

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
 )  
Tennessee Valley Authority ) Docket No. 52-047-ESP  
 )  
(Clinch River Nuclear Site) )  
\_\_\_\_\_ )

**DECLARATION OF DR. M.V. RAMANA IN SUPPORT OF  
INTERVENORS' NEW CONTENTION 4 (IMPERMISSIBLE DISCUSSION  
OF ENERGY ALTERNATIVES AND NEED FOR PROPOSED SMR)**

Under penalty of perjury, M.V. Ramana declares as follows:

1. My name is M.V. Ramana. I am a Professor and the Simons Chair in Disarmament, Global and Human Security at the Liu Institute for Global Issues, University of British Columbia, Vancouver, Canada.
2. I am a qualified expert on matters relating to nuclear energy policy and economics. I have a Ph.D. in Theoretical Physics from Boston University and a M.Sc. in Physics from the Indian Institute of Technology, Kanpur, India. I have written many academic papers and articles on a wide range of topics relating to nuclear energy in various journals and magazines, including *Scientific American*, *Science and Global Security*, *Energy Policy*, *Nuclear Technology*, *Journal of Risk Research*, *Environmental Impact Assessment Review*, *Energy Research and Social Science*, and *International Journal of Global Energy Issues*. I have also been a member of many professional organizations relevant to my area of expertise, including the International Panel on Fissile Materials and the Science and Security Board of the Bulletin of the Atomic Scientists. A copy of my curriculum vitae is attached.
3. I am familiar with the licensing-related filings and correspondence that have been submitted by Tennessee Valley Authority (“TVA”) in support of its application to the U.S. Nuclear Regulatory Commission (“NRC”) for an Early Site Permit for a Small Modular Reactor (“SMR”) on the Clinch River Nuclear Site, particularly TVA’s Environmental Report. I am also familiar with the Draft Environmental Impact Statement prepared by the NRC for the proposed ESP. NUREG-2226, Draft Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site (April 2018) (“Draft EIS”). And I am familiar with applicable NRC regulations, policies, and guidance documents.

4. I am familiar with the history of development of nuclear technology in the United States, including the development and operation of light water reactors and the development of SMR designs. I am also familiar with the characteristics and costs of a range of technologies available or currently being developed for electricity generation, including coal and gas based power plants; renewable energy sources such as solar and wind; and nuclear energy. I have researched and written papers on various technical and policy issues related to SMRs, including their technical characteristics, uranium fuel requirements and spent fuel generation, challenges with their licensing, conflicts between design priorities, and demand for them in developing countries.

4. I assisted Intervenors with the preparation of their new Contention 4, which asserts that the Draft EIS violates NEPA and NRC implementing regulations 10 C.F.R. §§ 51.75(b), 51.20(b), and 52.21, by impermissibly including an extensive discussion of the economic and technical benefits of the proposed SMR, including need for power and alternative energy sources. The factual assertions in the contention are true and correct to the best of my knowledge, and the opinions expressed therein are based on my best professional judgment.

*M. V. Ramana*

M.V. Ramana, Ph.D.

May 18, 2018

# CURRICULUM VITAE

**M. V. Ramana**  
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Liu Institute for Global Issues  
School of Public Policy and Global Affairs  
University of British Columbia

## EMPLOYMENT

- Simons Chair in Disarmament, Global and Human Security,  
Liu Institute for Global Issues, School of Public Policy and  
Global Affairs, University of British Columbia January 2017 onwards
- Professional Specialist, Program in Science and Global  
Security, Princeton University July 2012 – December 2016  
Researching issues related to nuclear power, nuclear  
proliferation and climate change
- Associate Research Scholar, Program in Science and Global  
Security, Princeton University November 2009 – June 2012  
Researching issues related to nuclear power, nuclear  
proliferation and climate change
- Lecturer, Woodrow Wilson School of Public and International  
Affairs March 2010 – May 2012, Fall  
2013, Fall 2014, Spring 2016  
Designed and taught courses related to energy, environment  
and development, and nuclear power for Masters students and  
Freshmen
- Visiting Research Scholar, Program in Science, Technology, and  
Environmental Policy, Woodrow Wilson School of Public and  
International Affairs, Princeton University May 2009 – November 2009  
Researching issues related to nuclear power and climate change
- Senior Fellow, Centre for Interdisciplinary Studies in  
Environment and Development, Bangalore April 2007 – April 2009  
Fellow, Centre for Interdisciplinary Studies in Environment  
and Development, Bangalore April 2004 – April 2007  
Researched economic and environmental aspects of India's nuclear energy program
- Research Staff, Program on Science and Global Security,  
Princeton University September 2001 – March 2004  
Researched global nuclear disarmament and India's nuclear weapons and energy programs
- Lecturer, Woodrow Wilson School of Public and International  
Affairs, Princeton University September 2001 – February  
2002  
Lectured and conducted precepts for a course on Methods in Science, Technology, and Environmental  
Policy
- Lecturer, Yale Center for International and Area Studies, Yale  
University August 2001 – December 2001  
Designed and taught course on Science, Technology, and Development in India

Research Associate, Center for Energy and Environmental Studies, Princeton University September 1998 – August 2001  
Conducted research on technical aspects of nuclear disarmament and India's nuclear weapons and energy programs; influence of scientists on nuclear policy

Lecturer, Woodrow Wilson School of Public and International Affairs, Princeton University February 1999 – July 1999  
Gave lectures and conducted precepts for a course on Science, Technology, and Public Policy

Post-doctoral Fellow, Security Studies Program, Massachusetts Institute of Technology August 1996 – August 1998  
Conducted research on technical aspects of nuclear weapons and disarmament, Indian ballistic missiles, and India's nuclear policy

Post-doctoral Fellow, Physics Department, University of Toronto September 1994 - July 1996  
Conducted theoretical research on tests of particle physics models at accelerator experiments

Research Fellow, Physics Department, Boston University June 1989 – August 1994  
Conducted research on phenomenological aspects of electroweak symmetry breaking

## EDUCATION

**Boston University**, Ph.D., Physics, September 1994 Thesis Advisor: Kenneth D. Lane  
Thesis Title: "Phenomenological Aspects of Electroweak Symmetry Breaking"

**Indian Institute of Technology, Kanpur**, M.Sc. Physics, May 1988

## HONORS, AWARDS, PROFESSIONAL SERVICE

Member, Team of Editors, *Journal of Peace and Nuclear Disarmament*, since 2017

Member, Editorial Board, *Science and Global Security*, since 2017

Distinguished Lecturer, Sigma Xi Society, 2017-18

Leo Szilard Award, American Physical Society, 2014

Member, International Panel on Fissile Materials, since 2005

Member, Science and Security Board of the Bulletin of Atomic Scientists, 2008-2014

Member, Editorial Board, *Energy Research and Social Science*, since 2015

Robert Jay Lifton Fellowship, John Jay College of Criminal Justice, City University of New York, 2005

Guggenheim Fellowship, 2003

Member, Selection Committee, Global Security and Cooperation Program, Social Sciences Research Council, 2000-01

MacArthur Foundation Research and Writing Grant, 1999

SSRC-MacArthur Fellowship for International Research on Peace and Security, 1999

SSRC-MacArthur Post-doctoral Fellowship on Peace and Security in a Changing World, 1996

National Talent Search Scholarship, 1981 -1988

Reviewed papers for several journals including *Bulletin of the Atomic Scientists*, *Climate Policy*, *Energy Policy*, *Journal of Environment and Development*, *Environmental Politics*, *Journal of Risk Research*, *Energy Strategy Reviews*, *Economic and Political Weekly*, and *Energy for Sustainable Development*.

## PUBLICATIONS

### Refereed Publications

#### Journal Articles

M. V. Ramana, “Technical and social problems of nuclear waste,” *WIREs Energy and Environment* (2018) doi.org/10.1002/wene.289.

Kumar Sundaram and M. V. Ramana, “India and the policy of no first use of nuclear weapons,” *Journal for Peace and Nuclear Disarmament* (2018) doi.org/10.1080/25751654.2018.1438737.

Matthias Englert, Friederike Frieß, and M. V. Ramana, “Accident Scenarios Involving Pebble Bed High Temperature Reactors,” *Science and Global Security*, **25**, no. 1 (2017), 42-55.

M. V. Ramana, A. H. Nayyar, and Michael Schoeppner, “Nuclear High-level Waste Tank Explosions: Potential Causes and Impacts of a Hypothetical Accident at India’s Kalpakkam Reprocessing Plant,” *Science and Global Security*, **24**, no. 3 (2016), 174-203.

M. V. Ramana and Priscilla Agyapong, “Thinking Big? Ghana, Small Reactors, and Nuclear Power,” *Energy Research and Social Science*, **21** (2016), 101-113.

M. V. Ramana and Ali Ahmad, “Wishful Thinking and Real Problems: Small Modular Reactors, Planning Constraints, and Nuclear Power in Jordan,” *Energy Policy*, **93** (2016), 236–245.

Amy King and M. V. Ramana, “The China Syndrome? Nuclear Power Growth and Safety After Fukushima,” *Asian Perspective*, **39** (2015), 607-636.

