

**International Student/Young Pugwash Conference**  
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This report summarizes the proceedings of the 6th International Student/Young Pugwash (ISYP) conference, “Core Dimensions of Nuclear Power and Nuclear Weapons at the Dawn of the Twenty-first Century” held in The Hague, The Netherlands from April 15 to 16, 2009. The agenda was designed to allow two working groups to focus on one side of the nuclear dual use dilemma: nuclear energy and nuclear weapons. Thirty participants discussed topics that originated in papers prepared for possible publication in the ISYP Journal at: [www.scienceandworldaffairs.org](http://www.scienceandworldaffairs.org)

ISYP is grateful for the opportunity to share our thoughts with the Pugwash Conferences on Science and World Affairs. It is our hope that this report and the activities of ISYP will enrich the ideas and actions of the entire Pugwash community.

### **Working Group Discussions**

Working Group A (WGA) focused on the technical, political and economic aspects of nuclear energy. Working Group B (WGB) considered the military aspects and applications of nuclear weapons technology. To consider the controversies related to dual use nuclear issues in a constructive way, the groups used working papers as points of departure for the following conversations.

### **Nuclear Energy and Climate Change**

In WGA, the discussion began with an overview of options for climate change mitigation and placed nuclear energy in context with other options like demand reduction, carbon capture and storage, increased investment in renewables and geoengineering. In the context of a conversation about technology research, development, and adoption, the group heard a presentation on the current state of nuclear fusion research, a technology which, while highly speculative, is well-funded due to its implications for thermonuclear weapons development and testing and its long term potential as an almost unlimited source of energy. Both conventional fission energy and speculative fusion technology have great potential as low-carbon energy sources, but research and deployment of these technologies must be more carefully monitored, preferably by international cooperative agreements.

### **Nuclear Energy in the Developed World**

Secondly, WGA considered the future of nuclear energy in developed countries. To begin this conversation the group heard a presentation on how the relationship between scientists and the public can impact public perception of technology, especially nuclear technology. This began a useful debate on the role of scientists as honest brokers in policy making—an issue highly

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<sup>1</sup> Although this document is a report of the presentations and discussions from the working groups its content are the sole responsibility of the rapporteurs.

relevant to the Pugwash community. Additionally, it is widely accepted that the new US administration and the global financial crisis have significantly altered the outlook for the future of nuclear energy. WGA addressed these issues by discussing a paper which linked the efforts of the Obama campaign to mobilize young voters through the Internet to a possible method of mobilizing popular support for nuclear disarmament. WGA then considered the effects of the financial crisis on nuclear power, discussing the complicated financial and regulatory climate necessary for an expansion of nuclear power in the United States. It was agreed that sustained and unequivocal governmental support is necessary to encourage capital investment, especially in the current volatile and depressed market.

### **Nuclear Aspirants: Views from the Middle East**

WGA then heard two presentations from nuclear aspirant countries and considered the domestic and regional implications of Iranian and Turkish nuclear energy policy. It was argued that the nuclear program in Iran, while necessary for domestic energy security and pollution control, has the potential to significantly upset the balance of power in the Middle East (WGA addressed the Iranian issue in further detail). This led to a conversation about the notion of nuclear power as a source of both relatively clean energy and national prestige coveted by ruling parties. It was argued that Turkey, like Iran, seeks nuclear power for secondary reasons, in large part for the prestige and political benefits a nuclear industry can confer, as well as regional and international leverage.

### **Risks of Nuclear Technology**

The group concluded the discussion by considering some of the negative aspects of nuclear technology. The group took a novel approach to the nuclear waste problem by discussing the weapons implications of depleted uranium, a low-level waste product often ignored when considering the back-end of the fuel cycle. While not highly radioactive, the depleted byproducts of uranium enrichment are indicated by several epidemiological studies to have lasting effects when used in conventional weapons. This presentation led to a discussion of chemical versus radiological toxicity, and how the public perception of radiation and nuclear issues affects international norms concerning acceptable and unacceptable conduct in war. The working group finished the discussion with a paper on the effects of nuclear terrorism. The group discussed possible scenarios ranging from a full-scale attack on a nuclear power plant to the detonation of a “dirty bomb” in a population center, concluding that while a full-scale nuclear attack is unlikely, the psychological and social implications of even a mildly destructive attack could be far-reaching.

