD ET AL., CLIMATE CHANGE AND THE LAW 492–95 (2009).

[253] *Id.* at 487–88.

cleaner energy technologies by increasing the cost of emitting carbon,[254] and aim to reduce domestic greenhouse gas emissions over time.

Domestic legislation also cultivates public opinion in favor of a particular course of climate change regulation.[255] Interest groups and vigorous public debate on climate change can educate populations as to the dangers of global warming, and in so doing, gradually increase popular support for action aimed at fixing the problem. Once a particular mechanism is in place, the public, theoretically, can experience the positive effects and modest costs of domestic climate change legislation. Domestic populations can then "develop a preference for progressively higher levels of environmental regulation."[256] This domestic support can also prime public acceptance of more stringent domestic and international action in the future.[257] Given growing public concerns over the danger of climate change, coalitions between industry and environmental groups will form, and compromise positions from these interested parties will facilitate further regulation. Finally, domestic climate change legislation could promote structural changes in the economy that result in increased political support for greater regulation.[258]

Despite these potential benefits, unilateral regulation in the climate change arena is not without potential problems. First, the costs of combating climate change are unknown. As a result, domestic regulation (or international regulation) may cause a spike, of unknown duration in energy prices as regulators experiment with different mechanisms to effectively deal with global climate change. Public opinion, in light of public uncertainty as to the effectiveness of the regulations and the resulting high fuel and heating oil prices, would likely quickly erode and harden, preventing support for future climate legislation.

Second, the benefits of unilateral action are unlikely to outweigh the costs or result in a meaningful decrease in greenhouse gas concentrations.[259]

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[254] The Lieberman-Warner Act also contains provisions for "offsets", which allow for investment into clean energy technology to generate emissions credits. *See id.* at 489–91.
[255] Brewster, *supra* note 123, at 265.
[256] *Id.*
[257] *Id.* at 266.
[258] *Id.* at 247–48.
[259] *See* Posner & Sunstein, *supra* note 242, at 1579–80. Specifically, these scholars argue that since,

In other words, domestic incremental solutions are unlikely to reverse the global problem of climate change because they are not coordinated across nations.[260] Even if one nation acts to change its energy policy, unchecked and increasing greenhouse gas emissions from other areas of the world, polluting our shared atmosphere, will cancel positive changes from that one jurisdiction.[261]

Third, incremental domestic regulation may also anchor public support in a particular mechanism or program that is viewed, even in the smallest way, as successful or cost-effective. In this situation, local constituencies are less likely to adopt new policies, even if they provide marginal benefit over the old regime, because the results and costs, compared to the status quo, are unknown.[262] Similarly, winning support for an incremental solution to climate change may lull the public into believing that meaningful legislation is in place, and therefore support for more stringent future regulations is not necessary or important.[263]

Fourth, and perhaps most significantly, incremental domestic regulations may actually cause environmental harm, in that uncoordinated programs could lead to an overall increase in greenhouse gas emissions.[264] Strict regulation of greenhouse gas emissions in one jurisdiction may increase harmful emissions in states with more permissive regulatory schemes.[265] This carbon leakage could occur for any of several reasons. Supply-side leakage could occur as less-regulated states increase production in greenhouse gas-intensive industries, to meet the growing demand from highly regulated states.[266] Greenhouse gas-heavy industries, rather than

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greenhouse gases dissipate very slowly, industrialized nations "have contributed more to the stock than countries that industrialized later, even though the later might today contribute more on an annual basis. About half of the [carbon dioxide] emitted in 1907 still remains in the atmosphere. If by some miracle the world suddenly stopped emitting [carbon dioxide] today, the stock of [carbon dioxide in the atmosphere in 2107 would remain at about 90% of what it is now. . . . We are not in a better position to see why unilateral action, even by the largest emitters, will accomplish so little. Such action cannot affect the existing stock, and by definition, it will do nothing (directly) about the rest of the flow." *Id.* (internal citations omitted)

[260] Coglianese & D'Ambrosio, *supra* note 222, at 8.

[261] *Id.*

[262] *Id.* at 15.

[263] *Id.* at 17.

[264] Brewster, *supra* note 123, at 271; Coglianese & D'Ambrosio, *supra* note 22222, at 9-11.

[265] Brewster, *supra* note 123, at 271.

