U.S. Tactical Nuclear Weapons in Europe after NATO’s Lisbon Summit: Why Their Withdrawal Is Desirable and Feasible

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Abstract

In this paper we describe how, over the past two decades, the usefulness of U.S. tactical nuclear weapons that are forward-deployed in Europe has gradually declined, and we explain the logic behind their decreased importance. We then list the main arguments in favor of the continuation of this trend until they are completely eliminated over the next couple of years, while subsequently investigating what the reasons are for NATO’s desire to prolong its reliance on these weapons in the future. In the final part of this paper, we analyze the political feasibility of their complete withdrawal, explain what the political practicalities of such a withdrawal would be, and end with several concluding remarks.
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Introduction

While the precise number is secret, it is commonly known that as of 2011, approximately two hundred U.S. nuclear weapons are based in Europe, a tenacious remnant of the Cold War that ended more than two decades ago. Yet a fundamental shift in thinking about the role of nuclear weapons in defense policy has been taking place over the past few years, particularly in the United States.

One of the underlying reasons behind recent political statements that nuclear weapons should ultimately be phased out entirely is that they are the victim of their own success as the perceived provider of the ultimate form of security. Indeed, there are still states who want to follow the example of the nuclear weapon states by acquiring these weapons. The result is a world in which the possession of nuclear weapons is still subject to the possibility of further proliferation. The Democratic People’s Republic of Korea (North Korea) has recently acceded to the group of nine countries that currently possess nuclear weapons. Iran may become number ten on this list. If Iran manages to develop a nuclear weapon, other states in the Middle East may follow suit, such as Egypt, Saudi Arabia, and Syria.

Consequently, the region could very well become the opposite of the much-desired nuclear-weapons-free-zone (NWFZ) that the agreed final document of the May 2010 Nuclear Nonproliferation Treaty (NPT) Review Conference aspires to establish. A world in which state-owned nuclear weapons continue to play a strategic role (and potentially increasingly
so), and in which tens of thousands of weapons’ worth of fissile materials are still available, makes the acquisition and eventual use of these weapons by terrorist organizations (such as Al Qaeda) more likely. That Cold War nuclear deterrence practices can keep these new nuclear-weapons actors at bay is questionable. The post–Cold War nuclear world is fundamentally different from the global order and relative stability of the Cold War. Hence, an increasing body of analysts regards the existence of nuclear weapons in today’s more complex world as a liability, rather than a means to enhance security.

The only sustainable way to prevent nuclear proliferation in the twenty-first century seems to be delegitimization of this category of weapons, and finally the complete elimination of nuclear weapons from all states. Indeed, it is increasingly recognized that nuclear proliferation becomes much harder in a world completely free of such weapons. This understanding—although obviously not shared by everyone—has now reached the foreign policy establishment, especially but not only in the United States. The most visible indicator of this change of opinion was a seminal op-ed by former U.S. Secretaries of State Henry Kissinger and George Shultz, former U.S. Secretary of Defense William Perry, and former U.S. Senator Sam Nunn in the *Wall Street Journal*.¹ This bipartisan group recommended the elimination of nuclear weapons, not as a utopian idea, but as a realistic political ambition. In addition to these former politicians and therefore more politically relevant, on April 5, 2009, in Prague, U.S. President Barack Obama made an impassioned speech in which he declared his wish to rid the world of nuclear weapons. He declared: “Some argue that the spread of these weapons cannot be stopped, cannot be checked—that we are destined to live in a world where more nations and more people possess the ultimate tools of destruction. Such fatalism is a deadly adversary, for if we believe that the spread of nuclear weapons is inevitable, then in some way

we are admitting to ourselves that the use of nuclear weapons is inevitable….So, today, I state clearly and with conviction America’s commitment to seek the peace and security of a world without nuclear weapons.”\(^2\) A couple of weeks earlier, British Prime Minister Gordon Brown pointed out that there are “tough responsibilities to be discharged by nuclear weapon states, for as possessor states we cannot expect to successfully exercise moral and political leadership in preventing the proliferation of nuclear weapons if we ourselves do not demonstrate leadership on the question of disarmament of our weapons.”\(^3\) These declarations indicate the increasing conviction among the nuclear weapon states that they must drastically alter their existing nuclear policies.

One category of nuclear weapons that has not been restricted by a formal arms control treaty is tactical nuclear weapons. Tactical (or sub-strategic)\(^4\) nuclear weapons are sometimes categorized as being less destructive than strategic nuclear weapons. Such a distinction, however, is misleading, because many tactical nuclear weapons, and maybe even most, are more destructive than the Hiroshima bomb. Linton Brooks, former director of the U.S. National Nuclear Security Administration (NNSA), once said: “By any rational definition, all nuclear weapons are ‘strategic.’”\(^5\) A better criterion to distinguish between tactical and strategic nuclear weapons is the range of their delivery vehicles. Indeed, tactical nuclear weapons are usually meant for short-range delivery vehicles, such as ballistic missiles or cruise missiles with a range of up to 500 kilometers (or 310 miles), as well as for tactical aircraft (equipped with gravity bombs), which typically have a maximum range of some 1,350

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\(^3\) Gordon Brown, speech on March 17, 2009, in *Disarmament Diplomacy*, No. 90 (Spring 2009).

\(^4\) In this paper we will use the term tactical.

kilometers (or 839 miles). As of 2011, the overall size of the U.S. arsenal of operational tactical nuclear weapons is thought to be approximately 500, with another 800 presumed to be in an inactive stockpile. These weapons include gravity bombs and warheads usable on land-attack and sea-launched Tomahawk cruise missiles. None of the approximately 100 active (and 200 inactive) Tomahawk sea-launched cruise missiles with nuclear warheads are actually likely to be deployed at sea. Russia possesses an estimated 2,500 to 5,500 tactical nuclear weapons. This number is gradually shrinking, mostly because the weapons are aging and breaking down. The short-range delivery systems—in contrast to the intermediate-range systems—do not have a well-defined role in Russian defense policy, and in principle they could rather easily be taken away without negatively affecting or certainly undermining Russia’s national interests.

This article focuses on tactical nuclear weapons that are stationed abroad, particularly the 200 remaining U.S. nuclear weapons based in Europe. Below we first describe the role and amount of U.S. nuclear weapons in Europe as of 2011. We follow by presenting the arguments in favor of withdrawal of these tactical nuclear weapons. Then, we provide the arguments against withdrawal of tactical nuclear weapons, and rebut these arguments. Next, most important, we analyze the political feasibility of a possible withdrawal. We then conclude by examining how the corresponding political decisions could be made, what remaining obstacles there may be, what political compromises may (or may not) be feasible, and which interim-steps could be taken.

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6 The United States also includes nuclear warheads for intermediate-range sea-launched cruise missiles in this category. Neither the United States nor Russia possesses nuclear warheads for short-range or intermediate-range land-based missiles anymore. The latter have been eliminated by the Intermediate Nuclear Forces (INF) Treaty. For a good overview of the broader topic of tactical nuclear weapons in the United States and Russia, see Miles Pomper, William Potter, and Nikolai Sokov, Reducing and Regulating Tactical (Nonstrategic) Nuclear Weapons in Europe (Monterey, Calif.: CNS, December 2009).

7 Ibid., p. 15.
The Gradually Diminishing Role for U.S. Nuclear Weapons in Europe

During the Cold War, the U.S. deployed tactical nuclear weapons in Europe for deterrence purposes against the conventional superiority of the Warsaw Pact nations. The thinking at the time was that the threat of a smaller provocation escalating into U.S.-Soviet mutually assured destruction would deter the Soviets from initiating a conflict in Europe—for example, by invading a NATO state. The first U.S. nuclear weapons in Europe arrived in 1953 through bilateral “Programs of Cooperation” between the United States and host nations within the framework of the Atlantic Alliance. Such programs were signed with Belgium, France, Germany, Greece, Italy, the Netherlands, Turkey and the United Kingdom.