WGB addressed the other side of the nuclear dual use issue, nuclear technology for weapons and the effect of nuclear weapons on international security. The group discussed presentations on the nuclear nonproliferation regime, science and technology behind verification, and regional nuclear proliferation pressure with a specific emphasis on the Middle East. It was widely recognized that nuclear deterrence operates with high degrees of uncertainty, which further increases during times of crisis. Rather than being a guarantor of security, nuclear deterrence may actually undermine security because of its unsustainability over the long term. To increase international security and eliminate the possibility of nuclear catastrophe the nuclear nonproliferation regime should be strengthened and nuclear disarmament more aggressively pursued.

## **The Nonproliferation Regime and Iran**

The nuclear nonproliferation regime, and in particular the Nuclear Nonproliferation Treaty (NPT), has come under increasing pressure in the twenty first century. Although the NPT has established prohibitive norms regarding the acquisition of nuclear weapons and has achieved success in identifying noncompliance, it has yet to come up with an effective mechanism to deal with the issue of demand for nuclear weapons. The group recognized that a deep feeling of insecurity is behind the desire for nuclear weapons, driving a country to seek unconventional means of self-guarantee. Accordingly, more emphasis should be placed on addressing the security concerns of potential proliferators by providing them with the necessary security assurances. All agreed that it is unwise and counterproductive to seek a military option before diplomacy can be allowed to work.

WGB then discussed nuclear weapons and Iran. It is important to recognize Iran's legitimate concerns and interests, and to treat Iran as an equal partner and not automatically assume Iranian nuclear energy efforts to be a security threat. Security guarantees by the US can provide Iran with less of an excuse for antagonistic behavior. In addition confidence must be built within the region to allow the regime to cooperate to address its security concerns. Although it may not be easy to build confidence in this volatile region, the new US administration has a good opportunity that could be used to achieve reconciliation between the two countries, and ultimately allow Iran to reengage with the region and the international community through a process of verifying the nature, scope, and capabilities of Iran's nuclear program. It is especially important that any proposal to address the Iranian nuclear issue take into account major themes that have permeated the discourse on Iran regarding its nuclear program: independence and justice. Both can serve as the preconditions for effective diplomatic engagement and confidence building with Iran.

Although the possible threats associated with Iran's nuclear development have been heavily emphasized, Iran's nuclear decision-making structure relative to its underlying political structure has been largely ignored. Iran's security concerns are a complex combination of regional power, economy, geopolitics, nationalism, energy and religious identity. It is critical to recognize the distinction between discourse for domestic consumption in Iran and the policy-related discourse intended for an international audience. Negotiators must build a broader and more comprehensive understanding of Iran's policy making complex in order to understand the important discourse and distinguish real policy priorities from hyperbole.

In the long-term, the primary goal of the international community should be to find a way for Iran to acquire the nuclear energy it wants through a transparent and international safeguarded method that eliminates the international community's concerns about noncompliance. The IAEA can create a regional supervisory body in charge of monitoring and verification to mitigate concerns and prevent growing fears that other states in the region would seek to develop sensitive technologies of their own in a clandestine manner.

## **Fissile Material**

The non-verifiability of the Fissile Material Cut-Off Treaty (FMCT) has been used as an argument by opponents of the regime in multilateral forums. To successfully conclude a FMCT

and strengthen the nonproliferation regime, the implementation of a reliable system to verify that nuclear material is not being produced is critical. To address these concerns new methods to detect clandestine fissile material production are important. For example, WGB discussed a method that establishes an atmospheric transport model to detect plutonium reprocessing activity that uses the radioactive noble gas isotope Kr85 as an indicator of plutonium separation. This new technology can increase the detectability of unreported nuclear activities, and in combination with an in force CTBT has the potential to greatly enhance the technical capabilities of the international nonproliferation regime.

### **Missile Defense**

WGB then turned to the US missile defense system. The deployment of a missile defense system is perceived by both Russia and China as a severe threat to their nuclear deterrent capabilities. The planned US missile defense system will influence Russian and Chinese military planning. A presented technical analysis demonstrated that the current ground-based missile defense system has the potential to intercept ballistic missiles launched from Russia and China, and will therefore intensify strategic instability between the US and these nuclear powers. The Obama administration needs to seriously address the negative side effects of the current US missile defense plan.