[266] Coglianese & D'Ambrosio, *supra* note 22222, at 10.

investing in costly new clean-production methods and processes, may elect to migrate from high-regulation, high-cost jurisdictions, to less-regulated and lower-cost areas.[267] At best, these moves would offset the positive effects of domestic climate change regulation, with production levels in the less-regulated states simply meeting pre-regulation demand. At worst, however, a nation's unilateral regulation could increase overall greenhouse gas emissions.[268] The economic boom caused by the relocation of industry to lower-regulation states could solidify the positions of those governments against adopting more stringent regulations in the future.[269] This would further constrain international negotiators, and make meaningful multilateral agreement even more difficult. Most importantly, as discussed above, the unilateral reduction of greenhouse gas emissions in one state is unlikely to have a positive effect on global climate change.[270]

2. International Consequences of Domestic Legislation

Unilateral domestic legislation on climate change could have several effects on the international plane. Domestic legislation could help signal a country's leadership and commitment towards lasting solutions to the problem of global warming.[271] Domestic mechanisms could also set the course for international agreements, indicating support for one particular mechanism over another.[272] National measures also may reflect a state's desire to take the lead in this area by signaling the extent to which the state is willing to bear the costs of coordinated efforts to address climate change.[273] This signal, depending on whether it is received favorably or unfavorably by the international community, could increase the credibility and power of that state's negotiators. Domestic legislation, as discussed above, has the potential to increase public support for meaningful international agreement.[274]

Domestic politics and diplomacy interact in an international negotiation.[275] The two-level game model, one game on the international

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[267] *Id.*
[268] Brewster, *supra* note 123, at 271; Coglianese & D'Ambrosio, *supra* note 22222, at 11.
[269] Coglianese & D'Ambrosio, *supra* note 222, at 10.
[270] Posner & Sunstein, *supra* note 242, at 1600–01.
[271] Brewster, *supra* note 123, at 258–63.
[272] *Id.* at 258–59.
[273] *Id.*
[274] *Id.* at 259.
[275] *Id.* at 252.

plane, and the other on the domestic plane, shows that policymakers bargain in the domestic and international spheres simultaneously.[276] At the domestic level, interested parties pressure political leaders to adopt favorable policies, and the political leaders solidify their power by maneuvering between these interests, appeasing some and denying others. At the international level, the same political actors seek to maximize their ability to satisfy domestic interests, while at the same time attempting to minimize international problems.[277]

The critical point is that bargaining at each level is not independent. In her important paper, Rachel Brewster argued, "What is achievable at the international level influences what the domestic legislature will accept, and the realities of domestic politics can affect the outcomes of international bargaining."[278] Importantly, "[t]he unusual complexity of this two-level game is that moves that are rational for a player at one board (such as raising energy prices, conceding territory, or limiting auto imports) may be impolitic for that same player at the other board."[279]

Domestic politics play another important role with respect to international relations: that of ratification. This political process explicitly links the domestic and international games. Ratification breaks international negotiations into two stages: bargaining between international parties, which leads to a tentative agreement and separate discussions in the domestic arena involving interested constituencies about whether to ratify and execute the agreement.[280] The ratification process establishes a "critical link" between the international and domestic levels.[281]

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[276] *See generally* Robert Putnam, *Diplomacy and Domestic Politics: the Logic of Two-Level Games*, *in* DOUBLE-EDGED DIPLOMACY: INTERNATIONAL BARGAINING AND DOMESTIC POLITICS 431–68 (Peter B. Evans et al., eds. 1993) (describing the two-level game).

[277] *Id.* at 436.

[278] Brewster, *supra* note 123, at 253.

[279] Putnam, *supra* note 2766, at 436.

[280] *Id.* at 438.

[281] *Id.* Note that the ratification process varies between nations, some imposing a parliamentary process like the United States, others incorporating other mechanisms. The important point and the unifying factor between all ratification procedures is that they necessarily account for domestic preferences. Also of note is that the ratification process in the United States is not always followed. The President often enters into executive agreements with international partners and does not seek ratification in the Senate, especially when the Congress has arguable granted broad authority. This is especially true in the trade context. *See generally* Myres S. McDougal & Asher Lans, *Treaties and Congressional-Executive or Presidential Agreements: Interchangeable Instruments of National Policy*, 54 YALE L.J. 181

During the ratification process, since all parties to an agreement must concur on identical documents, domestic actors have a binary decision, whether to approve or disapprove the international agreement.[282] Any changes in the agreement would necessitate reopening the international negotiations.[283] Therefore, any international agreement must fall within the range of possible agreements to which a domestic constituency would agree. Anything that falls outside of this "win-set" will fail ratification.[284] The size of the win-set is incredibly important, and determined by domestic preferences and coalitions, institutional structures (the ratification process, for example), and the strategy of the negotiator.[285] This last factor is especially important. Negotiators are responsible for the transfer of information at the international level, and so their strategic choices send different signals to their negotiating partners. These signals, dependent on the overall strategy, could either communicate broad domestic win-sets signaling a wide range of flexibility to negotiate, or purposefully limit the scope of the win-set to draw concessions or side-payments from other states.