M. V. Ramana and Ashwin K. Seshadri, “Negligence, Capture, and Dependence: Safety Regulation of the Design of India’s Prototype Fast Breeder Reactor,” *Journal of Risk Research*, **18**, no. 8 (2015), 1030-1050.

Benjamin Sovacool and M. V. Ramana, “Back to the Future: Small Modular Reactors, Nuclear Fantasies, and Symbolic Convergence,” *Science, Technology, and Human Values*, **40**, no. 1 (2015), 96-125.

M. V. Ramana and Zia Mian, “One Size Doesn't Fit All: Social Priorities and Technical Conflicts for Small Modular Reactors,” *Energy Research and Social Science* **2** (May 2014), 115-124.

Ali Ahmad and M. V. Ramana, “Too Costly to Matter: Economics of Nuclear Power for Saudi Arabia,” *Energy* **69** (May 2014), 682-694.

M. V. Ramana, Laura Berzak Hopkins, and Alexander Glaser, “Licensing Small Modular Reactors,” *Energy* **61**, (November 2013), 555-564.

M. V. Ramana and Ashwin Kumar, “‘One in Infinity’: Learning from Accidents and Lessons for Nuclear Safety in India,” *Journal of Risk Research* (2013), 23-42.

Alexander Glaser, Laura Berzak Hopkins, and M. V. Ramana, “Resource Requirements and Proliferation Risks Associated with Small Modular Reactors,” *Nuclear Technology* **184**, (October 2013), 121-129.

M. V. Ramana, “Shifting Strategies and Precarious Progress: Nuclear Waste Management in Canada,” *Energy Policy* **61**, (October 2013), 196-206.

M. V. Ramana and Eri Saikawa, “Choosing a Standard Reactor: International Competition and Domestic Politics in Chinese Nuclear Policy,” *Energy* **36** (2011), 6779-6789.

J. Y. Suchitra and M. V. Ramana, “The Costs of Power: Plutonium and the Economics of India’s Prototype Fast Breeder Reactor,” *International Journal of Global Energy Issues* **35**, no. 1 (2011), 1-23.

- M. V. Ramana and Divya Badami Rao, “The Environmental Impact Assessment Process for Nuclear Facilities: An Examination of the Indian Experience,” *Environmental Impact Assessment Review* **30**, no. 4 (2010), 268-271.
- M. V. Ramana and Ashwin Kumar, “Least Cost Principles and Electricity Planning for Karnataka,” *Energy for Sustainable Development* **13**, no. 4 (2009), 225–234.
- M. V. Ramana and J. Y. Suchitra, “Slow and Stunted: Plutonium Accounting and the Growth of Fast Breeder Reactors in India,” *Energy Policy* **37**, no. 12 (2009), 5028-5036.
- M. V. Ramana “India and Fast Breeder Reactors,” *Science and Global Security* **17** (2009), 54-67.
- M. V. Ramana and Ashwin Kumar, “Compromising Safety: Design Choices and Severe Accident Possibilities in India's Prototype Fast Breeder Reactor,” *Science and Global Security* **16** (2008), 87-114.
- Alexander Glaser and M. V. Ramana, “Weapon-Grade Plutonium Production Potential in the Indian Prototype Fast Breeder Reactor,” *Science and Global Security* **15** (2007), 85-105.
- M. V. Ramana and J. Y. Suchitra, “Costing Plutonium: Economics of Reprocessing in India,” *International Journal of Global Energy Issues* **27**, no. 4 (2007), 454-471.
- Zia Mian, A. H. Nayyar, R. Rajaraman, and M. V. Ramana, “Fissile Materials in South Asia and the Implications of the U.S.-India Nuclear Deal,” with *Science and Global Security* **14** (2006), 117-143.
- M. V. Ramana, Antonette D'Sa, and Amulya Reddy, “Nuclear Energy Economics in India,” *Energy for Sustainable Development* **IX**, no. 2 (June 2005), 35-48.
- M. V. Ramana, “An Estimate of India’s Uranium Enrichment Capacity,” *Science and Global Security* **12** (2004), 115-124.
- Zia Mian, R. Rajaraman, and M. V. Ramana, “Early Warning in South Asia: Constraints and Implications,” *Science and Global Security* **11** (2003), 109–150.
- M. V. Ramana, Dennis Thomas, and Susy Varughese, “Estimating Nuclear Waste Production in India,” *Current Science* **81**, no. 11 (December 10, 2001), 1458-1462.
- Zia Mian, M. V. Ramana, and R. Rajaraman, “Plutonium Dispersion and Health Hazards from Nuclear Weapons Accidents,” *Current Science* **80**, no. 10 (May 25, 2001), 1275-1284.
- Z. Mian, A. H. Nayyar, and M. V. Ramana, “Bringing Prithvi Down to Earth: The Capabilities and Potential Effectiveness of India's Prithvi Missile,” *Science and Global Security* **7**, no. 3 (1998), 333-360.
- M. V. Ramana, “Gauge Boson Scattering in a Hidden Symmetry Breaking Sector at  $e+e-$  Colliders,” *Modern Physics Letters A* **11** (1996), 247-255.
- M. V. Ramana “Glueballs in Strongly Interacting Theories at the Electroweak Scale,” *Physics Letters* **B368** (1996), 215-220.
- B. Holdom and M. V. Ramana, “New Flavor Physics in  $b$  Decays,” *Physics Letters* **B365** (1996), 309-311.
- B. Holdom and M. V. Ramana, “A New Physics Source of Hard Gluons in Top Quark Production,” *Physics Letters* **B353** (1995), 295-300.
- R. S. Chivukula, M. Golden, D. Kominis, and M. V. Ramana, “The Phenomenology of a Hidden Symmetry Breaking Sector,” *Physics Letters* **B293** (1992), 400-404.

R. S. Chivukula, M. Golden, and M. V. Ramana, “Colored Pseudo-Goldstone Bosons and Gauge Boson Pairs,” *Physical Review. Letters* **68** (1992), 2883-2886.

K. Lane and M. V. Ramana, “Walking Technicolor Signatures at Hadron Colliders,” *Physical Review* **D44** (1991), 2678-2700.

### **Conference Proceedings**

Wei Peng, Fabian Wagner, Denise L Mauzerall, M.V. Ramana, Haibo Zhai, Mitchell Small, Xin Zhang, and Carole Dalin, “Competing Air Quality and Water Conservation Cobenefits from Power Sector Decarbonization,” in *American Geophysical Union Fall Meeting*, December 12-16, 2016, San Francisco, USA.

M. V. Ramana, Alexander Glaser, and Laura Berzak Hopkins, “Small Modular Reactors: Uranium Resource Requirements, Waste Generation and Proliferation Risk Assessment,” in *21<sup>st</sup> International Conference on Nuclear Engineering*, July 29 to August 2, 2013, Chengdu, China, 1-7.

M. V. Ramana, “Constraints on India’s Fast Breeder Program,” in *51<sup>st</sup> Annual Meeting of the Institute of Nuclear Materials Management*, July 13, 2010, Baltimore, USA, 1-9.

M. V. Ramana and J. Y. Suchitra, “Economic and Environmental Costs of Nuclear Power,” in *Ninth Biennial Conference of the International Society of Ecological Economics*, December 15-18, 2006, New Delhi, India, 1-21.



## Non-Refereed Publications

### Journal Articles

M. V. Ramana and Zia Mian, “The Courage to Challenge the Nuclear World Order,” *Economic and Political Weekly*, **52**, no. 48 (2 December 2017), 22-25.

M. V. Ramana, “Small Modular Reactors for Nuclear Power: Hope or Mirage?,” *Energy Studies Institute Bulletin*, **10**, no. 6 (December 2017), 10-11.

M. V. Ramana and Suvrat Raju, “Old Plans, Ongoing Handouts, New Spin: Deciphering the Nuclear Construction Announcement,” *Economic and Political Weekly*, **52**, no. 24 (17 June 2017).  
<http://www.epw.in/journal/2017/24/web-exclusives/old-plans-ongoing-handouts-new-spin.html>.

M. V. Ramana, “An Enduring Problem: Radioactive Waste from Nuclear Energy,” *Proceedings of the IEEE*, **105**, no. 3, (March 2017), 415-418.

M. V. Ramana and Zia Mian, “Small Modular Reactors and the Challenges of Nuclear Power,” *Physics & Society*, **45**, no. 4 (January 2017), 5-9.

M. V. Ramana, “The Frontiers of Energy: A Gradual Decline?,” *Nature Energy*, **1**, no. 1 (2016), 7-8.

M. V. Ramana and Zia Mian, “Scrambling to build a Nuclear Middle East,” *Bulletin of the Atomic Scientists*, **72**, no. 1 (2016), 39-43.

M. V. Ramana, “The Checkered Operational History of High Temperature Gas Cooled Reactors,” *Bulletin of the Atomic Scientists*, **72**, no. 3 (2016), 171-179.

M. V. Ramana, “A Principled and Knowledgeable Critic: Praful Bidwai on Nuclear Weapons and Energy,” *Economic and Political Weekly*, **L**, no. 32 (August 2015), 23-26.