After that, the number of U.S. tactical nuclear weapons in Europe rapidly increased from 2,500 in 1961 to 7,200 in 1966. After the debacle of the Multi-Lateral Force (MLF), NATO nuclear policy was formed by a series of “guidelines” at the end of the 1960s and the beginning of the 1970s. NATO’s Nuclear Planning Group (NPG) was established in 1966 to ensure that the security of NATO’s non–nuclear weapon states would still be guaranteed after the entry into force of the NPT. Subsequently, at the beginning of the 1970s, the number of U.S. tactical nuclear weapons based in Europe started to decrease, and dropped from some 6,000 in 1980 to about 4,600 in the mid-1980s.

Both the theory and practice of extended nuclear deterrence were criticized during the Cold War. Europe never felt very comfortable with the U.S. nuclear umbrella because of the

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8 The Warsaw Pact consisted of the USSR, Poland, the DDR, Hungary, Czechoslovakia, Hungary, Romania, Bulgaria, and Albania.
9 NATO consisted in 1953 of the following states: Belgium, Canada, Denmark, France, Greece, Iceland, Italy, Luxemburg, the Netherlands, Norway, Portugal, Turkey, the United Kingdom, and the United States.
10 The Multilateral Forces (MLF) would be a fleet of warships with nuclear weapons, manned and operated by NATO command instead of an assortment of independent forces. It was never realized.
deterrent's perceived lack of credibility. This led to emotional debates inside the Alliance, especially after the arrival of Russian intercontinental missiles at the end of the 1950s, which made the United States vulnerable to nuclear counterattack by the Soviet Union.\footnote{Previously, the Soviet Union could only use bombers, which could only fly one way.} Most Europeans did not believe that the United States would put Baltimore or Boston at risk to defend Berlin or Brussels. Robert Jervis had doubts: “The whole point of coupling is to show the Russians that they cannot be sure that the US will not respond in a way which could lead to mutual destruction. But, as the proponents of the countervailing strategy stress in their critique of assured destruction, it is hard to make such threats credible.”\footnote{Robert Jervis, \textit{The Illogic of American Nuclear Strategy} (Ithaca, N.Y.: Cornell University Press 1984), p. 95.} Henry Kissinger admitted in 1979 that the Europeans better did not ask the United States for strategic guarantees anymore: “We must face the fact that it is absurd to base the strategy of the West on the credibility of the threat of mutual suicide. Therefore, I would say—which I might not say in office—the European allies should not keep asking us to multiply strategic assurances that we cannot possibly mean or, if we do mean, we should not want to execute, because if we execute we risk the destruction of civilization.”\footnote{Quoted by Stanley Sloan, \textit{NATO’s Future: Toward a New Transatlantic Bargain} (Basingstoke: Macmillan 1986), p. 66.} Samuel Huntington, who had been an official in the National Security Council (NSC) in the Carter administration, testified in 1984 of the “virtual certainty…that no American president [would] authorize the use of nuclear weapons in response to a conventional attack on Europe.”\footnote{Samuel Huntington, “Correspondence: Conventional Retaliation into Eastern Europe,” \textit{International Security}, Vol. 9, No. 1 (Summer 1984), p. 212.} More significantly, there is a growing consensus among historians that Stalin and his successors never really had the intention to invade Western Europe. Some academics therefore claim that the U.S. nuclear weapons stationed in Europe were already "irrelevant" during the Cold War.\footnote{John Mueller, “The Essential Irrelevance of Nuclear Weapons,” \textit{International Security}, Vol. 13, No. 2 (Fall 1988), pp. 55–79; and John Vazquez, “The Deterrence Myth: Nuclear Weapons and the Prevention of Nuclear War,” in Charles Kegley, ed., \textit{The Long Postwar Peace} (London: HarperCollins, 1991).}
Advocates of tactical nuclear weapons in Europe believed that without the U.S. nuclear umbrella, Washington’s European allies would set about acquiring nuclear weapons themselves. In other words, these tactical nuclear weapons prevented nuclear proliferation. In hindsight, this claim seems doubtful. For instance, the U.S. nuclear umbrella did not prevent France from acquiring nuclear weapons.

With the end of the Cold War, the implosion of both the Soviet Union and the Warsaw Pact, and the removal of Soviet tactical nuclear weapons from the territory of Eastern European states and the newly independent states of the former Soviet Union, one could have expected the withdrawal of all U.S. nuclear weapons from Europe. Surprisingly, this reciprocal gesture did not happen. A Russian proposal to negotiate a bilateral treaty on tactical nuclear weapons in 1991 was unsuccessful. The 1991-1992 Presidential Nuclear Initiatives (PNI), which were "unilateral/reciprocal measures" that allowed fast and dramatic reductions without a formal arms control agreement and therefore without verification, removed only half of the U.S. tactical nuclear weapons. President George H. W. Bush promised to reduce the number of nuclear (gravity) bombs in Europe from 1,500 to 700.

NATO’s nuclear force structure and operational policy also changed substantially, as the 1999 NATO Strategic Concept describes: "Since 1991…the Allies have taken a series of steps which reflect the post–Cold War security environment. These include a dramatic reduction of the types and numbers of NATO’s sub-strategic forces including the elimination of all nuclear artillery and ground-launched short-range nuclear missiles; a significant relaxation of the

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18 These reciprocal measures are to a certain extent also unilateral as one of the sides has to start taking actions to which the other side responds, and so on. For the texts, see SIPRI Yearbook 1992 (Stockholm: SIPRI, 1993), pp. 65–73, 85–92.
readiness criteria for nuclear-role forces; and the termination of standing peacetime nuclear contingency plans. NATO’s nuclear forces no longer target any country.” 19 The nuclear infrastructure at the Supreme Headquarters Allied Powers Europe (SHAPE), particularly the Special Weapons Branch, had also been radically downgraded after the Cold War. 20 Declaratory policy, in contrast, remained ambiguous. NATO’s Strategic Concept in 1991 deleted the words “weapons of last resort,” which had been included for the first time in NATO documents the year before. President Mikhail Gorbachev, and later President Boris Yeltsin, responded by eliminating 50 percent of their tactical warheads for aircraft, 33 percent of nuclear warheads for surface ships and submarines (except for SLBMs), and all warheads for tactical land-based missiles, artillery shells and mines.

There was an even bigger chance to change the prevailing policy with the Clinton Nuclear Posture Review in 1993–1994. Since 1991, it had become clear that Russia had neither the capabilities nor the intentions to invade Western Europe. Also, Russia’s economy was experiencing a severe downturn, which rendered its significant loss in power on the international scene obvious. The option of withdrawing all U.S. nuclear weapons from Europe was seriously considered by senior Clinton appointees, but the Review failed in this respect due to bureaucratic opposition, conservative thinking, and a lack of political leadership, including by President Bill Clinton. 21 The result was that the United States diminished the number of its nuclear weapons in Europe further, from 700 to 500 by the early 2000s. 22 The remaining nuclear weapons were also consolidated in fewer bases in Turkey in 1995, and in

19 NATO Strategic Concept, 1999, par. 64.
Germany one year later. Another chance for a radical reduction in the number of deployed
tactical nuclear weapons was offered at the Helsinki summit in March 1997, where Clinton
and Yeltsin talked about the possibility of including sub-strategic nuclear weapons in the next
round of START negotiations. However, because START II never entered into force due to
the controversy about missile defense, START III ended up never being negotiated.