Depending on the apparent political strategy behind a regulatory move, domestic legislation could provide a bargaining advantage or disadvantage for negotiators on the international plane.[286] National legislation may allow a state to credibly commit to international action, demonstrating the state's willingness to incur the costs of regulation. It also may signal a state's willingness to compromise and negotiate a particular issue. However, national legislation could also send the opposite signal. If the constraints imposed by a domestic regulation fall outside the range of possible international agreement, multilateral compromise and negotiation at will prove difficult. As a result, domestic legislation could eliminate an international win-set entirely.[287] In other words, domestic legislation signals

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(1945), *available at* http://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=3471&context=fss_papers.

[282] Putnam, *supra* note 276, at 439.

[283] *Id.*

[284] *Id.*

[285] *Id.* at 443–52.

[286] Brewster, *supra* note 123, at 253.

[287] *Id.* at 254.

both a state's willingness to cooperate, and how much it is willing to contribute to a particular change.[288]

International climate change negotiations include both coordination and distribution games. Domestic legislation signals a state's willingness to cooperate and on what terms. In the green energy arena, it can assure other states that the state is indeed willing to cooperate to reach a solution.[289] However, domestic legislation also signals the limit to which a state is willing to cooperate and how the costs for the change should be distributed among the other players.[290] If the domestic legislation indicates a state's willingness to take more than its share of the distributed costs, domestic and international interests are likely to overlap and states are likely to find common ground on which to base multilateral agreement.[291] If on the other hand the state is only willing coordinate on its own terms, an agreement is still possible, but arriving at an agreement will be more difficult.[292]

In the climate change arena, the distribution of the costs of reform is the critical question. Seen in this light, domestic legislation may send a complex message to the international community. Domestic politics could further complicate the signal as international observers could view climate legislation passed within only a thin majority as a sign of uncertainty. Knowing that Congressional elections occur every two years, international actors may simply wait for a stronger coalition to form before entering costly international negotiations. A "state's domestic legislation can be a positive or a negative signal of [a state's] willingness to sign on to a treaty."[293]

In the United States, the Green Arms Race will provide the domestic support required for congressional action, while at the same time allowing a solution that escapes the difficulties of a formally negotiated, multi-lateral treaty mechanism. Congress has already shown its willingness to initiate and pass energy legislation in the national security context. Experts, working within both formal arrangements and informal networks,

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[288] *Id.* at 259. Professor Brewster's article contains a terrific description of two games that emerge from this situation: the Battle of the Sexes and the Stag Hunt. Though slightly outside of the purview of this paper, the lessons are nonetheless critical to understand the problems and limitations of multilateral climate change negotiations.

[289] *Id.* at 261.

[290] *Id.*

[291] *Id.* at 261–62.

[292] *Id.*

[293] *Id.* at 262.

will be able to stoke the Green Arms Race to globalize demand for green energy.

3. Linking Domestic and International Efforts

As noted, the disagreement in the climate change arena among states is largely distributional. States are unable to even agree on the criteria that should inform such a distribution. The questions are, by now, familiar. Should a state's past contribution to the global concentration of greenhouse gases in the atmosphere be used as a factor to calculate that state's proportional share? How should a state's contribution to global concentration be calculated, by a per capita basis or by gross volume? Should developing states bear the same or lesser burden than industrialized nations, even though emerging economies are the fastest growing source of greenhouse gas emissions?[294] If there is a cap-and-trade system, how will greenhouse gas emissions be distributed globally amongst states? States appear willing to contribute their proportional share, but unfortunately, "proportional" does not mean the same thing to each player at the table.