M. V. Ramana, “Atomic State: Big Science in Twentieth-Century India,” Book Review, *Technology and Culture* **55** (July 2014), 762-763

S Rajendran Pillai and M. V. Ramana, “Breeder reactors: A Possible Connection Between Metal Corrosion and a History of Sodium Leaks,” *Bulletin of the Atomic Scientists* **70**, no. 3 (May/June 2014), 49-55.

Zia Mian and M. V. Ramana, “Asian War Machines,” *Critical Asian Studies* **46**, no. 2 (June 2014), 345-360.

Ashwin Kumar and M. V. Ramana, “Nuclear Safety in India: Theoretical Perspectives and Empirical Evidence,” *OUCIP Journal of International Studies* **1**, no. 1 (July—December 2013), 49-72.

M. V. Ramana, “Why India’s electricity is Likely to Remain in Short Supply: The Economics of Nuclear Power,” *Bulletin of the Atomic Scientists* **69**, no. 6 (November/December 2013), 67–78.

Benjamin K. Sovacool, Patrick Parenteau, M. V. Ramana, Scott V. Valentine, Mark Z. Jacobson, Mark A. Delucchi, and Mark Diesendorf, “Comment on “Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power”,” *Environmental Science and Technology* **47**, (May 2013), 6715-6717.

Suvrat Raju and M. V. Ramana, “Cost of Electricity from the Jaitapur Nuclear Power Plant,” *Economic and Political Weekly* **XLVIII**, no. 26 & 27 (2013), 51-60.

M. V. Ramana, “Nuclear policy responses to Fukushima: Exit, Voice, and Loyalty,” *Bulletin of the Atomic Scientists* **69**, no. 2 (March/April 2013), 66-76.

M. V. Ramana, “Flunking Atomic Audits,” *Economic and Political Weekly* **XLVII**, no. 39 (2012), 10–13.

Ashwin Kumar and M. V. Ramana, “The Limits of Safety Analysis: Severe Nuclear Accident Possibilities at the PFBR,” *Economic and Political Weekly* **XLVI**, no. 43 (2011), 44-49.

M. V. Ramana, “Nuclear Power and the Public,” *Bulletin of the Atomic Scientists* **67**, no. 4 (July/August 2011), 43 -51.

Zia Mian and M. V. Ramana, “The Enduring Power of Mass Production, Mass Consumption, and Mass Destruction,” *Development* **54**, no. 2 (2011), 194-196.

Thomas Cochran, Harold Feiveson, Zia Mian, M. V. Ramana, Mycle Schneider, and Frank von Hippel, “It’s Time to Give Up on Breeder Reactors,” *Bulletin of the Atomic Scientists* **66**, no. 3, (May/June 2010), 50-56.

Suvrat Raju and M. V. Ramana, “The Other Side of Nuclear Liability,” *Economic and Political Weekly*, **XLV**, no. 16, (April 17, 2010), 48-54.

M. V. Ramana and Ashwin Kumar, “Safety First? Kaiga and Other Nuclear Stories,” *Economic and Political Weekly* **XLV**, no. 7 (2010), 47-54.

M. V. Ramana, “Nuclear Power: Economic, Safety, Health, and Environmental Issues of Near-Term Technologies,” *Annual Review of Environment and Resources* **34** (2009), 127-52.

Divya Badami Rao and M. V. Ramana, “Violating Letter and Spirit: Environmental Clearances for Koodankulam Reactors,” *Economic and Political Weekly* **XLIII**, no. 51 (December 20, 2008), 14-18.

Zia Mian and M. V. Ramana, “Going MAD: Ten Years of the Bomb in South Asia,” *Economic and Political Weekly* **XLIII**, no. 26 and 27 (June 28, 2008), 201-208.

U. A. Shimray and M. V. Ramana, “Uranium Mining in Meghalaya: Simmering Problem,” *Economic and Political Weekly* **XLII**, no. 52 (December 29, 2007), 13-17.

M. V. Ramana, “Heavy Subsidies in Heavy Water: Economics of Nuclear Power in India,” *Economic and Political Weekly* **XLII**, no. 34 (August 25, 2007), 3483-3490.

M. V. Ramana, “Economics of Nuclear Power: Subsidies and Competitiveness,” *Economic and Political Weekly* **XLII**, no. 2 (January 13, 2007), 169-171.

J. Y. Suchitra and M. V. Ramana, “High Costs, Questionable Benefits of Reprocessing,” *Economic and Political Weekly* **XLI**, no. 47 (November 25, 2006), 4848-4851.

M. V. Ramana, “Twenty Years after Chernobyl: Debates and Lessons,” *Economic and Political Weekly* **XLI**, no. 18 (May 6, 2006), 1743-1747.

J. Y. Suchitra and M. V. Ramana, “Nuclear Power: No Route to Energy Security,” *Energy Security Insights* **I**, no. 1 (March 2006), 13-16.

Zia Mian and M. V. Ramana, “Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal with India,” *Arms Control Today* (January/February 2006), 11-17.

M. V. Ramana, “Tall Claim, Little Evidence,” *Economic and Political Weekly* **XL**, no. 50 (December 10, 2005), 5237-5239.

M. V. Ramana, “Nuclear Power: Expensive and Unsafe,” *Electrical India* **45**, no. 11 (November 2005), 1-11.

Zia Mian and M. V. Ramana, “Feeding the Nuclear Fire,” *Economic and Political Weekly* **XL**, no. 35 (August 27, 2005), 3808-3812.

- M. V. Ramana, Antonette D'Sa and Amulya Reddy, "Economics of Nuclear Power from Heavy Water Reactors," *Economic and Political Weekly* **XL**, no. 17 (April 23, 2005), 1763-1773.
- M. V. Ramana, "India's Uranium Enrichment Program," *International Network of Engineers and Scientists Against Proliferation Bulletin* **24** (December 2004), 71-74.
- M. V. Ramana, "Scientists, Nuclear Weapons, and the Peace Movement," *Economic and Political Weekly* **XXXIX**, no. 46-47 (November 20, 2004), 5013-5016.
- Zia Mian, A. H. Nayyar, and M. V. Ramana, "Making Weapons, Talking Peace: Resolving Dilemma of Nuclear Negotiations," *Economic and Political Weekly* **XXXIX**, no. 29 (July 17, 2004), 3221-3224.
- M. V. Ramana, R. Rajaraman and Zia Mian, "Nuclear Early Warning in South Asia: Problems and Issues," *Economic and Political Weekly* **XXXIX**, no. 3 (January 17, 2004), 279-284.
- M. V. Ramana, "Scientists, Nuclear Weapons and Peace in India," *International Network of Engineers and Scientists Against Proliferation Bulletin* **22** (December 2003), 25-27.
- M. V. Ramana, "A Stepping Stone to a Fully Nuclear Future," *Science and Global Security* **11** (2003), 81-83.
- M. V. Ramana, "Risks of a LOW Doctrine," *Economic and Political Weekly* **XXXVIII**, no. 9 (March 1, 2003), 860-864.
- R. Rajaraman, M. V. Ramana, and Zia Mian, "Possession and Deployment of Nuclear Weapons in South Asia: An Assessment of Some Risks," *Economic and Political Weekly* **XXXVII**, no. 25 (June 22, 2002), 2459-65.
- M. V. Ramana and A. H. Nayyar, "India, Pakistan and the Bomb" *Scientific American* (December 2001), 73-83.
- M. V. Ramana, "South Asian Mode of Weaponisation," *Economic and Political Weekly* **XXXV**, no. 11 (March 11, 2000), 896-897.
- M. V. Ramana, "Reinventing the Arms Race," *FORUM for Applied Research and Public Policy* **14**, no. 2 (Summer 1999), 1-6.
- Zia Mian and M. V. Ramana, "Disarmament Judo: Using the NPT to make the Nuclear-Weapon States Negotiate the Abolition of Nuclear Weapons," with Zia Mian, *Disarmament Diplomacy* **36** (April 1999), 1-4.
- Zia Mian and M. V. Ramana, "Beyond Lahore: From Transparency to Arms Control," *Economic and Political Weekly* **XXXIV**, no. 16-17 (17 April 1999), 938-942.
- M. V. Ramana, "India's Nuclear Program: From 1946 to 1998," *International Network of Engineers and Scientists Against Proliferation Bulletin* **16** (November 1998), 8-9.
- Zia Mian and M. V. Ramana, "Stepping Away from the Nuclear Abyss: Some Proposals," *International Network of Engineers and Scientists Against Proliferation Bulletin* **16** (November 1998), 12-14.
- M. V. Ramana, "Effects of a Nuclear Blast over Bombay," *Medicine and Global Survival* **5**, no. 2 (October 1998), 74-77.
- M. V. Ramana, "Do Nuclear Weapons provide Security?" *Seminar* **468** (August 1998), 50-54.
- M. V. Ramana, "The Hawks take Flight: India and the Fissile Material Cutoff," *International Network of Engineers and Scientists Against Proliferation Bulletin* **13** (July 1997), 10-12.

