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## ***Denuclearizing North Korea requires trust***

In their Policy Forum “Denuclearizing North Korea: A verified, phased approach” (7 September, p. 981) A. Glaser and Z. Mian describe a pathway for verified denuclearization of North Korea. I agree that such an approach is necessary and, equally importantly, technically feasible. However, Glaser and Mian only highlight the disarmament side of the denuclearization agreement, without a plan to develop the mutual trust and the assurances on which such a deal depends. Incentivizing North Korea to reduce nuclear weapons and fissile materials will require confidence-building measures, ease of sanctions, and security guarantees. These elements are strongly related to the disarmament questions and must be regulated with similar precision.

Coordinating with the proposed phased approach, the involved parties could pair North Korea’s freeze on weapon-related activities with a freeze of new nuclear-related sanctions or military exercises in the region. Such commitments would lay the foundation for an interim agreement, paving the way for long-term denuclearization. In a final step, the facilitation of humanitarian trade in areas such as health and nutrition would initiate the ease of sanctions and the establishment of credible security guarantees.

These measures need control and verification mechanisms, too. In case of nonfulfillment of such an agreement, it must be possible to swiftly reinstate the United

Nations Security Council’s sanctions. The structure of this contingency could be similar to the snapback mechanism in Article 37 of the Joint Comprehensive Plan of Action with Iran (1). Likewise, North Korea will insist on similar guarantees if it dismantles its nuclear weapons. It is always a challenge to create mechanisms that can credibly assure such guarantees for both parties, and this has become even more difficult after the U.S. withdrawal from the Iran nuclear agreement.

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## ***Neutrino physics for Korean diplomacy***

Continued diplomatic progress with North Korea will be a journey of many steps, as A. Glaser and Z. Mian describe in their Policy Forum “Denuclearizing North Korea: A verified, phased approach” (7 September, p. 981). Leaders in North Korea, South Korea, and the United States agree that one step could be dismantlement or civilian repurposing of the nuclear reactors at Yongbyon. We propose a cooperative method for verifying reactor shutdown or conversion. The key tools are meter-scale, field-deployable detectors that track neutrino emissions from reactor cores.

Neutrino detectors can track power

A freeze in military exercises could help to establish trust during nuclear negotiations with North Korea.

levels and fuel evolution in nuclear reactors, as experiments in South Korea, China, Russia, the United States, and Europe have demonstrated (1–7). At Yongbyon, neutrino detectors could be deployed to verify reactor shutdown or civilian operations without the need for operational records or access inside reactor buildings. Shutdown of North Korea’s main plutonium production reactor could be verified with a detector in a standard freight container parked outside the reactor building.

Existing neutrino technology may be attractive to all parties in the ongoing talks. North Korea may value a tool for demonstrating treaty compliance while maintaining custody of the reactor buildings. Other parties may value the tamper resistance of the neutrino signal and resilience of neutrino detectors, which require minimal on-site access and can reconstruct reactor operational history even after a data-taking pause. Neutrino projects are also a natural opportunity to strengthen relations between North and South Korea and to build international scientific ties. South Korea has an active neutrino community and could choose to deploy a counterpart to a Yongbyon-based detector at one of its own reactors. Resulting scientific collaboration could benefit Korea and the world. We encourage policy-makers to consider neutrino detectors as one step toward stability and security on the Korean Peninsula.

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## Improve traffic death statistics in China

Sustainable Development Goal 3.6 aims to “halve the number of global deaths and injuries from road traffic accidents” by 2020 (1). Accurate statistics are crucial to monitoring the progress toward this goal. According to current data, China contributed 23% of global road traffic deaths in 2016 (2). However, Chinese police departments have been criticized for underreporting road traffic deaths (3, 4) and consistently attributing more than 99% of fatal crashes to road users’ behavior rather than vehicle or environmental factors (5). Incomplete and distorted fatal crash data not only mislead policy-makers and researchers but also misdirect prevention efforts.

Police-reported data suggest that China witnessed a 46% decrease in road traffic deaths from 2002 to 2016 (6), but other data contradict this trend (4, 7, 8). Such discrepancies raise questions about the efficacy of national prevention efforts. The distorted cause spectrum statistics, which indicate that human error causes more than 99% of Chinese road traffic crashes

(6) [compared with India, where human error cause rates hover in the 75 to 85% range (9)], mistakenly lead national prevention efforts to focus on safety education rather than multifaceted programs that incorporate legislation, engineering, and environmental approaches (10).

Improving the accuracy of Chinese road traffic injury statistics is achievable. The Chinese central government should establish and fund an independent body to collect crash data. China should also correct methodological oddities that yield inaccurate data. Improvements would include adopting the more commonly used window of 30 days postcrash for a mortality to be classified as a road traffic injury death (11), replacing exclusive-cause with multicausal classification systems, and integrating other health and occupational surveillance data with traffic crash data to enable more accurate mortality estimation. Finally, China should develop a publicly available crash data database, modeled on other national systems such as the Fatality Analysis Reporting System in the United States (12), to allow researchers, practitioners, and the public to cite and use valid data for road traffic injury prevention.

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