

## BOOK REVIEW

**Unmaking the bomb: A fissile material approach to nuclear disarmament and nonproliferation**, by Harold A. Feiveson, Alexander Glaser, Zia Mian and Frank N. Von Hippel, Cambridge, MIT Press, 2016, 296 pp., AU\$25.00 (paperback), ISBN 978-0-26252-972-3

This is a story of 'fissile material', which is an essential component of nuclear weapons. How is fissile material produced? How is it used to make nuclear weapons? What to do with fissile materials after nuclear weapons are dismantled? Are civilian nuclear power programmes also producing fissile materials? How to prevent such materials from being used to make nuclear weapons? What are the imminent threats posed by fissile materials and how to reduce these threats? And, finally, can we eventually dispose fissile materials?

If you are interested in any one of those questions, this book provides the answers. Based on many years of research, writing, teaching and policy activities, the authors have assembled very extensive and useful information on fissile materials. Although it is not a 'story telling' book, it is often amusing and interesting to read how those fissile materials have been produced, used, stored and now pose serious security threats to the world. In fact, it is a chilling story identifying many potential risks frequently unrecognised by many policy-makers and experts.

The book consists of three detailed chapters. The first is on how fissile material was and has been produced; the second is on the relationship between civilian nuclear energy programmes and nuclear weapons and the third is on how to eliminate fissile materials. Each chapter can be read independently but the chapters follow historical trends and thus the entire book can be read as a 'historical narrative of fissile materials'. Although it has many technical sections and descriptions, there are no mathematical formulae in the book so that readers without scientific background can follow the contents without much difficulty. In addition, there are many helpful pictures and graphs included to illustrate the story.

The book deals with both highly enriched uranium (HEU) and plutonium. The chapters dealing with plutonium have considerable interest and importance, as plutonium is a much more complex and difficult problem than HEU. In fact, the readers would be surprised to learn that civilian nuclear programmes are producing more plutonium than military programmes, and the global stockpile is increasing even now. This is one of the reasons that I strongly believe that this book should not only be read by security experts but also by civilian nuclear energy experts. The increasing civilian plutonium stockpile is posing serious security threats to global society. The book tells a convincing story about how this is the result of unwise and unreasonable nuclear energy policy, especially in the back-end of the nuclear fuel cycle.

Another interesting feature of the book is its multidisciplinary nature. It has an appearance of a technical book, yet shows how the issues are much more than technical issues, and require social, economic and political analysis to find solutions. That is why I suggest that the book should be widely read by non-technical experts as well.

Finally, readers will find persuasive arguments in the book that nuclear disarmament and non-proliferation issues cannot be solved without dealing with this complex issue of fissile materials. Although the global stockpile of nuclear warheads is now down from a peak of about 70,000 to just below 15,000, the global stockpile of fissile materials is now equivalent to more than 100,000 nuclear weapons, and is increasing still further (primarily due to an increase in the global plutonium stockpile). This book is a quiet but very serious warning

from the authors to the world about plutonium risks and the other dangers associated with fissile materials. The authors' principal conclusions are that:

Banning nuclear weapons will not end the threat if countries continue to hold stocks of fissile material and use them in civilian programs. Ending the threat of proliferation, a nuclear terrorism means recognizing that increasing security of fissile materials and controlling their production will not suffice indefinitely. Unmaking the bomb requires eliminating the fissile materials that make nuclear weapons possible. (183)

The authors are all physicists of Princeton University's Science and Global Security Programs. They are the founders and core members of International Panel on Fissile Materials (IPFM), which was established in 2006. I am also a member of IPFM from its foundation and appreciate their leadership very much. The book was translated into Japanese by my colleague, Prof. Akira Tomizuka, and myself, and published in 2017.

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