## Reports and Chapters in Reports

Elena Krieger, Arjun Makhijani, Boris Lukanov, and M. V. Ramana, *A Clean Energy Pathway for New Jersey*, Prepared for New Jersey Conservation Foundation as part of ReThink Energy NJ by the Institute for Energy and Environmental Research and PSE Healthy Energy, September 2017

M. V. Ramana, “Bangladesh,” “Canada,” “China,” “India,” “Iran,” “Jordan,” “Pakistan,” and “Small Modular Reactors,” in Mycle Schneider and Antony Froggatt, *The World Nuclear Industry Status Report 2017*, Mycle Schneider Consulting, Paris (September 2017), 108-110, 114-117, 151-160, 196-206.

Bernadette K. Cogswell, Nataliawati Siahaan, Friga Siera R, M. V. Ramana, and Richard Tanter, *Nuclear Power and Small Modular Reactors in Indonesia: Potential and Challenges*, Indonesian Institute for Energy Economics and Nautilus Institute for Security and Sustainability, April 2017

Ray Acheson and M. V. Ramana, “India,” in Ray Acheson, ed., *Assuring Destruction Forever: 2017 Edition*, Reaching Critical Will, New York (2017), 10-11.

M. V. Ramana, “Bangladesh,” “China,” “Jordan,” “India,” “Pakistan,” and “United States,” in Mycle Schneider and Antony Froggatt, *The World Nuclear Industry Status Report 2016*, Mycle Schneider Consulting, Paris (July 2016), 43-44, 50-53, 125-148, 162-163.

M. V. Ramana and Frank von Hippel, eds., *Plutonium Separation in Nuclear Power Programs: Status, Problems, and Prospects of Civilian Reprocessing Around the World*, International Panel on Fissile Materials, Princeton (July 2015), 2-178.  
Contribution: Report Design: 30%; Writing: 50%; Editing: 50%; Production: 80%

M. V. Ramana, “India” in M. V. Ramana and Frank von Hippel, eds., *Plutonium Separation in Nuclear Power Programs: Status, Problems, and Prospects of Civilian Reprocessing Around the World*, International Panel on Fissile Materials, Princeton (July 2015), 52-61.

Alexander Glaser, M. V. Ramana, Ali Ahmad, and Robert Socolow, “Small Modular Reactors: A Window on Nuclear Energy,” An Energy Technology Distillate from the Andlinger Center for Energy and the Environment at Princeton University (June 2015), 3-27.

M. V. Ramana, “Advanced Nuclear Reactors—The Story of the SMR,” in Mycle Schneider and Antony Froggatt, *The World Nuclear Industry Status Report 2015*, Mycle Schneider Consulting, Paris (July 2015), 68-77.

M. V. Ramana, “India,” in Ray Acheson, ed., *Assuring Destruction Forever: 2015 Edition*, Reaching Critical Will, New York (2015), 38-43.

M. V. Ramana, “India,” in Ray Acheson, ed., *Still Assuring Destruction Forever*, Reaching Critical Will, New York (2013), 10-11.

M. V. Ramana, “Modernizing India’s Nuclear Arsenal,” in Ray Acheson, ed., *Assuring Destruction Forever: Nuclear Weapon Modernization Around the World*, Reaching Critical Will, New York (2012), 34-43.

Harold Feiveson, Zia Mian, M. V. Ramana, and Frank von Hippel, eds., *Spent Fuel from Nuclear Power Reactors: Experiences and Lessons from Around the World*, International Panel on Fissile Materials, Princeton (2011), 2-182.

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“Health and Environmental Effects of Underground Nuclear Tests,” *Dainik Bhaskar (Hindi)*, March 1999

“Radiation Perils to Workers: Experiences from the United States,” *Dainik Bhaskar (Hindi)*, February 1999

“Reject the Hydrogen Bomb!,” *Dainik Bhaskar (Hindi)*, January 1999

“Did India Test an H-bomb?,” with Frank von Hippel, *Federation of American Scientists Public Interest Report* **52** No. 1, January/February 1999

“Does India Need the H-bomb?,” with Frank von Hippel, *The Hindu*, December 23, 1998

“Nuclear Weapons and Security,” *Dainik Bhaskar (Hindi)*, December 1998

“The Indian Nuclear Bomb – Long in the Making,” *Precis* **9** No. 3 Fall 1998

“If? Bombing Bombay,” *Himal* August 1998

“India's Changing Nuclear Policy,” *Peace Magazine* XIV, January/February 1998

“A Fissile Material Cutoff Treaty,” *Peace Magazine* XII, May/June 1996



## PROFESSIONAL MEETINGS

- “Challenges of Small Modular Reactors,” Presentation at Panel on “Emerging Technologies for Small-scale Grids”, Singapore International Energy Week, Singapore, October 27, 2017
- “Nuclear Energy and Nuclear Disarmament: Can the two co-exist?,” Presentation at the Gathering in the Shadows of a Nuclear Winter Conference, South Asian Network for Secularism and Democracy and Institute for the Humanities, Simon Fraser University, Vancouver, September 9, 2017
- “Global and Regional Economics of Nuclear and Renewable Energy,” Presentation at Workshop on The Future of Nuclear Energy in the Middle East, International Panel on Fissile Materials and American University of Beirut, Beirut, March 15, 2017
- “Nuclear Energy in Saudi Arabia: Necessary? Economically Competitive?,” Presentation at NPEC Public Policy Fellowship Retreat, Nonproliferation Policy Education Center, Washington, D.C., March 4, 2017
- “Linkages Between Nuclear Energy and Nuclear Weapons,” Presentation (over Skype) at Workshop on The Nuclear-Climate Nexus and Sustainable Peace, International Peace Bureau World Congress, Berlin, October 1, 2016
- “Emerging Reactor and Fuel Cycle Technologies, Including Associated Safety, Security, and Safeguards Risks,” Presentation at Workshop on Managing Risks Associated with Global Nuclear Energy Expansion: Emerging Challenges and Cooperative Solutions, George Washington University, Washington, D. C., May 5, 2016
- “Reprocessing and Breeder Reactors: The Case of India,” Presentation at Meeting of the International Panel on Fissile Materials, American Association for the Advancement of Science, Washington, D. C., March 14-15, 2016
- “Ethical Concerns Regarding Nuclear Energy: Weapons, Accidents, Wastes, Costs, and Democracy,” Workshop on Ethics and Governance of Energy Technologies, Eindhoven University of Technology, Netherlands, January 15, 2016
- Co-convenor, Working Group on “Civilian Nuclear Energy, Energy Resources, and International Cooperation,” 61st Pugwash Conference on Science & World Affairs, Nagasaki, Japan, November 1-5, 2015
- “Small Modular Reactors in the United States,” Workshop on Nuclear Power And Small Modular Reactors In Indonesia: Potential And Challenges, Indonesian Institute of Energy Economics, Jakarta, June 25, 2015
- “The Challenges of Nuclear Safety,” International Workshop on Emerging Energy Scenarios in the Middle East, Munib and Angela Masri Institute of Energy and Natural Resources, American University, Beirut, May 22, 2015
- “Accident Risks for High Temperature Reactors,” 1<sup>st</sup> International Conference on Nuclear Risks, Vienna, April 16-17, 2015
- “Taking Sides on the ‘Double Movement’,” Polanyi Conference on Science and Social Responsibility, University of Toronto, November 15, 2014
- “Nuclear Power in Today’s Energy and Environmental Discourse,” Workshop on New Studies in Ecology and Environment, New Delhi, India, August 23, 2014
- “Liability” and “Waste Management,” two talks at Workshop on Nuclear Power in East Asia: The Costs and Benefits, Australian National University, Canberra, Australia, August 12-14, 2014