In 1999, an expanded NATO\textsuperscript{23} had a second opportunity to rectify the \textit{status quo}, as
recommended at the time by Ivo Daalder, who is U.S. Ambassador at NATO from 2009.\textsuperscript{24} Despite German and Canadian proposals for a no-first-use policy, however, NATO’s policy
remained the same. The NATO Strategic Concept of 1999 stipulated:

> Nuclear weapons make a unique contribution in rendering the risks of aggression
> against the Alliance incalculable and unacceptable. Thus, they remain essential to
> preserve peace\textsuperscript{25}….The fundamental purpose of the nuclear forces of the Allies is
> political: to preserve peace and prevent coercion and any kind of war. They will
> continue to fulfill an essential role by ensuring uncertainty in the mind of any
> aggressor about the nature of the Allies’ response to military aggression.”\textsuperscript{26} The
> Strategic Concept also explicitly mentioned the nuclear weapons in Europe as an
> indispensable transatlantic link: “A credible Alliance nuclear posture and the
> demonstration of Alliance solidarity and common commitment to war prevention
> continue to require widespread participation by European Allies involved in collective
> defense planning in nuclear roles, in peacetime basing of nuclear forces on their
> territory and in command, control and consultation arrangements. Nuclear forces

\textsuperscript{23} In 1999, the Czech Republic, Poland, and Hungary joined NATO. Earlier, NATO had been expanded to
Turkey and Greece (1952), Western Germany (1955), and Spain (1982).
\textsuperscript{24} Ivo Daalder, “NATO and Nuclear Weapons: Toward a Re-examination,” in: Susan Eisenhower, \textit{NATO At Fifty}
\textsuperscript{25} \textit{NATO Strategic Concept}, 1999, par. 46.
\textsuperscript{26} Ibid., par. 62.
based in Europe and committed to NATO provide an essential political and military link between the European and American members of the Alliance. The Alliance will therefore maintain adequate nuclear forces in Europe.”

Thus, despite the biggest overhaul in the international political system in half a century, and despite the administration of a Democratic U.S. president for eight years, U.S. nuclear weapons remained in Europe.

During the last decade, the United States further reduced the number of nuclear weapons stationed in Europe from 500 to about 200 as of 2011. This included the withdrawal of all tactical nuclear weapons from Greece in 2001. The same happened with 130 nuclear bombs at Ramstein, one of the German air bases, in the period 2005–2007, and the 110 bombs in the United Kingdom at Lakenheath in the same period, both as a result of U.S. National Security Presidential Directive 35 (NSPD-35) of May 2004. These reductions had been predicted by the Supreme Allied Commander Europe (SACEUR) General James Jones, when he visited the Belgian Senate in March 2004. It is believed that in 2008, the United States withdrew its weapons from the Ghedi Torre Air Base in Italy, or at least consolidated them at the Aviano base. The remaining U.S. nuclear weapons in Europe have been modernized between 1998 and 2003.

Since U.S. President George W. Bush left office, there have been at least three missed opportunities for the complete withdrawal of the tactical U.S. nuclear weapons from Europe.

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27 Ibid., par. 63.
28 Some claim that the reason was the arrival of a new fighter plane without a nuclear-capable capacity. See, for example, Eben Harrell, “Are U.S. Nukes in Europe Secure?” Time, June 19, 2008.
President Obama regards nuclear disarmament as one of his foreign policy priorities, and he succeeded in changing U.S. nuclear weapons policy. It is striking, therefore, that the tactical nuclear weapons in Europe have so far not been subjected to further reduction or elimination. It seemed logical, for an administration that wanted to participate in a successful NPT Review Conference in May 2010, that it would remove these weapons, as they were regarded by many analysts as low-hanging fruit. Instead, the Obama Nuclear Posture Review, released in the spring of 2010, made no decision on tactical nuclear weapons. The reasons are, first, that Obama wanted to discuss the issue multilaterally with the allies in the framework of the NATO Strategic Concept Review. Second, the Obama administration did not want to endanger the ratification of the new START treaty in the U.S. Senate. While this reasoning may be understandable, the end result remained the same, that is, a growing discontentment in some of the host (and other) nations over the continued presence of these weapons on their territories.

An indication of the host nations’ discontentment is the letter sent by Germany, Belgium, the Netherlands, Luxembourg, and Norway to the NATO Secretary-General in February 2010, asking him to put the issue on the agenda of the informal NATO meeting of the Ministers of Foreign Affairs in Tallinn in April 2010. But at a press conference in Tallinn on April 22, 2010, NATO Secretary-General Anders Rasmussen suggested that U.S. tactical nuclear weapons should remain in Europe: “My personal opinion is that the stationing of U.S. nuclear weapons in Europe is part of deterrence to be taken seriously.” Several NATO member states allegedly made it clear to Rasmussen that they disagreed.32 At the Tallinn meeting, the member states basically agreed to disagree, except for five principles formulated by U.S. Secretary of State Hillary Clinton. While rather conservative, these principles left openings

for possible changes in the future; the principles did not say that the remaining tactical nuclear weapons had to stay.33

A second missed opportunity was the May 2010 NPT Review Conference. While Germany explicitly mentioned tactical nuclear weapons, it did not want to break ranks with its NATO allies by unilaterally suggesting removal of these weapons. The agreed document at the end of the Conference made no mention of tactical nuclear weapons, mostly because of resistance from Russia and the United States. Instead, the final document referred to “all types of nuclear weapons,” rather than explicitly listing categories such as tactical weapons. In this respect, one could argue that this constituted a step backward, since the last successful Review Conference document, published in 2000, did explicitly refer to the “tactical nuclear weapons.”

When raising the issue of the removal of tactical nuclear weapons during 2009–2010, government officials usually referred to the NATO Strategic Concept Review. But the latter has been the third, and most crucial, missed opportunity to withdraw the last remaining U.S. tactical nuclear weapons from Europe. Nuclear weapons were one of the most contentiously debated topics in the review of the Strategic Concept of NATO.34 The NATO Expert Group report in preparation of the November 2010 Review of NATO’s Strategic Concept did not express a potential shift in nuclear weapons policy, because it was too divisive. Similarly, the

33 Clinton’s five principles are: (1) as long as nuclear weapons exist, NATO will remain a nuclear alliance; (2) the principle of sharing nuclear risks and responsibilities; (3) to continue to reduce the role and numbers of nuclear weapons; (4) Allies must broaden deterrence with e.g. missile defense; and (5) in future reductions, the aim should be to seek Russian agreement to relocate these weapons away from NATO territory and to include tactical nuclear weapons in the next round of arms control discussions between the United States and Russia.
paragraph about nuclear weapons policy in the final communiqué of the NATO Defense Ministers in June 2010 was deleted because of disagreements.

Despite many calls to withdraw the few remaining U.S. tactical nuclear weapons from Europe, the NATO Strategic Concept itself, approved at the Lisbon Summit in November 2010, basically continued the existing policy. The text was a compromise between the advocates of change, such as Germany, and the opponents of change, such as France and the Eastern European member states. For the first time, the Concept said that the member states are resolved to seek a safer world for all and to create the conditions for “a world without nuclear weapons in accordance with the goals of the Nuclear Non-Proliferation Treaty,” but with the caveat added by France that this should be done "in a way that promotes international stability, and is based on the principle of undiminished security for all".  

Further, it was stated that "as long as nuclear weapons exist, NATO will remain a nuclear alliance“. NATO is not going to give up its nuclear weapons unilaterally. The existing policy was further confirmed: “Deterrence, based on an appropriate mix of nuclear and conventional capabilities, remains a core element of our overall strategy,” but at the same time, "the circumstances in which any use of nuclear weapons might have to be contemplated are extremely remote….The supreme guarantee of the security of the Allies is provided by the strategic nuclear forces of the alliance, particularly those of the United States.” The idea of extended nuclear deterrence therefore has not been abandoned.

While the tactical nuclear weapons were mentioned in former Strategic Concepts, however, they are not explicitly mentioned in the 2010 Concept. On the other hand, it states that “we will ensure the broadest possible participation of Allies in collective defence planning on

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35 NATO Strategic Concept, November 2010, par. 26.
36 Ibid., par. 17.
37 Ibid., par. 18.
nuclear roles, in peacetime basing of nuclear forces, and in command, control and consultation agreements." In theory, the latter can still continue, even if the tactical nuclear weapons are withdrawn. Further, the document declared that "we will seek to create the conditions for further reductions in the future." But the latter is in some way linked to Russia: "In any future reductions, our aim should be to seek Russian agreement to increase transparency on its nuclear weapons in Europe and relocate these weapons away from the territory of NATO members. Any further steps must take into account the disparity with the greater Russian stockpiles of short-range nuclear weapons." 