### **China**

Nuclear abolition serves China's national interests and coincides with its long standing nuclear strategy. China therefore has the potential to be an active supporter of nuclear disarmament. Reducing the salience of nuclear weapons in national defense is a key precondition for global nuclear disarmament. In order to engage China in the international movement towards global nuclear disarmament, the adoption of a No First Use policy by all nuclear weapon states is critical. China perceives the US missile defense program and US efforts to obtain a precision-guided conventional global strike capability as key security threats and these must be addressed. In addition, verification measures that are associated with nuclear disarmament might be more intrusive to China than to the US or Russia, due to China's relatively small nuclear arsenal. Therefore, further study and interaction on these issues is needed to address China's concerns.

### **North Korea**

A presentation recognized that efforts to redirect North Korean nuclear scientists are a key aspect to achieving irreversible denuclearization on the Korea Peninsula. To avoid unemployed North Korean nuclear scientists from becoming an impediment in future negotiations, it is important to lay out a concrete plan for their redirected services as part of a broader effort to address North Korean nuclear disarmament. An approach similar to the Cooperative Threat Reduction program between the United States and former Soviet states could serve as a model for effective North Korean disarmament and help prevent future clandestine North Korean nuclear activities.

### **South Africa**

Middle power diplomacy is believed to have played a crucial role in the permanent extension of the NPT. Having given up its nuclear weapons, South Africa was in the unique position to play honest broker in multilateral nuclear diplomacy at the NPT review conference in 1995. In the last two years however, there has been a shift in South Africa's general foreign policy orientation. This shift is illustrated in South Africa's voting behavior as a non-permanent member of the UN

Security Council where it has voted against major western power initiatives on several occasions and exerted a non-aligned policy orientation. South Africa's recent revisionism may separate it from other middle powers and perpetuate a rift between developed and developing countries in their efforts to sustain the nonproliferation regime. A new honest broker may be needed to mediate nuclear disputes across this divide.

### **Non-State Actors**

Like in WGA the conversation ended on a sobering note with a presentation on the prospects for nuclear terrorism. There is a consensus that the emergence of non-state actors, combined with their possible access to nuclear materials poses a serious threat to the international community. The group agreed that while it is unlikely that non-state actors could acquire the required technology, the deployment of a radiological or dirty bomb is possible and could sow widespread fear, if not destruction although most of the terrorist groups that seek to achieve political objectives will be deterred from using nuclear weapons because of the weapon's catastrophic effects. To some terrorists, like those involved in global jihad movements, the rules are very different and they may have the motivation to actually use nuclear weapons. To mitigate the nuclear threat from non-state actors, cooperation among states is essential, and immediate measures taken by states at the unilateral, bilateral, and multilateral level to secure weapons and nuclear material are imperative.

### **Conclusion**

The results of both working groups were integrated in a final plenary session where all participants came together to discuss a world without nuclear weapons. In Prague on April 5th, 2009 U.S. President Barack Obama clearly stated America's "commitment to seek the peace and security of a world without nuclear weapons." He also said "This goal will not be reached quickly—perhaps not in my lifetime. It will take patience and persistence." In order to achieve the vision expressed by President Obama it is time now to face this problem and work towards building broad coalitions among all interested in nuclear disarmament and train the next generation of scientists and scholars that will carry out this bold vision.

A question was posed: "What happens when we reach a world free of nuclear weapons?" Will the total abolition of nuclear weapons make the world safer, or will the balance of power merely shift to countries with a nuclear weapons capability, if not actual bombs? The group agreed that the goal of reduction to zero makes sense only in a wider context of international cooperation and peace. Without addressing the causes of conflict and de-legitimizing violence as a means of conflict resolution, any call for the abolition of nuclear weapons is merely symbolic. In addition to arms control, the goal must be collective security engagement that builds on established international institutions and diplomacy to mitigate threats before they need to be controlled.

An economically linked world is one that makes the use of nuclear weapons unimaginable and the calculus of Cold War nuclear deterrence increasingly irrelevant. It is perhaps in the growing economic, social, and political interdependence of a globalizing world that we find our answer and re-affirm our faith in the wisdom of nuclear disarmament in the context of total disarmament and perpetual peace.