- “The State of the SMR Market,” Third Trilateral Meeting, Carnegie Mellon University, Pittsburgh, May 8-9, 2014
- “Arguing from the Periphery,” American Physical Society Annual Meeting, Savannah, GA, April 6, 2014
- “Resource Requirements and Proliferation Risks Associated with Small Modular Reactors,” Panel on Opportunities and Challenges for Nuclear Small Modular Reactors, American Association for the Advancement of Science Annual Meeting, Chicago, February 15, 2014
- “Global Context for Nuclear Power,” Conference on Nuclear Technology, Nuclear Energy and a ME WMD-free Zone, Doha, Qatar, October 27, 2013
- “The Impact of Fukushima and Chernobyl on India’s Anti-Nuclear Movements,” Conference on Traveling Norms and the Politics of Contention, Zurich, Switzerland, October 25, 2013
- “Small Modular Reactors: Uranium Resource Requirements, Waste Generation and Proliferation Risk Assessment,” Presentation at the 21<sup>st</sup> International Conference on Nuclear Engineering, Chengdu, China, July 29-August 2, 2013
- “Fukushima Nuclear Accident: Shortcomings of Safety Regulation and Lessons Learned,” Panel Discussion at the Carnegie International Nuclear Policy Conference, Washington, D.C., April 8, 2013
- “Whither Nuclear Power?” Panel Discussion at the Carnegie International Nuclear Policy Conference, Washington, D.C., April 8, 2013
- “One in infinity’: Assessing Nuclear Risks in India,” Presentation at the Panel on “India at Risk: Capacity, Institutions and Expertise”, Society for Risk Analysis 2012 Annual Meeting, San Francisco, December 12, 2012
- “How about Domestic Emission Inequities? The Case of India,” Presentation at the International Conference on Inequality and Sustainability, Stockholm Environmental Institute & Center for International Environment and Resource Policy, Boston, November 9, 2012
- “Proliferation Risks Associated with Small Modular Reactors,” Presentation at the “Summer Symposium on Science and World Affairs”, Organized by the Union of Concerned Scientists, Princeton, July 9, 2012
- “India and Nuclear Transparency,” Presentation at the Workshop on “Transparency”, Organized by the International Panel on Fissile Materials, Princeton, March 31, 2012
- “Nuclear Safety and Security in India,” Presentation at the Panel Discussion on Nuclear Policy of Key Countries, Seoul National University, Seoul, South Korea, March 22, 2012
- “Indian Fallout: Public Protest and Organizational Strategies in the Aftermath of the Fukushima Accidents,” Presentation at Panel Discussion on Nuclear Energy After Fukushima: Japan and Beyond, Association of Asian Studies Conference, Toronto, March 18, 2012
- “Nuclear Power in India: Implications of Fukushima,” Presentation at the Panel on Nuclear Power: One Year after Fukushima, American Physical Society Meeting, Boston, March 1, 2012
- “India’s Nuclear Plans: Can they be Realized?,” Presentation at the Workshop on “Reprocessing”, Organized by the International Panel on Fissile Materials, Tokyo, January 20, 2012
- “Prospects for India’s Breeder Program,” Presentation at the Workshop on “Nuclear Fuel Cycle Issues in Asia”, Organized by the International Panel on Fissile Materials, Tokyo, March 19, 2010

- “Inherently Ambiguous? The Limits of Nuclear Accident Scenarios and Safety Analyses,” Meeting on “Knowledge Society Debates”, Organized by the STEPS Centre, University of Sussex, National Institute of Advanced Studies, Bangalore, January 8, 2009
- “Some Challenges for Nuclear Power in Developing Countries,” Presentation at Conference on “New Generation Nuclear: From policy to implementation,” Organized by Chatham House, London, November 17-18, 2008
- “Nuclear Power in India: Perspectives and Challenges,” Presentation at Conference on “The nuclear energy revival: regional perspectives and governance challenges,” Organized by Centre for International Governance Innovation & Canadian Centre for Treaty Compliance, Waterloo, November 6-7, 2008
- “More than Desirable: Some Necessary, but not Sufficient, Conditions for Nuclear Expansion,” Presentation at the Conference on The Future of Nuclear Energy, Organized by the Bulletin of the Atomic Scientists, Argonne National Laboratory, and the University of Chicago, Chicago, September 25-26, 2008
- “Nuclear Power and Energy Security in India,” Presentation at Meeting on “The Proposal for Nuclear Trade with India,” Organized by Heinrich Böll Foundation and Arms Control Association, Berlin, May 13, 2008
- “Some Implications of the US-India Nuclear Deal,” Presentation at the NGO Panel on “The US-India Nuclear Deal and the NPT,” Nuclear Non Proliferation Treaty Preparatory Committee Meeting, United Nations, Geneva, May 2, 2008
- “Fissile Material Implications of the US-India Nuclear Deal,” Presentation at the Annual Meeting of the German Physical Society, Berlin, February 29, 2008
- “Nuclear Safety,” Presentation at the Centre for Interdisciplinary Studies on Environment and Development Advisory Committee Meeting, Bangalore, January 11, 2008
- “Climate Change and Nuclear Power in Developing Countries,” Presentation at “Nuclear Energy: Myth and Reality,” Side event at 13<sup>th</sup> Conference of Parties to the United Nations Framework Convention on Climate Change, Organized by Heinrich Böll Foundation, Nusa Dua, Bali, December 13, 2007
- “Infeasible and Undesirable: A Nuclear Comeback and Climate Security,” Presentation at 2<sup>nd</sup> TERI-KAF Conference on “Energy, Climate, and Security: The Inter-Linkages,” Organized by The Energy and Resources Institute and Konrad Adaneur Foundation, Goa, October 13 - 14, 2007
- “Nuclear Reactors: Unsafe at any Price,” Presentation at the International Conference on “Indo-US Nuclear Deal,” Organized by the Heinrich Böll Foundation, CNDP, and PEACE, New Delhi, August 31-September 1, 2007
- “The U.S. India Nuclear Deal: Debates and Implications,” Presentation at the Meeting on “Forging a New Consensus for the NPT,” Article VI Forum, Vienna International Center, Vienna, March 29, 2007
- “Nuclear Energy: Projections and Economics,” Presentation at Workshop on Power Sector Reforms and Regulation in India, Prayas, Pune, March 22-23, 2007
- “Economic and Environmental Costs of Nuclear Power,” Presentation at the Ninth Biennial Conference of the International Society of Ecological Economics, New Delhi, December 16-18, 2006
- “Nuclear Economics in a Developing Country: The Case of India,” Presentation at the Conference on The Future of Nuclear Energy, Organized by the Bulletin of the Atomic Scientists, Argonne National Laboratory, and the University of Chicago, Chicago, November 1-2, 2006

- “Nuclear Energy and Climate Change,” Presentation at the Workshop for Journalists on Energy and Climate Change, Organized by PANOS South Asia, New Delhi, July 5, 2006
- “Feeding the Nuclear Fire,” Presentation at the Conference on International Nuclear Cooperation with India, Simons Centre for Disarmament, University of British Columbia, Vancouver, November 22, 2005
- “India’s Nuclear Enclave and the Practice of Secrecy,” Presentation at the Second Workshop on “Culture, Society and Nuclear weapons in South Asia,” Social Science Research Council, Washington, D.C., August 28-29, 2005
- “An Estimate of India’s Uranium Enrichment Capacity,” Presentation at the 17<sup>th</sup> International Summer Symposium on Science and World Affairs, Princeton, July 23-31, 2005
- Discussant, First Workshop on “Culture, Society and Nuclear weapons in South Asia,” Social Science Research Council, Amsterdam, May 9-11, 2005
- “Nuclear Power: the Department of Atomic Energy’s Plans and Constraints,” Presentation at the Consultation Meeting on Strategies to Realize a Non-nuclear India organized by Citizens for Alternatives to Nuclear Energy and Centre for Interdisciplinary Studies in Environment and Development, Bangalore, January 29, 2005
- Coordinator, Environmental Sustainability Group, Workshop on “Neglected Dimensions of Electricity Sector Policies: Equity, Sustainability, and Institutions and Governance,” Prayas, Pune, January 11-12, 2005
- “India and Nuclear Secrecy,” Presentation at the Conference on “Transparency as a Pre-requisite of Arms Control,” Peace Research Institute, Bensheim, November 19-20, 2004
- “Nuclear Energy and Security,” Presentation at the Workshop on “The Challenge of Hiroshima: Alternatives to Nuclear Weapons, Missiles, Missile Defenses, and Space Weaponization in a Northeast Asian Context,” International Network of Engineers and Scientists Against Nuclear Weapons, Hiroshima, October 8-11, 2004
- “Energy and Environmental Sustainability,” Presentation at the National Seminar on Integrating Environmental Sustainability with Economic Development, Maharani’s Arts College for Women, Bangalore, August 26, 2004
- “The Cost of Electricity from Indian Pressurised Heavy Water Reactors,” Presentation at the Centre for Interdisciplinary Studies on Environment and Development Advisory Committee Meeting, Bangalore, January 12, 2004
- “Effects of Nuclear Explosions,” Lecture at the Workshop on “Defence, Technology and Cooperative Security in South Asia”, Regional Centre for Strategic Studies, Shanghai, December 3-13, 2003
- “Problems with Nuclear Early Warning Systems in South Asia,” Lecture at the Workshop on “Defence, Technology and Cooperative Security in South Asia”, Regional Centre for Strategic Studies, Shanghai, December 3-13, 2003
- “Nuclear Weapons Effects,” Presentation at the Institute for Energy and Environmental Research Technical Training Workshop, Takoma Park, Maryland, June 19, 2003
- “Nuclear South Asia,” Talk at Panel on “War and Public Health,” Presentation at the American Public Health Association 130<sup>th</sup> Annual Meeting & Exposition, Philadelphia, November 11, 2002
- “Under the Nuclear Shadow,” Discussion at Middlesex County College, October 31, 2002