The Lisbon Summit declaration also explicitly calls for a review of "NATO's overall posture in deterring and defending against the full range of threats to the Alliance.” This strategic review would include nuclear weapons, missile defense, and conventional weapons. Although no timeframe or deadline is mentioned, observers believe that an Action Plan can be expected in 2011.

The current number of U.S. gravity bombs based in Europe is estimated at around 160–200. These are B61-3 and B61-4 bombs with a destruction power ranging from 0.3 to 170 kilotons, for delivery by U.S. or NATO aircraft, which are deployed in five NATO countries. Table 1 summarizes the breakdown by country of these nuclear weapons and indicates the air bases where they are presumably stored. Although the data reported in Table 1 are fairly good estimates by non-governmental experts, a confirmation and more accurate information regarding the precise numbers of U.S. nuclear weapons in Europe are kept confidential by the

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38 Ibid., par. 19.
39 Ibid., par. 26.
42 Compare with the 14 KT Hiroshima-bomb.
authorities in NATO, the United States, and the respective host countries. That the general public in Europe is not allowed to know officially whether weapons of mass destruction are stationed on their soil is problematic from a democratic point of view. This may undermine NATO’s legitimacy in these countries in the long term. Of the remaining five European countries currently possessing U.S. tactical nuclear weapons, only three (Belgium, Germany, and the Netherlands) are in charge of nuclear strike missions for their national air forces, through so-called “dual-key arrangements.” This means that in times of peace, the weapons remain under U.S. custody in the host nations, but in times of war, the weapons can be transferred to the host nations, which are then in charge of using them. The other two states, Italy and Turkey, are both on NATO’s Southern flank, and together possess two out of three U.S. nuclear weapons based in Europe. These two states are involved in the nuclear burden-sharing of NATO by hosting U.S. airplanes and the nuclear warheads assigned to them. The strike mission of the Turkish air force may have been expired.43

Table 1. Estimated number of U.S. tactical nuclear weapons deployed in Europe, 2010.

<table>
<thead>
<tr>
<th>Country</th>
<th>Air base</th>
<th>Number of tactical nuclear weapons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>Kleine Brogel</td>
<td>20</td>
</tr>
<tr>
<td>Germany</td>
<td>Büchel</td>
<td>20</td>
</tr>
<tr>
<td>Italy</td>
<td>Aviano</td>
<td>50</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Volkel</td>
<td>20</td>
</tr>
<tr>
<td>Turkey</td>
<td>Incirlik</td>
<td>50-90</td>
</tr>
</tbody>
</table>

Arguments in Favor of Withdrawal of U.S. Tactical Nuclear Weapons from Europe

We find that advocates of withdrawal of U.S. tactical nuclear weapons from Europe employ one or more out of four different reasons: 1) the withdrawal fits perfectly into the current nuclear disarmament logic; 2) there is insufficient convincing military justification for keeping these weapons in Europe; 3) their presence cannot be legitimized on the grounds of their use as anti-terrorism tools, but rather they themselves involve major security risks in this respect; 4) it is costly to maintain them.

Disarmament Logic

Nuclear weapons are by definition weapons of mass destruction, and their use contradicts modern international humanitarian law. The effectiveness, and therefore credibility, of nuclear deterrence has always been questioned because of its disproportionate nature. Most would agree that the nuclear taboo, i.e., the norm implying that it is immoral and illegitimate to use such destructive military devices that do not discriminate between military and civilian fatalities, has continued to grow in the decades since these weapons were first invented. Each
day these weapons are not used, it becomes harder to imagine their future use.\textsuperscript{44} It would therefore appear logical that NATO should support the denuclearization of the Alliance, including and perhaps starting with the withdrawal of U.S. nuclear weapons from Europe. In their seminal plea, Henry Kissinger, George Shultz, William Perry and Sam Nunn explicitly included the suggestion to eliminate \textquoteleft\textquoteleft short-range nuclear weapons designed to be forward-deployed\textquoteright\textquoteright as a concrete step towards a nuclear-weapons-free-world.\textsuperscript{45} In addition, the famous article 6 of the NPT requires that the nuclear weapon states disarm all their nuclear weapons in term, regardless of the specific type of weapons.

If nuclear disarmament stalls, the fight against nuclear proliferation will become even harder. Former IAEA Director-General Mohamed ElBaradei attacked NATO’s nuclear weapons policy in 2009:

\begin{quote}
Imagine this: a country or group of countries serves notice that they plan to withdraw from the Nuclear Nonproliferation Treaty (NPT) in order to acquire nuclear weapons, citing a dangerous deterioration in the international security situation. ‘Don’t worry,’ they tell a shocked world. ‘The fundamental purpose of our nuclear forces is political: to preserve peace and prevent coercion and any kind of war. Nuclear weapons provide the supreme guarantee of our security. They will play an essential role by ensuring uncertainty in the mind of any aggressor about the nature of our response to military aggression…The international uproar that would follow such a move is predictable. Yet the
\end{quote}

\textsuperscript{44} Nina Tannenwald, \textit{The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons since 1945} (Cambridge: Cambridge University Press, 2007).

\textsuperscript{45} Shultz, Perry, Kissinger, and Nunn, \textquoteleft\textquoteleft A World Free of Nuclear Weapons.’
rationale I have just cited to justify nuclear weapons is taken from NATO’s current Strategic Concept.”

What ElBaradei and other specialists and decision-makers increasingly recognize is that, as long as nuclear weapons states and nuclear alliances cling to nuclear weapons, it will be fundamentally impossible to stop the spread of nuclear weapons to more countries. Only in a world without nuclear weapons does the fight against further proliferation have a real chance to be successful.

The withdrawal of these weapons would therefore constitute a symbolically meaningful act *vis-à-vis* non–nuclear weapons states. These states argue that the practice of hosting foreign nuclear weapons conflicts with the spirit, if perhaps not the precise letter, of the NPT. More significantly, the deployment can be interpreted as contrary to articles I and II of the NPT. Article I forbids nuclear weapons states to transfer, directly or indirectly, nuclear weapons to other states. Article II stipulates that non-nuclear weapons states may not receive nuclear weapons from other countries. Also, the final document of the 2000 NPT Review Conference—especially the often-quoted "thirteen steps"—called for making tactical nuclear weapons “an integral part of the nuclear arms reduction and disarmament process”.

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47 Symbolically, because the nuclear weapon states (and alliances) should not expect immediate nonproliferation returns as a result of their disarmament actions. The argument is that nuclear elimination will make a fundamental difference with respect to proliferation, not disarmament steps in the direction of Global Zero.
48 Article I of the NPT states: “Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly, and not in any way to assist, encourage, or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.”
49 Article II of the NPT states: “Each non-nuclear weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.”
Another important reason to consider removal of tactical U.S. nuclear weapons from Europe is that the United States is the only nuclear weapons state that deploys short-range nuclear weapons in other nations, a point that non–nuclear weapons states continue to point out. Apart from the fact that this practice demonstrates to non–nuclear weapons states the presumed security value of these weapons and therefore fails to signal the desirability not to develop these weapons themselves, continued deployment could lead to imitation, and correspondingly to an increase in nuclear dangers. For instance, it is possible that the continued U.S. deployment might inspire nuclear weapons states such as Russia, China, India, or Pakistan to deploy some of their nuclear weapons in partner countries. After Iran acquires nuclear weapons, it is not unthinkable that Pakistani nuclear weapons could, for example, be deployed in Saudi Arabia. It has been claimed that in response to the missile defense policy of President George W. Bush, Russia played with the idea of stationing nuclear bombers in Cuba.50 If the U.S. tactical nuclear weapons are withdrawn from Europe, it will become harder for other nuclear weapon states to rationalize stationing nuclear weapons abroad.