In the national security context and perhaps even in the international law practice more broadly, discussions of proportionality arise in the midst of military conflicts. That said, the concept is also gaining traction in other areas of international practice. Proportionality can be used to judge the lawfulness of countermeasures and can dictate the terms in which disputes are settled.[295] The concept of proportionality frames disagreements and prevents them from spiraling out of control.[296] The legitimate (and proportional) response to violations of a trade agreement should not exceed those necessary to achieve the objective of the agreement. Proportionality also plays a role in the legal area "between coastal states allocating their 'fair' shares of territorial seas, exclusive economic zones, and oceanic and subsoil resources."[297] In this arena, the principle of proportionality governs the lateral limits of reasonable argument. A state's position with respect to a "fair" distribution of costs can only be credible if

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[294] Carlos Pascual & Evie Zambetakis, *The Geopolitics of Energy: From Security to Survival*, *in* ENERGY SECURITY: ECONOMICS, POLITICS, STRATEGIES, AND IMPLICATONS 25 (Carlos Pascual & Jonathan Elkind, eds., 2010).

[295] Thomas M. Frank, *On Proportionality of Countermeasures in International Law*, 102 AM. J. INT'L L 715, 716 (2008).

[296] *Id.* at 715.

[297] *Id.* (internal citation omitted).

informed by terms of proportionality.[298] Though there is broad consensus that proportionality governs such divisions, there is still a range of legitimate argument. This range impacts the utility of the proportionality principle in the climate change context.

Domestic measures reflect a state's particular conception of fairness and proportionality. As a result, domestic legislation is widely divergent, based on each nation's answers to the questions leading this section. In the absence of international coordination, there is little chance that unilateral domestic action will solve the problem of climate change. "A series of uncoordinated national regulations will be better than no regulation (if carbon leakage levels are sufficiently low), but it will not provide a lasting solution to the dangers of climate change."[299] If each government incorporates its own conception of its proportional share of the burden, global emissions will not decrease, and may simply continue on their current upward trend.

D. The Green Arms Race and Climate Change

When viewed with even only moderate skepticism, multilateral instruments addressing climate change are largely symbolic, not requiring significant domestic commitment or action. Lacking sufficient consensus, these mechanisms avoid the toughest issues and contain generalized proscriptions. Domestic constituencies in each state are interested in the potential costs of reform and significantly constrain commitment on the international plane. Further, developing and industrialized nations are unable find a middle ground between their positions on key issues of distribution, funding, and verification mechanisms.[300] In short, decades of multilateral efforts have failed, and climate change remains an elusive issue for our national security.

Unfortunately, the utility of unilateral action to address climate change is also questionable. Uncoordinated state action could lead to significant problems, the least of which may be a failure to lower atmospheric greenhouse gas concentrations. Unilateral action would not

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[298] *Id.*

[299] Brewster, *supra* note 123, at 273.

[300] Corbin Hiar, *Will the Cancun Conference Be Copenhagen Redux?*, U.N. DISPATCH (Nov. 17, 2010), http://www.undispatch.com/climate-plan-failure-cancun-copenhagen.

solve the key issue of how to distribute emissions among states.[301] If each country simply adopts standards that it considers fair and efficient, greenhouse gases will remain at unsustainable levels. Furthermore, even strict regulation in any given state would be unlikely to reduce overall greenhouse gas concentrations and may simply lead to increased emissions in states with more permissive regulatory schemes.[302]

As Hamlet so artfully observed, "Ay, there's the rub."[303] Both multilateral and unilateral action fall short. Climate change is a global problem requiring a solution that effectively coordinates state action, while at the same time allowing domestic constituencies to localize the benefits of regulatory change in exchange for bearing the costs of reform.

Pursuing victory in the Green Arms Race will successfully align domestic and international interests to solve the two-level game. The critical limitation of both multi- and unilateral approaches to climate change is the inability of domestic constituents to localize the benefits of reform. Investment in the green military however will immediately have domestic benefit. The mission to of the Department of Defense will continue to drive progress and create local support.

In addition to the increase in military efficiency, innovation will benefit domestic constituencies by creating new jobs and sparking entrepreneurship. As networks and experts do their work, research and development will be spread and the demand for green energy will be globalized.

IV. Limitations

The Green Arms Race will not provide a global panacea that will make the United States military immediately more efficient while solving the problem of climate change. There are several possible limitations.