- “Dangers of Nuclear War and Paths to Nuclear Weapons Abolition,” Presentation at the American Friends Service Committee Conference on “Paths to a Just and Secure Future,” Boston, October 11, 2002
- “Nuclear South Asia,” Overview Lecture at the 1<sup>st</sup> International Professional Meeting of Independent Technical Security Analysts, Chicago, July 23-24, 2002
- Invited “Shadow Expert” at the SANITY (Students Against Nuclear Insanity and for Tomorrow’s Youth) Youth Caucus at the Nuclear Non Proliferation Treaty Preparatory Committee Meeting, United Nations, New York, April 17, 2002
- “The Arms Race in South Asia,” Presentation at the NGO Panel on “The Shape of Things to Come,” Nuclear Non Proliferation Treaty Preparatory Committee Meeting, United Nations, New York, April 12, 2002
- “Alternatives to Missile Defense,” Briefing for Delegates, NGOs and Press at the Nuclear Non Proliferation Treaty Preparatory Committee Meeting, United Nations, New York, April 11, 2002
- “Effects of Nuclear Explosions and Nuclear War in South Asia,” Lecture at the Workshop on “Defence, Technology and Cooperative Security in South Asia”, Regional Centre for Strategic Studies, Kalutara, Sri Lanka, January 5-14, 2002
- “Plutonium Dispersal and Health Hazards from Nuclear Weapon Accidents,” Lecture at the Workshop on “Defence, Technology and Cooperative Security in South Asia”, Regional Centre for Strategic Studies, Kalutara, Sri Lanka, January 5-14, 2002
- “Beyond Missile Defense: Arguments,” Presentation at the 13<sup>th</sup> International Summer Symposium on Science and World Affairs, Berlin, July 21-30, 2001
- “The Missile Race in Critical Regions: Is there a way out?,” Presentation at the Workshop on “Moving Beyond Missile Defense”, International Network of Engineers and Scientists Against Nuclear Weapons, Santa Barbara, March 19-21, 2001
- “Is there a Missile Threat? The Dynamics of Missile Proliferation and the State of Missile Control,” Presentation at the Workshop on “Moving Beyond Missile Defense”, International Network of Engineers and Scientists Against Nuclear Weapons, Santa Barbara, March 19-21, 2001
- “Ballistic Missile Disarmament,” Presentation at the Panel on “Outer Space: Disarmament Issues,” Organized by the NGO Committee on Disarmament, Disarmament Week, United Nations, October 19, 2000
- “Why Nuclear Disarmament,” Presentation at the Alliance for Nuclear Accountability Meeting, Amarillo, September 23, 2000
- “Plutonium Dispersion and Health Hazards from Nuclear Weapons Accidents,” Presentation at the 12<sup>th</sup> International Summer Symposium on Science and World Affairs, Moscow, Russia, August 23-31, 2000
- “Scientists and Radiation Protection: A History,” Presentation at the NGO Panel on “Health, Environment, Science and Society: Professional Responsibility in the Nuclear Age,” Nuclear Non-Proliferation Treaty Review Conference, United Nations, New York, May 15, 2000
- “Environmental Aspects of the Nuclear Fuel Cycle,” Presentation at the NGO Panel on “The Toxic Legacy of the Nuclear Age,” Nuclear Non-Proliferation Treaty Review Conference, United Nations, New York, May 4, 2000
- “Scientists and Ideology,” Presentation at the NGO Panel on “Personal Responsibility in the Nuclear Age,” Nuclear Non-Proliferation Treaty Review Conference, United Nations, New York, May 1, 2000

- “NPT Forecast: Cloudy or Sunny,” Presentation at the NGO Presentation in preparation for the Nuclear Non-Proliferation Treaty Review Conference, United Nations, New York, April 18, 2000
- “The Future of Post-Nuclear South Asia,” Presentation at the Conference on “Rethinking the Past, Shaping the Future: Partition, History and Identity,” South Asian Students Association of Smith College, Northampton, MA, March 25, 2000
- Overview presentation at the workshop (jointly organized with Srirupa Roy, New York University) on “Nuclear Understandings: Science, Society, and the Bomb in South Asia,” Dhaka, February 17, 2000
- Overview presentation at plenary discussion on “Nuclear Policy and Understandings in India” at the 13<sup>th</sup> Annual SSRC-MacArthur Foundation Fellows' The Conference, New Delhi, August 19-23, 1999
- “Health Effects of Reactor Accidents,” Presentation at the 11<sup>th</sup> International Summer Symposium on Science and World Affairs, Shanghai, China, July 28 - August 5, 1999
- “Regional Proliferation,” NGO Presentation at the Nuclear Non Proliferation Treaty Preparatory Committee Meeting, United Nations, New York, May 10-21, 1999
- “Nuclear Capabilities of India,” Presentation at the session on “Physics and Disarmament” at the 63<sup>rd</sup> Annual Meeting of the German Physical Society, Heidelberg, March 18, 1999
- Keynote Speaker, Symposium on De-alerting of Nuclear Weapons, Organized by The United Nations Department of Disarmament Affairs, New York, October 26, 1998
- “Radioactivity Releases from Underground Nuclear Tests,” Presentation at the 10<sup>th</sup> International Summer Symposium on Science and World Affairs, Cambridge, Massachusetts, USA, July 13-21, 1998
- “India's Nuclear Tests: Some Technical Aspects,” Presentation at the 10<sup>th</sup> International Summer Symposium on Science and World Affairs, Cambridge, Massachusetts, USA, July 13-21, 1998
- “Effects of a Nuclear Explosion,” Presentation at the Institute for Energy and Environmental Research Technical Training Workshop, Takoma Park, Maryland, July 7-12, 1998
- Discussant, Panel Discussion on “India, Pakistan and Global Nuclear Disarmament,” Sponsored by Congresswoman Barbara Lee and Congressman John Conyers and the Institute for Policy Studies, Rayburn House Office Building, Washington, D.C., June 25, 1998
- “India's Nuclear Tests,” Presentation at the 12<sup>th</sup> Annual SSRC-MacArthur Foundation Fellows' Conference, San Salvador, May 17-23, 1998
- Invited Specialist to discuss “Agreements on controlling the components: a fissile material cut-off” at the International Consultation on “Global Security and Nuclear Disarmament” organized by the United Services Institution, Delhi and the Oxford Research Group, U.K., Neemrana, March 3-6, 1998.
- “Serving a Nuclear Summons: How to make the Nuclear Weapon States Negotiate Disarmament,” Presentation at the Pugwash Workshop on “Eliminating Nuclear Weapons,” New Delhi, March 1-3, 1998
- Participant, Meeting on “The Future of Russian-US Strategic Arms Reductions: START III and Beyond,” Jointly sponsored by The Center for Arms Control, Energy, and Environmental Studies, The Moscow Institute of Physics and Technology, and The MIT Security Studies Program, Cambridge, USA, February 2-6, 1998
- “Modelling Prithvi and Agni,” Presentation at the 9<sup>th</sup> International Summer Symposium on Science and World Affairs, Cornell University, Ithaca, USA, July 24 -August 3, 1997

- Participant, Conference on “The Future of Nuclear Weapons : A US-India Dialogue,” Center for Advanced Study of India, University of Pennsylvania, May 5-8, 1997
- “Nuclear Energy in India: Problems and Prospects,” Presentation at the NGO sessions of the NPT Preparatory Conference, United Nations, New York, USA, April 15, 1997
- “The Effects of Nuclear Explosions - a Case Study of Mumbai,” Presentation at the Regional Meeting of the International Physicians for the Prevention of Nuclear War, New Delhi, India, February 21-23, 1997
- “History of the Comprehensive Test Ban Treaty,” Overview Presentation at Panel Discussion on South Asia and the CTBT, Massachusetts Institute of Technology, USA, September 24, 1997
- “India's Participation in a Fissile Material Production Cutoff Convention,” Presentation at the 8<sup>th</sup> International Summer Symposium on Science and World Affairs, Beijing, China, July 23-31, 1996
- “India's Participation in a Fissile Material Production Cutoff Convention” Presentation at the 10<sup>th</sup> Annual SSRC-MacArthur Foundation Fellows' Conference, Oxford University, United Kingdom, May 18-23, 1996
- “New Flavor Physics in b Decays,” Presentation at the 2<sup>nd</sup> Workshop on High Energy Physics Phenomenology, SN Bose Institute, Calcutta, January 1996
- “A New Physics Source of Hard Gluons in Top Quark Production,” Presentation at the 17<sup>th</sup> Annual MRST Meeting on High Energy Physics, Rochester, NY, USA, May 8-9, 1995
- Participant, Theoretical Advanced Study Institute in Elementary Particle Physics, Boulder, Colorado, USA, June 2-28, 1991