In addition, the withdrawal of U.S. nuclear weapons from Europe may be a necessary condition to convince Russia to take action on their much larger number of tactical nuclear weapons. As a minimum reply to such a unilateral decision from the U.S. side, Russia could reciprocate by moving their tactical nuclear weapons deeper into Russia.51 Sergey Kislyak, Russian ambassador to the United States, admitted that the withdrawal of U.S. nuclear weapons from Europe would be a serious factor in changing Russia’s position on consolidating, reducing, or eliminating its tactical nuclear weapons.52

51 This was recommended by a U.S. Strategic Command conference in July 2009.
Lack of Military Justification

Advocates of keeping tactical U.S. nuclear weapons in Europe stress that as long as nuclear weapons exist, their deterrent role is still useful. However, if nuclear deterrence can be questioned, this applies even more to extended nuclear deterrence, that is, forward deployment of nuclear weapons. Alternatives to extended deterrence and nuclear weapons are possible: in the U.S.-Europe case, deterrence with modern conventional weapons and with U.S. troops stationed in Europe seems a more credible form of NATO’s solidarity clause than the nuclear umbrella.

If one had to choose between strategic and tactical nuclear weapons, the military would probably opt for the former as the best pick in terms of credibility. Strategic nuclear weapons are generally considered more accurate, and therefore more reliable. As a result, NATO’s extended nuclear deterrent is basically left unaltered if the U.S. tactical nuclear weapons are removed from Europe. The strategic nuclear weapons located in the United States, in combination with those of the United Kingdom and France, continue to fulfill NATO’s deterrent role. As former State Department and Pentagon official Wayne Merry pointed out, “If Japan and South Korea, in a much more challenging security environment, accept so-called ‘over the horizon’ American nuclear guarantees as sufficient for their security, why cannot Europeans?”


With the “enemy” gone after the end of the Cold War, U.S. tactical nuclear weapons in Europe have essentially become obsolete. It has become clear that Russia has neither the intention nor the capabilities to attack Europe. While Eastern European states may still at times feel slightly insecure because of past historical incidents, today they should feel reassured through many other means.\(^{56}\) The optimal strategy today seems clearly to improve overall relations between NATO and Russia, as NATO Secretary-General Rasmussen has confirmed. Militarily speaking, dual-capable aircraft are unable to reach Russia or the Middle East, except if refueled. The U.S. Vice-Chairman of the Joint Chiefs of Staff, General James Cartwright, has admitted that NATO nuclear weapons do not serve a military function not already addressed by other U.S. military assets.\(^{57}\) Also, against the many other potential threats that NATO may face—terrorism, cyber attacks, or ethnic wars—nuclear weapons do not serve a military purpose in such contingencies.

With a quasi-consensus that these weapons are militarily obsolete, how can they be political useful? U.S. EU Command (EUCOM) “no longer recognizes the political imperative of U.S. nuclear weapons within the Alliance.”\(^{58}\) In 2009, German Foreign Minister Walter Steinmeier was less diplomatic, stating that these weapons “are absolutely senseless today.”\(^{59}\) His successor, Guido Westerwelle, argued during the Munich Security Conference in early 2010 that “the last remaining nuclear weapons in Germany are a relic of the Cold War.”\(^{60}\) Even hawks like Karl-Heinz Kamp admit that “the critics of the U.S. nuclear presence in Europe

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\(^{60}\) Knops, U.S. Non-Strategic Nuclear Weapons in Europe.
have a point when they state that the current strategic rationale for nuclear bombs on European soil is at best doubtful.  

**Security Risks**

According to a Blue Ribbon Review set up by the U.S. Air Force in 2008, most U.S. nuclear weapon storage sites in Europe do not meet U.S. Defense Department security standards. The review, extensively covered in the European media, disclosed that nuclear weapons in Europe are regarded by the U.S. Air Force as becoming progressively less important, which leads to diminishing attention by personnel as well as to waning expertise. This is particularly worrisome in view of the existing terrorist threat. As the U.S. ‘gang of four’ claimed in their second *Wall Street Journal* article: “These smaller and more portable nuclear weapons are, given their characteristics, inviting acquisition targets for terrorist groups.” In Belgium in 2001, for example, Kleine Brogel Air Base was on the target list of Nizar Trabelsi, a Muslim extremist with ties to Al Qaeda. This makes a recent incident even more worrying: at the end of January 2010, peace activists climbed over the fence in Kleine Brogel, walked around inside the base for more than an hour without meeting a soldier, reached the bunkers, video-taped everything, went to the entrance of the base, succeeded in smuggling out

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the videotape, and posted it on the Internet. 66 If unarmed peace activists are able to accomplish this, others with more malign intentions can undoubtedly do so as well.

**Maintenance Costs**

The costs of keeping tactical nuclear weapons in Europe are split between the United States and the respective host nations. The United States finances the production, transport, and safe storage of the weapons on the base, and furnishes personnel for maintenance, custody, and safety. The host nations provide land for storage sites and infrastructure for U.S. personnel, and pay for owning and operating the dual-capable aircraft, as well as for the external perimeter security of the base. Because of enhanced security risks after 9/11, the corresponding costs went up considerably, to a level estimated at $120–180 million U.S. The total cost for the United States alone is approximately $200 million U.S. per year per air base. 67 One U.S. military official stated: “We pay a king’s ransom for these things and…they have no military value.” 68 The U.S. Air Force prefers to spend money on more valuable weapons. In February 2004, the Defense Science Board of the U.S. Department of Defense recommended that the Secretary of Defense "consider eliminating the nuclear role for Tomahawk cruise missiles and for forward-based, tactical, dual-capable aircraft" because "there is no obvious need for these systems, and eliminating the nuclear role would free resources that could be used to fund strategic strike programs of higher priority." 69

If B-61 gravity bombs remain in Europe, they will most likely need to be upgraded. The U.S. House and Senate, however, disagreed about spending money on these upgrades in 2008, partly because the members felt that there was no clearly articulated strategy for these weapons. A House-Senate compromise in 2009 provided only $33 million U.S. for a study on modernizing the non-nuclear components of these weapons. It also called for further studies by the National Academy of Sciences and JASON70. Failure to upgrade the B-61 bombs may force the United States to remove these weapons from its arsenal after 2017.71 The budgetary aspects are even more important for the European host nations, especially after the economic and financial crisis that began in 2008. Many of the host nations, such as Germany and the Netherlands, also have to make decisions about a new fighter plane in the foreseeable future. This is a major driver behind the demand for withdrawal in Germany, as it opts for the non-dual-capable Eurofighter as the successor of the nuclear-capable Tornado. While the Netherlands may instead choose the more expensive and dual-capable U.S. Joint Strike Fighter (JSF), it will need to decide whether or not to equip the JSF with dual-nuclear capability (which involves an additional price tag).

Arguments against Withdrawal of U.S. Tactical Nuclear Weapons from Europe

Opponents of withdrawal of U.S. tactical nuclear weapons from Europe argue essentially along two lines of thought: 1) the solidarity around which NATO is built consists fundamentally of burden-sharing obligations; (2) extended deterrence functions as a brake against further nuclear proliferation.

NATO Solidarity and Burden-sharing

70 JASON is an independent group of scientists which advises the U.S. government on matters of science and technology.
Many members of the foreign policy establishment assume that tactical nuclear weapons should stay in Europe because they constitute a quintessential link between the United States and Europe. Miller, Robertson and Schake argue: “the nuclear arsenal in Europe serves to put the U.S. homeland at risk to nuclear attack if NATO is forced to resort to using Europe-based nuclear bombs to defend its borders.” Omer Ersun, the Turkish Ambassador to Canada, for instance, declared that “NATO without the U.S. nuclear weapons deployed in Turkey would mean nothing to the Turks.” As a reaction to the withdrawal initiative of German Foreign Minister Guido Westerwelle, a NATO diplomat warned: “The weapons are the foundation of that solidarity. Take them away and what have we left?”