First, there is no guarantee that the Green Arms Race will lead to a more effective military or allow the United States more freedom in the

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[301] *See* Brewster, *supra* note 1233, at 246.
[302] *See id.* at 246; *see supra* Part III.C.1. *See also* Coglianese & D'Ambrosio, *supra* note 222, at 9; Posner & Sunstein, *supra* note 24242, at 1579–80.
[303] WILLIAM SHAKESPEARE, HAMLET 285 (Ann Thompson & Neil Taylor eds., Arden Shakespeare 2006) (1899).

foreign policy arena. Presidents since FDR have been tinkering with the nation's energy policy.[304] President Roosevelt, as part of the New Deal, built dams.[305] Eisenhower, perhaps inadvertently, created a market for petroleum by building the interstate highways.[306] Nixon started "Project Independence to 'make the U.S. energy independent by 1980.'"[307] President Reagan tried deregulation and the Clinton Administration tried to create a car that achieved eighty miles per gallon.[308]

Presidents Bush and Obama are wartime Presidents. In this context, investment and regulation have clear benefits: the force will be lighter, more efficient, and in the end, more effective. The imminent Green Arms Race will only help this effort by creating a global demand for new and more efficient technology. This Long War is drawing a new line allowing the achievement of what was before impossible.

Second, governments may not have the political will or enough money to see it through. In early 2011, the then-Secretary of Defense, Robert Gates, announced $78 billion worth of cuts to the U.S. Department of Defense.[309] These cuts included reductions in the size of the Army and Marine Corps. In addition to these budget cuts, Secretary Gates challenged the military services to find $100 billion in savings that they would be able to retain in order to continue major weapons programs and modernize their forces.[310] In an era of declining budgets, it will be difficult for the Defense Department to fund clean energy research and development programs, especially when "cheaper" and proven technologies are available in the short-term. The cuts will only get deeper as full-scale combat operations wind down in Afghanistan.

Political support, especially in election years, may be difficult to sustain. Already gearing up for the election cycle this fall, House and Senate

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[304] *See* Mark P. Mills, *The Efficacy of Presidential Energy Policy*, FORBES.COM (Apr. 7, 2009), http://www.forbes.com/2009/04/07/roosevelt-reagan-bush-clayton-christensen-energy-policy.html.
[305] *Id.*
[306] *Id.*
[307] *Id.*
[308] *Id.*
[309] Charley Keyes, *Defense Secretary Announces Billion in Budget Cuts*, CNN (Jan. 6, 2011), *available at* http://articles.cnn.com/2011-01-06/politics/pentagon.budget.cuts_1_defense-budget-gates-plan-defense-secretary-robert-gates?_s=PM:POLITICS.
[310] *Id.*

committees voted to limit DoD's efforts to fund biofuel programs.[311] One senator stated that, "Adopting a 'green agenda' for national defense of course is a terrible misplacement of priorities."[312] I could not, respectfully, disagree more. Participation in the coming green arms race has direct implications for national security and global stability. Political will for a more efficient and effective military must be sustained, even through lean budget years. As described above, active participation in the Green Arms Race will allow our forces to travel further, faster, and lighter. It will also allow the Pentagon to escape its current susceptibility to wildly fluctuating fuel costs.

The defense department has weathered this storm previously. Secretary Mabus notes that other secretaries faced skepticism and resistance during the transformations from wind to coal, from coal to oil, and from oil, to nuclear power.[313] He states, "If we made all of our decisions on the cost of a new technology, we wouldn't have nuclear submarines today. We wouldn't have nuclear carriers today. We wouldn't have computers today because they're a lot more expensive than typewriters."[314] Long-term vision, rather than short-sighted election year posturing, must prevail.

The Pentagon's budget process poses a bureaucratic challenge to sustained long-term investment in greening the force. The cost-savings from clean and renewable energy investment will be realized several years into the future, when more efficient systems are deployed on the battlefield. Planners and decision-makers are reluctant to allocate current dollars that will yield benefits beyond the five year defense program or "FYDP."[315] As defense observers have noted, "[t]here's that struggle that the payback is not going to give you money to move around the FYDP."[316] Leaders within the

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[311] Snider, *supra* note 93.

[312] *Id.*

[313] Joshua Stewart, *Lawmaker Challenges Mabus on Biofuel Goals*, NAVY TIMES (Apr. 7, 2012), http://www.navytimes.com/news/2012/04/navy-randy-forbes-biofuel-goals-secnav-ray-mabus-040712w/.