## INVITED SEMINARS AND LECTURES

- “Life Under the Shadow: Twenty years of Nuclear Weapons in India and Pakistan,” Seminar, Centre For India And South Asia Research, University Of British Columbia, March 29, 2018
- “Global Environmental Crises,” Lecture in Course on Introduction to International and Intercultural Studies, Douglas College, March 26, 2018
- “The Fukushima Accident, Policy Choices and the Contested Future of Nuclear Energy,” Lecture in Course on Urban Systems and Society, School of Community and Regional Planning, University Of British Columbia, March 12, 2018
- “Can Nuclear Energy be a Solution to Climate Change? Possible? Desirable? Feasible?,” Colloquium, Indiana University of Pennsylvania, February 22, 2018
- “Nuclear energy, radioactive waste, and sustainability,” Lecture in Course on Sustainability, Indiana University of Pennsylvania, February 22, 2018
- “The Nuclear Arms Race in South Asia: The Case of India,” Lecture in Course on Weapons of Mass Destruction and International Security, Princeton University, Princeton, February 21, 2018
- “Nuclear Weapons in India: History and Risk,” Seminar, Ethnic Studies Department & International Institute, University Of California, San Diego, November 30, 2017
- “Nuclear Power in the Middle East,” Seminar, University of San Diego, November 30, 2017
- “Nuclear Energy and SMRs: Products and Problems,” Lecture in Course on Nuclear Energy and Policy, Michigan State University, November 15, 2017
- “Nuclear Bombs and Nuclear Power: World Peace & Energy Security -- Unravelling the Promises,” Asian College of Journalism, Chennai, India, November 6, 2017
- “Nuclear Energy and SMRs in Indonesia,” Energy Studies Institute, National University of Singapore, October 25, 2017
- “The Global Future of Nuclear Energy,” School of Public Policy and Global Affairs, University of British Columbia, Vancouver, October 18, 2017
- “The Nuclear Arsenals of India and Pakistan: Programmes, Plans and Dangers,” Lecture in Course on Nuclear Weapons and Disarmament, University of Melbourne, May 8, 2017
- “The Nuclear Arms Race in South Asia: The Case of India,” Lecture in Course on Weapons of Mass Destruction and International Security, Princeton University, Princeton, April 10, 2017
- “Why do States Build Nuclear Weapons? The Case of India,” Carleton College, MN, November 4, 2016
- “Nuclear Power: Overview, Economics, and India,” Carleton College, MN, November 4, 2016
- “Small Modular Reactors: An Inadequate Response to the Challenges Faced by Nuclear Power,” Nanyang Technological University, Singapore, October 18, 2016
- “U.S. Launch of the World Nuclear Industry Status Report 2016,” with Mycle Schneider, Natural Resources Defense Council, Washington, D.C., September 19, 2016
- “After Fukushima: Nuclear Power Programs Around the World,” Google Hangout with Sigma Xi, October 11, 2016



- “Nuclear Weapons in South Asia: Programmes, Plans, and Dangers,” Dr. Asghar Ali Engineer Memorial Advisory Committee and Coalition for Nuclear Disarmament and Peace, Mumbai, August 27, 2016
- “The Future of Nuclear Energy in India: Expectations and Constraints,” School of Media and Cultural Studies, Tata Institute of Social Sciences, Mumbai, August 26, 2016
- “Understanding Nuclear Energy and Nuclear Diplomacy,” Asian College of Journalism, Chennai, August 22, 2016
- “Whither Nuclear Power in the Middle East: The Cases of Saudi Arabia and Jordan,” Nonproliferation Policy Education Center, Washington, D.C., May 5, 2016
- “Connections Between Nuclear Energy and Nuclear Weapons,” Liu Institute for Global Issues, University of British Columbia, Vancouver, January 8, 2016
- “Exit, Voice, and Loyalty: Policy Choices and the Future of Nuclear Energy since Fukushima,” Liu Institute for Global Issues, University of British Columbia, Vancouver, January 7, 2016
- “Nuclear Power and India’s Energy Needs: Lessons from History,” Energy Policy Institute at the University of Chicago- India Centre, New Delhi, December 23, 2015
- “Status of nuclear power in India and the potential impact of India- Japan nuclear cooperation,” Citizens’ Nuclear Information Center, Tokyo, November 6, 2015
- “Nuclear Energy in China and India: Can Ambitions Meet Reality?” Kyoto University, Kyoto, November 4, 2015
- “Assessing Risk Assessment: Nuclear Regulation and Reactor Safety,” Princeton Institute for International and Regional Studies, Princeton University, Princeton, October 15, 2015
- “Nuclear Fission Energy: Status and Policies,” ExxonMobil – Princeton University Workshop, Princeton, October 13, 2015
- “Nuclear India: Politics, Rhetoric and Reality,” The Alliance for a Secular and Democratic South Asia & Science for the People, Massachusetts Institute of Technology, Cambridge, October 5, 2015
- “Challenges in Licensing Small Modular Reactors,” Bapeten (Nuclear Energy Regulatory Agency of Indonesia), Jakarta, June 26, 2015
- “Reprocessing and Breeder Reactors in India,” International Panel on Fissile Materials Panel on the Global Challenge of Reprocessing and Plutonium Disposal, NPT Review Conference, United Nations, New York, May 7, 2015
- “Nuclear Energy: Global Overview & the Case of India,” Program on International Relations and Strategic Affairs, Princeton University & Center for Policy Research, Princeton, April 9, 2015
- “Atomic Development and Democratic Dissent: Opposition to the Koodankulam Nuclear Plant in India,” Lecture, Program for South Asian Studies, Princeton University, Princeton, March 4, 2015
- “Nuclear Energy After Fukushima,” Colloquium, Department of Physics, Ohio State University, February 23, 2015
- “Nuclear Energy in India: Current Status and Future Outlook,” Korea Advanced Institute of Science and Technology, Daejeon, December 22, 2014
- “Nuclear Energy in India: Historical Record and Future Prospects,” Institute of South Asian Studies, National University of Singapore, August 19, 2014

- “Nuclear Power in India: History and Prospects,” Melbourne University, August 15, 2014
- “Motivations and Challenges for Small Modular Reactors,” Nuclear Engineering Department, Universidade Federal do Rio de Janeiro, March 18, 2014
- “The Power of Promise: Examining the Feasibility of a Rapid Expansion of Nuclear Energy in India,” South Asia Institute and the Kennedy School Project on Managing the Atom, Harvard University, Cambridge, December 6, 2013
- “Fukushima: Implications for the Understanding of Severe Accidents and the Future of Nuclear Energy,” Colloquium, Department of Physics, Case Western University, Cleveland, November 21, 2013
- “Nuclear Energy: Issues in India and Around the World,” Presentation at Prayas Energy Group, Pune, November 1, 2013
- “Challenges in Licensing Small Modular Reactors,” Trilateral Meeting, University of Maryland, College Park, September 19-20, 2013
- “Nuclear Energy and Climate Change,” Presentation at the Heinrich Böll Foundation, Beijing, August 6, 2013
- “Nuclear Power: Why, What, Why Not,” Lecture, Vermont Law School, South Royalton, July 12, 2013
- “Nuclear Arms Race in South Asia: The Case of India,” Lecture at the Heinrich Böll Foundation, Berlin, April 29, 2013
- “The Future of Nuclear Energy in India: History, Technology, and Economics,” Program in South Asia Studies, Princeton University, Princeton, March 28, 2013
- “Nuclear Energy in India: History, Technology, and the Future,” King’s College London, March 20, 2013
- “The Potential for Severe Accidents Associated with Nuclear Power,” Round Table on Liability Legislation in India, New Delhi, March 17, 2013 (over Skype)
- “Nuclear Energy in India: Learning from the Past, Thinking about the Future,” Indian Institute of Technology, Madras, February 22, 2013
- “The Power of Promise,” Jawaharlal Nehru University, New Delhi, February 20, 2013
- “Risk Perception in the Indian Nuclear Establishment,” The Energy and Resources Institute (TERI), New Delhi, February 20, 2013
- “Nuclear Power: Motivations and Problems,” National Institute of Immunology, New Delhi, February 19, 2013
- “Nuclear Energy in India: Perspectives on its Past, Present and Future,” Madras Institute of Development Studies, Madras, February 18, 2013
- Is Nuclear Energy the Answer to India's energy needs? Loyola College, Madras, February 18, 2013
- “Nuclear Accidents and Learning: The Indian Experience,” National Institute of Advanced Studies, Bangalore, February 15, 2013
- “Nuclear Energy in India: Past and Future,” Indian Institute of Management, Bangalore, February 14, 2013