There are several reasons why this logic may no longer apply. First, nuclear coupling may indeed have been a suitable means to link Europe to the United States during the Cold War. Given the changed circumstances of today, however, it is hard to believe that the post–Cold War U.S.-European relationship depends more on the presence of U.S. nuclear weapons on European territory than it does on a host of other ties, including economic, financial, historical, and social connections. In any case, these nuclear weapons did not prevent a transatlantic crisis within NATO during 2002 and 2003 over the pending war in Iraq. On the other hand, considerable solidarity has arguably been shown among NATO allies by unconditionally sending joint combat troops to missions abroad, such as to the Balkans and Afghanistan. Forward-deployed tactical nuclear weapons, however, played no role in these cases of demonstrable solidarity. One could turn this argument around: if the strength of NATO depends on the presence of a declining number of U.S. nuclear weapons in Europe, this says a lot about the vitality of NATO. Second, other kinds of burden-sharing are

72 Franklin Miller, George Robertson, and Kori Schake, “Germany Opens Pandora Box,” Briefing Note (London: Centre for European Reform, February 2010), p. 2.
imaginable. Even during the Cold War, not all NATO member states agreed to install tactical nuclear weapons on their territory, including Spain and Norway. The number of NATO states receiving U.S. nuclear weapons has always been a minority, and as of 2011 there are only five out of twenty-five non-nuclear member states that are hosting such weapons. This is not a totally balanced example of burden-sharing. Third, with limited defense budgets, NATO will increasingly need to exploit opportunities of specialization in the future. Using that logic, it may appear more rational that the United States, the United Kingdom, and France specialize in the remaining nuclear weapons tasks of NATO, and that the current five nuclear weapons host nations spend their limited financial means on non-nuclear specialized tasks.

Extended Deterrence as a Brake against Further Nuclear Proliferation

Some claim that because of U.S. nuclear weapons stationed in Europe, some of the host nations have agreed not to develop their own nuclear weapons.75 The most cited examples are Turkey and, to a lesser extent, Germany. This argument, however, is not flawless. Within NATO there are no cases that prove that extended deterrence has prevented nuclear proliferation. Germany is legally bound not to develop nuclear weapons because of its constitution, and German public opinion has always been very anti-nuclear. According to Harald Müller, observers regularly underestimate how deeply rooted Germany’s non-nuclear status is in its political culture: "Any German government that sought to effect a change in the country’s nuclear status would risk public protest ranging all the way up to civil-war-style conditions compared to which the events surrounding the shifting of Castor [civilian nuclear spent fuel] containers would probably appear trivial.”76

It is also doubtful whether Turkey would have developed its own nuclear weapons if the United States had not stationed them in the country. For instance, the current Turkish government, headed by Recip Tayyip Erdogan, maintains better relations with Iran than with Israel. This is demonstrated by Turkey’s willingness to deposit Iranian uranium as part of a proposed Brazilian-Turkish-Iranian nuclear deal, as well as the irritations created between Israel and Turkey as a result of the Gaza Flotilla incident, both during the first half of 2010. There is increasing pressure today to create a Nuclear Weapon Free Zone in the Middle East, as formally stated during the NPT Review Conference in May 2010. This pushes Turkey to re-think its current policy vis-à-vis U.S. nuclear weapons based on its territory. Furthermore, if Turkey believes that possessing nuclear weapons is of vital interest for the nation, it is doubtful whether the presence of the remaining—and dwindling—number of U.S. nuclear weapons really makes any difference in its calculation.

**Political Feasibility of Withdrawal**

On the basis of the evidence described above, we conclude that the arguments in favor of withdrawing U.S. tactical nuclear weapons from Europe are convincing, while the arguments in favor of keeping them are relatively weak. Hence, we recommend complete withdrawal over the next couple of years. In fact, we find that it is long overdue. Moreover, the remaining presence of U.S. nuclear weapons in Europe provides the wrong signal in today’s changed world order, and should be considered an anachronism. We believe that the question is not if, but when and how these weapons can best be removed.
If, as argued here, the withdrawal is desirable, is it also politically feasible? The United States is in principle not against withdrawal. U.S. officials apparently have even told their European counterparts so.77 According to Hans Kristensen of the Federation of American Scientists (FAS), "the US would move these weapons tomorrow if this were just its own decision."78 The United States, however, prefers that the European host nations take the initiative.79 If the European host nations requested withdrawal, the United States would not resist. On the contrary, even the U.S. military, which is responsible for managing these weapons in Europe, would like to see them removed. U.S. EUCOM concluded that “there is no military downside to the unilateral withdrawal of nuclear weapons from Europe”.80

Also in Europe, within both the general public and the elite, there is a clear demand for withdrawal of the U.S. tactical nuclear weapons. In Belgium, for instance, polls show that three-quarters of the population is in favor of withdrawal.81 On a regular basis, the peace movement organizes protests at the Kleine Brogel Air Base. Members of the Belgian Parliament (including from ruling parties) participate by climbing over the fence—even an acting Flemish Minister once climbed over the fence. The Mayors for Peace movement is popular in Belgium. As of 2011, 355 Mayors (out of 589) had signed up, including Theo Kelchtermans, Mayor of Peer, which hosts the Kleine Brogel Air Base. On July 13, 2005, the Belgian Parliament adopted a resolution asking for the gradual withdrawal of the U.S. nuclear weapons. The Flemish Parliament adopted a similar resolution on February 24, 2010.

77 Pomper, Potter, and Sokov, Reducing and Regulating Tactical (Nonstrategic) Nuclear Weapons in Europe, p. 27.
81 See, for example, a poll by Flemish Peace Institute in 2007.
Articles in favor of the global elimination of nuclear weapons, and backing the withdrawal of tactical nuclear weapons from Europe, have now been written by dozens of high-level statesmen, similar to the bipartisan op-ed by Kissinger, Shultz, Perry, and Nunn. These articles have been co-authored in many different countries, including Germany, the Netherlands, Belgium and Italy.

Therefore, it seems incorrect for the United States to use European preferences to legitimize the status quo, as James Schlesinger, for instance, does: “Nuclear weapons in Europe provide a continuous deterrent element; as long as our allies value their political contribution, the United States is obligated to provide and maintain the nuclear weapon capability.”

Around the same time, U.S. Secretary of Defense Robert Gates claimed: "my impression is that all of our allies in Europe are very comfortable with the [U.S. extended deterrence] arrangements that we have today.”

Though most do not highly value the political contribution of U.S. nuclear weapons, and would like to see their withdrawal, top-level decision-makers in Europe have been rather quiet on this subject, at least until recently. In the years directly after the fall of the Berlin Wall, it might have appeared ungrateful for European countries to renounce the U.S. nuclear weapons immediately. But twenty years later, it is hard to defend such politeness. Former

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Dutch Prime Minister Ruud Lubbers suggested that "it is time to end the current practices…in which the governments of those European NATO Allies consider it impolite and a lack of gratitude for the past to table this with the USA; in which the US consider it vice versa not done (polite, appropriate) to table it with the European Allies." The intra-allied controversy about the war in Iraq in 2003 did not help in this context. European decision-makers have been careful and have tried not to unnecessarily challenge the relations with the United States on defense issues since then.

With the German initiative of Foreign Minister Guido Westerwelle in October 2009, it seems that this circle of thinking has been broken. Westerwelle succeeded in including the following paragraph in the German government coalition declaration of October 24, 2009: “in the context of the talks on a new Strategic Concept for NATO we will advocate within NATO and towards our U.S. allies a withdrawal of remaining nuclear weapons from Germany.” This is the first time that a government of one of the host nations has so clearly spoken out in favor of withdrawal. It is thus now up to political decision-makers in Belgium, the Netherlands, Italy, and Turkey to take responsibility and join the push for change within NATO. A turn in that direction was the initiative by Belgium, Germany, Norway, Luxembourg, and the Netherlands to jointly ask to put the issue of tactical nuclear weapons on the agenda of the informal NATO Ministerial meeting in Tallinn on April 22–23, 2010.