[314] *Id.*

[315] The FYDP provides congress with visibility over DoD's projected spending for five years (the current year and at least four subsequent years). For a more detailed discussion of the FYPD, *see Future Years Defense Program*, ACQUIPEDIA (Nov. 1, 2010), https://acc.dau.mil/CommunityBrowser.aspx?id=362504.

[316] Sandra I. Erwin, *Defense Energy: Small Incremental Steps to Do Better than Sweeping Reforms*, NAT'L DEFENSE MAGAZINE (Sept. 2011), http://www.nationaldefensemagazine.org/archive/2011/September/Pages/DefenseEnergySmall,IncrementalStepsDoBetterThanSweepingReforms.aspx.

U.S. armed forces are making these difficult decisions in favor of long-term saving even in light of the short term costs (and declining budgets), but real change will take sustained effort across several administrations.

Even if the United States is able to successfully fund research and development programs to develop new clean energy technologies, it is also not clear that the world economy, emerging only slowly from its own financial crisis, will be able to support a full-scale arms race. In other words, even in the regulation and technologies are available, other countries may not have the ability to invest in their transfer and correspondingly, an increased incentive to free-ride. This problem can be mitigated by the mechanics of the Green Arms Race itself. Domestic constituencies in each nation will benefit from clean energy innovation in various ways, whether through increased military efficiency and lethality, or domestic economic growth fueled by new industry and technology. The problem of free-riding, nations enjoying the benefits of energy efficient technology without investing their "proportional" share, can be controlled by the experts and networks, stopping and starting the flow of information and technology as appropriate.

Finally, we may not prevail. The real inconvenient truth about a potential Green Arms Race is that we might lose. The President has challenged American "scientists and engineers to assemble teams of the best minds in their fields, and focus on the hardest problems in clean energy . . . ."[317] Clean energy breakthroughs are needed across all sources, whether wind and solar, nuclear, clean coal, or natural gas. All of these are difficult tasks that will come with significant monetary and political costs. To further complicate matters, while the United States currently enjoys technical and military superiority, that could change, and quickly. China and India are not starting the race towards energy efficient technology and regulation from a standstill.

> China and India realized that with some changes of their own, they could compete in this new world. And so, they started educating their children earlier and longer, with greater emphasis on math and science. They're investing in research and new technologies. Just recently, China became the home to the world's largest private solar research facility, and the world's fastest computer.[318]

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[317] Obama, *supra* note 209.
[318] *Id.*

The problem of winning the Green Arms Race is one, like climate change, that spans several disciplines including education, economics, and national security. Winning will be difficult. With India, China, and others already in the game, it turns out that the Green Arms Race has begun. The United States, with its current military superiority and early move towards greening the force, is well-positioned to compete. Whether or not there is a winner, the Arms race of the 21st century will radically alter the global conversation on energy and climate change.

V. Conclusion

This Article has attempted to harness the current move to green the U.S. military to affect global change in energy policy and in so doing, reorient the discussion on climate change and national security. The history of seemingly continuous military conflict in Central Asia has repeated itself uncomfortably. Today, Marines and soldiers are pulled out of their tactical combat roles to provide security for fuel and water convoys as they trek to forward operating bases. Just as with the Second Afghan War in the late 19th century, today's supply convoys not only sap resources away from tactical units, but they also provide attractive, steady, and predictable targets for enemy forces. The required movement of supply trains across borders also provides political leverage that constrains our national security choices. The greening of the military will favorably shift the ratio of trigger pullers to support personnel, allow us to operate more freely and quickly, and, in the end, save lives.

The Green Arms Race has the power to change the way we think and speak about energy, climate change, and national security. Experts, operating the formal and informal networks, will have the power to control admission to the green military "club." This can be a powerful carrot to nations looking for energy efficient technology and regulation. As the domestic and international benefits of energy efficient military forces become more apparent, more countries from both the industrialized and developing world will seek to join. Membership to the club, in this way, has the power to affect other norms, like human rights, trade practices, intellectual property rights, and individual freedom to name a few. Participating officials could impose strict conditions and benchmarks on membership into the green military club. Nations seeking to join will have little choice but to incorporate changes across these important areas.

Orienting toward the imminent Green Arms Race will radically alter the discussion on climate change and energy dependence, and improve our national security posture. Greening the military will no longer be a fringe environmental issue, but rather a national security choice. Decision-makers will be able to realize the full variety of foreign policy choices, no longer constrained by the politics of oil. The change is happening already, and we must sustain the will to innovate and win.