**Political Practicalities of Withdrawal**

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While the case in favor of withdrawal is abundantly clear, and the European public supports this change, politics sometimes follows another logic. Former British General Hugh Beach explains that the continuing presence of the weapons is due more to “institutional paralysis than to logic: the desire to demonstrate America’s continued commitment to European security and some vague concept of risk and burden sharing among NATO allies.”91 Hans Kristensen agrees: "The bombs are there because of bureaucratic resistance to change and NATO’s inability to address the issue of the future of nuclear weapons in NATO".92 It is not unusual for large organizations, like NATO, to have difficulty with adapting to changed circumstances. Bureaucratic processes tend to maintain the status quo. As U.S. Major Brian Polser argues: "NATO’s conception of the transatlantic link and the essential political and military role of [tactical nuclear weapons] in maintaining a condition of coupling between the United States and Europe have become institutionalized to the point of bureaucratic opposition."93 At a certain point, though, the status quo may endanger national interests, both in Europe and the United States.

The opponents of withdrawal consist mostly of public officials in the respective ministries of defense, who regularly meet in the NATO High Level Group. Unsurprisingly, this circle of public servants favors the retention of U.S. nuclear weapons in Europe. Likewise, there is a similar (but less status quo–minded) circle in the various ministries of foreign affairs, who get together on an intermittent basis either in their respective capitals or at NATO headquarters in Brussels. Most of these representatives have lived through the Cold War, and firmly believe in nuclear deterrence. For example, two NATO officials who oppose withdrawal are Michael

Rühle and Guy Roberts. As Roberts testifies: “Unfortunately, the weapons we’ve invented cannot be uninvented. We must live with them…. Living with destructive technologies is our lot, the modest punishment we must bear for progress. The bomb is with us to stay. It is, after all, the ultimate guardian of our safety.” Some of these officials may have personal and professional interests at stake. Simon Lunn, who interviewed many officials on this subject matter, concluded that there are tensions “between the nuclear practitioners who deal with these issues on a daily basis and the policy world who have to deal with the political consequences of their recommendations.”

Opponents of withdrawal will try to be compensated for withdrawal in one way or another when the time comes. The devil is therefore in the details. The following political practicalities thus remain to be resolved: 1) should the withdrawal be unilateral or as a result of negotiations with the Russians? 2) should the withdrawal be publicly announced or done in secrecy? 3) should opponents of withdrawal be compensated, and if so, how? 4) should withdrawal of the remaining nuclear weapons be done at once or be spread out over time? and 5) should such withdrawal be decided by consensus within NATO?

**Withdraw through Negotiations with Russia, or Unilaterally?**

Tactical nuclear weapons are the only nuclear weapons for which there is no formal arms control agreement. This is why the Obama administration wants to include tactical nuclear weapons in the next round of arms control negotiations, after the New START has entered

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into force. The question now is whether the last remaining U.S. nuclear weapons in Europe should be withdrawn before the start of these talks. From a Western point of view, it may seem logical to wait to withdrawing the tactical weapons and to include them in the discussions with Russia, as suggested by the New Strategic Concept, and earlier, even more strongly by the Group of Experts that prepared NATO’s New Strategic Concept.\(^97\) Domestic politics in the United States is another important factor: the Republicans want a clear linkage between the withdrawal of the U.S. and Russian tactical nuclear weapons.\(^98\)

The asymmetrical numbers, however, are a major difficulty. Russia has many more tactical nuclear weapons and will not agree to exchange them for the much lower numbers on the NATO side. In contrast to Gorbachev and Yeltsin, Dmitry Medvedev regards the era of making deeper cuts than the United States as over. Russia may link the tactical nuclear weapons to the strategic nuclear weapons in reserve, a revision of the Conventional Forces in Europe Treaty, missile defense, or some combination of these. Russia may also want to bring the British and French nuclear weapons into the discussions. Furthermore, there will be more counting issues with the weapons, because such a treaty would not only have to deal with the delivery vehicles but also with the weapons themselves. This means elaborating other verification procedures, including control of storage sites, for the first time. In short, negotiations for a treaty on tactical nuclear weapons will not be easy.

Yet another asymmetry exists: the United States has nuclear weapons deployed on the territory of other states, which is not the case for Russia. Different Russian officials, including Duma International Affairs Committee Chairman Konstantin Kosachgov,\(^99\) General Staff

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\(^98\) See, for example, Stephen Rademaker, “The Kremlin’s Trump Card,” *ISYP Russia*, June 28, 2010.

Chief Nikolai Makarov,100 and Russian Ambassador to NATO Dmitry Rogozin101—have already taken the position that the U.S. nuclear weapons should be withdrawn before talks about tactical nuclear weapons can be held.

This brings us to the option of unilateral withdrawal of U.S. nuclear weapons from Europe, in the hope that the Russians reciprocate with a subsequent gesture. For example, this could occur in the form of moving its tactical nuclear weapons deeper into Russian territory. By consolidating the tactical nuclear weapons on U.S. territory, bilateral negotiations about the remaining tactical nuclear weapons may become less complicated, because at least one asymmetrical problem will have been solved. Withdrawing weapons unilaterally has the advantage that it does not have to be approved by the U.S. Senate. Even NATO’s Expert Group did not recommend formal negotiations with Russia on tactical nuclear weapons. A face-saving solution may be a unilateral withdrawal without calling it as such, just like the "reciprocal" Presidential Initiatives of 1990–1991. Interestingly, the Obama Nuclear Posture Review called for “formal agreements and/or parallel voluntary measures.”102 Similarly, Carl Bildt and Radek Sikorski proposed in a common op-ed “substantial unilateral confidence building efforts” in this regard.103

Public or Secret Withdrawal?

The tactical nuclear weapons could be withdrawn secretly, like they were in the past in Germany, Greece, and the United Kingdom. From the foreign policy establishment’s point of

view, the advantage of removing nuclear weapons secretly is that the public will not immediately ask for more disarmament measures. It prevents what some would call a slippery slope toward more disarmament.\textsuperscript{104} This fear was the reason why France was against the withdrawal during the deliberations of the New Strategic Concept in 2010. France is afraid that once the U.S. tactical nuclear weapons are gone, the debate will turn to the French weapons.\textsuperscript{105}

Some national representatives seem afraid of a public debate about these issues\textsuperscript{106}, although the current NATO Secretary-General tried to be as open as possible with regard to NATO’s New Strategic Concept. As Oliver Thränert put it: “a full-scale debate about U.S. nuclear withdrawal from Europe could trigger a controversy that would undermine NATO cohesion. Many members could lose confidence in the Alliance’s defense commitments in general, and the U.S. commitment to defend Europe in particular.”\textsuperscript{107} Also, Paul Schulte argues along these lines: "Whatever concessions might be made over forward-based U.S. nuclear systems and dual-capable aircraft would not end anti-nuclear pressure and dispute within NATO. Anti-nuclear activists would continue to campaign to abolish all nuclear forces and to end the U.S. nuclear guarantee, which some see as immoral and provocative."\textsuperscript{108}

The disadvantage of secrecy is that there are opportunity costs. The nuclear weapons states and alliances can score disarmament points in the eyes of the non–nuclear weapons states, and

\textsuperscript{106} Yost, “Assurance and US Extended Deterrence in NATO,” p. 778.
of world public opinion, by withdrawing openly. For this reason, we advocate a public withdrawal.

**Compromise with compensations**

Paradoxically, many past arms control measures have been supplemented by an arms build-up in other areas, basically because of bureaucratic or industrial pressure. As Paul Stockton explains, "arms development and arms control [in the U.S.] go forward in tandem, through an intra-governmental logrolling mechanism in which support for one is traded for the other."¹⁰⁹ Steven Miller is not surprised: "[arms control] engages the interests of a large, powerful complex, a not well understood process of defense decision-making and weapons acquisition, a process that generally seeks security not by constraining or eliminating weapons and military options but by providing them; this, it should not be forgotten, is the job that the Pentagon is hired to do, and it should come as no surprise that it seeks to fulfill that responsibility."¹¹⁰ Opponents of arms control in the defense establishment have been influenced in the past by compensating the loss of one weapons category with the build-up of another. Examples abound: the Limited Test Ban Treaty (1963), for instance, led to an expanded underground testing program in the United States; SALT-I led to accelerated defense spending for Trident and the B-1 bomber; the agreement of SALT-II accelerated the development of the MX missile, and START-I launched the B-2 bomber.¹¹¹ Was it by chance that on the day START I was signed, the U.S. Senate approved the Missile Defense Act? The signing of the Comprehensive Nuclear-Test-Ban Treaty in 1996 was compensated for,

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ironically, by giving the nuclear laboratories more money than they received during the Cold War in the form of the Stockpile Stewardship Program. More recently, the U.S. Defense Authorization Law linked approval of the New START by the Senate to modernizations of the existing nuclear arsenal.\textsuperscript{112} The Obama administration is spending more money on the nuclear labs than the Bush administration.

In the case of withdrawal of U.S. nuclear weapons from Europe, two kinds of compensation could be provided. “Atlanticists” will require a replacement of the symbol of the transatlantic link. The most obvious candidate is missile defense.\textsuperscript{113} Offensive weapons would be replaced by defensive weapons, something which in principle would be easier to sell to a skeptical public in Europe. The gradual Europeanization of missile defense has been progressing since the end of the 1990s, particularly within NATO. It culminated with the George W. Bush plan to set up a third site of the U.S. missile defense system in Poland and the Czech Republic. The latter has been modified by the Obama administration, as announced in September 2009.

As Thränert argues: “An effective missile defense system could substitute for nuclear sharing as a means to keep the United States committed to European defense... The aim would be to have a NATO missile defense as a substitute for the U.S. nuclear presence in Europe by the time the decision to modernize nuclear forces would need to be made.”\textsuperscript{114} Obama’s Nuclear Posture Review seems to suggest the same: “Contributions by non-nuclear systems to U.S. regional deterrence and reassurance goals will be preserved by avoiding limitations on missile

\textsuperscript{114} Thränert, “NATO, Missile Defense, and Extended Deterrence,” p. 72.
defenses in New START and ensuring that New START will not preclude options for using heavy bombers or long-range missile systems in conventional roles.”

From a strategic point of view, however, missile defense does not seem to be a very good option, primarily because the technology is not really ready. This even applies to the more moderate SM-3 missile defense interceptors on Aegis ships that the Obama administration aims to install.

Despite these misgivings, NATO has adopted missile defense as "a new mission" at the Lisbon Summit in 2010. And in contrast to earlier rumors, missile defense was not regarded as the formal replacement of the U.S. tactical nuclear weapons. It was again France that did not want to make such a link. Nevertheless, it may still be that missile defense will replace the U.S. tactical nuclear weapons in the future.

“Europeanists,” on the other hand, may hope that the withdrawal of U.S. nuclear weapons from Europe increases the likelihood of a so-called Euro-bomb. It is no secret that France is interested in such Europeanization of these weapons of mass destruction, through which it could not only legitimize but also possibly ascertain co-financing of its force de frappe. Advocates have already linked this option to the withdrawal of U.S. nuclear weapons from Europe. Whether by chance or not, and certainly also as the result of budgetary constraints,
France and the United Kingdom announced an intensification of their nuclear weapons cooperation in September 2010. From a disarmament point of view, however, the Euro-bomb scenario appears to go against the trend of de-legitimizing the existence of nuclear weapons.

**Complete Removal or Interim Steps?**

Instead of complete removal, consolidation could take place first at one or two of the existing bases, most likely in Italy or Turkey, as proposed in a NATO report in 2006. But as a more recent RUSI paper argues, “If the three northern European countries were to withdraw from deploying nuclear-capable aircraft, the retention of Italy as the only DCA [=Dual-Capable Aircraft] country would make little political or operational sense.”

Furthermore, even in the case of complete removal of these weapons from Europe, there remains the possibility of redeployment from the United States back to Europe in case of a crisis. Critics claim that such redeployment may prompt a further escalation. Still another possibility is to use this option as a bargaining instrument, and retain the infrastructure as long as Russia has not reacted positively to the withdrawal by responding in kind. It therefore seems advisable to withdraw the weapons one sweep, hence without any interim steps, except maybe for the option of keeping the infrastructure as long as Russia has not reciprocated.

**Decision-making within NATO: Unilaterally or by Consensus?**

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120 Chalmers and Lunn, “NATO’s Tactical Nuclear Dilemma,” p. 4.
To date, NATO Secretary-General Rasmussen has been able to convince member states to decide with consensus on this sensitive issue. A few caveats need to be made, however. First, it was generally not by consensus that these nuclear weapons arrived in the respective host nations. These involved bilateral agreements between the United States and the host nation in each individual case, and not a deal between all NATO member states. Logic would thus imply that their withdrawal can also be regulated via this form of bilateral decision-making, as has already been the case with Canada, Greece, and the United Kingdom. Second, it seems easier to introduce new weapons systems into NATO by consensus than to withdraw existing systems by consensus. Third, decision-making by consensus may be a recipe for inertia, as in the past, or for a bad compromise, perhaps in the future. These elements should thus by all means be avoided. In case of further inertia due to the absence of a political consensus within NATO, the European host nations can and should take unilateral measures. As Eben Harrel argues in *Time* magazine: "If Obama [‘s Nuclear Posture Review] fails to address the issue—and if NATO doesn’t come to an agreement—countries may choose to take their own steps to get rid of the weapons."122 In that case, some analysts suggest that the host nations unilaterally de-certify the dual-capable aircraft by "the removal of all mechanical and electronic equipment… and the denuclearization of facilities on national air bases intended for storage and maintenance of nuclear weapons."123 If this measure does not work, unilateral decisions by some host nations cannot be further excluded. As Paul Ingram rightly warns:

“Premature closing down of options for an easy life [for NATO] will only store up trouble for the future—trouble that could lead eventually to governments reluctantly taking unilateral decisions in response to domestic pressures without adequate consideration of broader

Alliance security.... Highly public disagreements that pitch governments against parliament and public, or governments against governments, could be extremely damaging.”

Conclusion

The time is ripe to withdraw U.S. tactical nuclear weapons from Europe. The arguments of the few opponents do not seem to outweigh the benefits of their withdrawal. The political climate—with a U.S. president who has “global zero” high on his personal agenda and is highly interested in the nuclear weapons threat—seems better today than it has been in years, if not decades. We believe the question is not if, but how and how fast, NATO will change its nuclear policy. If NATO is not able to have a serious internal debate about it, and if it is not able to adapt itself to significantly changed global circumstances, we wonder to what extent the Atlantic Alliance is a political—instead of a purely military—organization. The withdrawal of tactical U.S. nuclear weapons may be the beginning of a much more fundamental evolution of the Alliance and the start of its necessary and imminent reinvention.

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</tr>
<tr>
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</tr>
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<tr>
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<tr>
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</tr>
</tbody>
</table>


2008-08 Oliver, Hongyan. “In-use Vehicle Emissions Project in China – Tianjin Study.”


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2003-08 Oil and Security Executive Session Rapporteur's Report.


2003-06 Snyder, Lori. “The Effects of Environmental Regulation on Technology Diffusion in the Chlorine Manufacturing Industry.”


<table>
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<tr>
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<th>Title</th>
<th>Authors</th>
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<tbody>
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<tr>
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<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>2002-07</td>
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<td></td>
</tr>
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</table>
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2001-09 Pate, Jason and Gavin Cameron. “Covert Biological Weapons Attacks against Agricultural Targets: Assessing the Impact against U.S. Agriculture.”

Foster, Charles H.W. Foster and James N. Levitt, “Reawakening the Beginner’s Mind: Innovation in Environmental Practice.”


Koblentz, Gregory. “Overview of Federal Programs to Enhance State and Local Preparedness for Terrorism with Weapons of Mass Destruction.”

Kayyem, Juliette. “U.S. Preparations for Biological Terrorism: Legal Limitations and the Need for Planning.”

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Donahue, Laura and Juliette Kayyem. “The Rise of the Counterterrorist States,”


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Clark, William. “America's National Interests in Promoting a Transition toward Sustainability.”


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<table>
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<tr>
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