- “Nuclear Energy in India: Perspectives on its Past, Present and Future,” Hyderabad Central University, Hyderabad, February 13, 2013
- “Nuclear Energy in India,” Panel Discussion at Lamakaan: An Open Cultural Space, Hyderabad, February 12, 2013
- “Worried in Koodankulam: Nuclear Safety and Public Protests in India,” Lecture at the San Jose Peace and Justice Center, San Jose, December 22, 2012
- “Organizing for Nuclear Disarmament and Peace in India,” Hiroshima/Nagasaki Commemoration, Coalition for Peace Action, Princeton, August 6, 2012
- “Small Modular Reactors: Features, Motivations,” Exploring the End of Nuclear Power and Examining its Proliferation and Health Problems, Institute for Energy and Environmental Research, Washington, D.C., July 25, 2012
- “Connections Between Nuclear Power and Nuclear Weapons: Production,” Exploring the End of Nuclear Power and Examining its Proliferation and Health Problems, Institute for Energy and Environmental Research, Washington, D.C., July 25, 2012
- “Nuclear Power: Why, What, Why Not,” Lecture, Vermont Law School, South Royalton, July 13, 2012
- “Small Modular Reactors: Overview,” Seminar at the Brookhaven National Laboratory, Upton, New York, May 9, 2012
- “Nuclear Power After Fukushima,” Colloquium, Department of Mathematical Sciences, Montclair State University, Montclair, New Jersey, November 30, 2011
- “The Future of Nuclear Power” Fall 2011 Maclean House Lecture Series, Sponsored by the Office of the Alumni Association, Princeton University, Princeton, October 6, 13, & 20, 2011
- “The Economics of Nuclear Power,” Seminar at the Indian Institute of Science, Bangalore, August 29, 2011
- “Nuclear Power: Risk and Ethics,” Lecture at Ashoka Trust in Ecology and Environment, Bangalore, August 29, 2011
- “United Kingdom,” Presentation at panel discussion on “The Challenges of Spent Fuel Management: Experience and Lessons from Around the World” at the AAAS Center for Science, Technology and Security Policy, Washington D.C., June 3, 2011
- “Nuclear Power: Global Trends, Future Projections,” Presentation at panel discussion on “The Jobs, Costs, and Security Landscape of a US Nuclear Expansion,” Organized by Center for Earth, Energy, and Democracy, Institute for Agriculture and Trade Policy, Minneapolis, March 25, 2011
- “Implications of Fukushima for Nuclear Safety: A Preliminary Assessment,” Presentation at panel discussion on “After the Earthquake: Japan’s Nuclear Plant Crisis” at the Woodrow Wilson School for Public and International Affairs, Princeton University, March 24, 2011
- “Nuclear Energy and Climate Change,” Plenary Lecture at the Conference on “Towards a Nuclear Weapon Free World” and the 10th Anniversary National Convention of the Coalition for Nuclear Disarmament and Peace, New Delhi, December 11, 2010
- “Nuclear Power: Current Trends, Future Projections, Developing Countries,” Bulletin of the Atomic Scientists, Doomsday Clock Symposium, Washington, D. C., November 4, 2010

- “Looking up at the Apocalypse: Disarmament, Climate Change, and Justice,” Panel Presentation at “For a Nuclear Free, Peaceful, Just, Sustainable World Conference”, Riverside Church, New York City, May 1, 2010
- “India: Climate Debates, Energy Trends,” Princeton Environmental Institute, Princeton University, February 5, 2010
- “Dealing with Climate Change: Equity, Justice, and Social Change,” Climate Change Panel, Bulletin of the Atomic Scientists, Domsday Clock Symposium, New York City, January 13, 2010
- “A Nuclear Powered Solution to Climate Change: Feasible? Desirable?,” Environment Affairs Forum, Princeton University, November 24, 2009
- “India’s Energy Future: How Much Can Nuclear Power Contribute?,” Science, Technology, and Environmental Policy Seminar, Princeton University, September 28, 2009
- “Nuclear Energy in India: History and Future,” Rotary Club, Bangalore, March 14, 2009
- “Kya Dam Hai? The Economics of Nuclear Power,” Gujarat Vidyapeeth, December 8, 2008
- “Between Three Hard Places: India's Energy and Climate Change Policies,” Seminar, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, October 14, 2008
- “Nuclear Power as a Solution to Climate Change?,” Seminar, John F. Welch Technology Centre, General Electric Company, Bangalore, September 15, 2008
- “Economic Costs of Nuclear Power in India,” Seminar, Indian Institute of Management, Bangalore, March 21, 2008
- “Can Nuclear Power Help with Climate Change? Lessons from the Experience in India and Elsewhere,” Lecture for Postgraduate Certificate Course on Technology and Sustainable Development, Indian Institute of Technology, Madras, January 14, 2008
- “The Nuclear Deal and the Evolving Indo-US Relationship,” Lecture for course on “Globalization”, Swaraj Vidyapeeth, Bangalore, December 29, 2007
- “Indo-US Nuclear Deal,” Talk to CONCERNs, Student Group, Indian Institute of Science, Bangalore, November 17, 2007
- “The US-India Nuclear ‘Deal’: Underlying Issues and Debates,” Seminar, Institute for Social and Economic Change, Bangalore, November 15, 2007
- “Some Aspects of the US India Nuclear Deal,” Seminar, Indian Statistical Institute, Bangalore, November 7, 2007
- “Nuclear Energy: Economic and Environmental Aspects,” Lecture for course on “Approaching the Environment in India – New Theories and Methods in the Study of the Nature-Society Interface,” Institute for Social and Economic Change, Bangalore, August 9, 2007
- “Implications of the US India Nuclear Deal,” Presentation to the Citizens for Alternatives to Nuclear Energy, Bangalore, April 19, 2007
- “Breeder Reactors: Overview and Economics,” Seminar, National Institute for Advanced Studies, Bangalore, November 29, 2006
- “An Overview of Nuclear Power in India,” Presentation to the Greenpeace International Advisory Committee, Greenpeace, Bangalore, June 4, 2006

- “India: Prisoner of the Nuclear Dream,” Special Energy and Environmental Policy Lecture, Center for Energy and Environmental Policy, University of Delaware, May 18, 2006
- “The US-India Nuclear Deal,” Seminar, Science, Technology and Global Security Working Group, Program in Science, Technology and Society, Massachusetts Institute of Technology, May 12, 2006
- “Nuclear Power in India: Failed Past, Dubious Future,” Seminar, Nonproliferation Policy Education Center, Washington, D.C., May 10, 2006
- “The US-India Nuclear Deal,” Seminar, Center for International Security and Cooperation, Stanford University, May 1, 2006
- “The US-India Nuclear Deal,” Joint Seminar with Zia Mian, South Asia Studies Committee, Princeton University, April 25, 2006
- “Nuclear Weapons in India: Glimpses from History” and “Atomic Energy in India”, Two lectures at the National Law School of India University, Bangalore, April 1, 2006
- “South Asia: Under the Nuclear Shadow,” Seminar, Liu Institute for Global Studies, University of British Columbia, Vancouver, Canada, November 23, 2005
- “Promises and Failures: The Story of Atomic Energy in India,” Colloquium, Raman Research Institute, Bangalore, October 6, 2005
- “Nuclear Power: Plans, Prospects, and Constraints,” Presentation to Greenpeace, Bangalore, August 24, 2005
- “Nuclear Power in India: Current Status, Future Prospects,” Seminar, Centre for International Security and Cooperation, Stanford University, July 20, 2005
- “Ionizing Radiation and Health,” Lecture, Bangalore Planetarium, May 27, 2005
- “Technology Choices and their Implications: the Case of Nuclear Energy in India,” Lecture, Course on Technology and Policy in India, Indian Institute of Management, Bangalore, March 16, 2005
- “Economics of Nuclear Power in India,” Seminar, Institute for Social and Economic Change, Bangalore, February 17, 2005
- “Nuclear Energy and Nuclear Weapons: Issues for an Informed Public Debate,” Public Lecture, Organized by Society for Promoting Participative Ecosystem, Prayas, Centre for Environment Education, and others, Pune, January 12, 2005
- “Technology and Development: Nuclear Energy in India,” Two lectures, Course on Technology and Sustainable Development, Indian Institute of Technology, Chennai, January 4, 2005
- “Future of Nuclear Power in India,” Lunch Seminar, Program on Science and Global Security, Princeton University, October 1, 2004
- “Nuclear Power in India: An Overview,” Seminar, Department of Chemical Engineering, Indian Institute of Science, Bangalore, August 19, 2004
- “Secrecy and India’s Nuclear Establishment,” Lecture, Alternate Law Forum, Bangalore, May 21, 2004
- “A Progressive Bomb?,” Seminar, China Study Group, New York, January 31, 2004
- “An Estimate of India’s Uranium Enrichment Capacity,” Lunch Seminar, Program on Science and Global Security, Princeton University, August 6, 2003

- “Nuclear Power in India,” Seminar, Center for Energy and Environmental Policy, University of Delaware, May 15, 2003
- “Steps Towards Operationalizing the Indian Nuclear Arsenal,” Lunch Seminar, Program on Science and Global Security, Princeton University, January 22, 2003
- “Normal Accidents and Nuclear War,” Lecture, Course on “Engineers in Society,” New Jersey Institute of Technology, October 24, 2002
- “Deployment of Nuclear Weapons and Early Warning in South Asia,” Technical Seminar, Security Studies Program, Massachusetts Institute of Technology, October 10, 2002
- “Beyond Missile Defense,” Division of Natural Sciences and Mathematics Colloquium, Colgate University, April 19, 2002
- “Health Impacts from Uranium Mining in India,” Presentation to ASHA, Princeton University, February 16, 2002
- “The Environmental and Health Impacts of the Nuclear Fuel Cycle,” Seminar, Institute for Social and Economic Change, Bangalore, January 3, 2002
- “Uranium Mining and Health in India,” Presentation to ASHA, Columbia University, November 4, 2001
- “Economics of Nuclear Power from Fast Breeder Reactors in India,” Seminar, Indira Gandhi Institute for Development Research, August 20, 2001
- “Nuclear Power Economics in India: Fast Breeders vs. Heavy Water Reactors,” Seminar, Center for Energy and Environmental Studies, Princeton University, July 10, 2001
- “Scientists and India’s Nuclear Bomb,” Seminar, Center for International Security and Cooperation, Stanford University, March 13, 2001
- “Scientists and India’s Nuclear Bomb,” Lecture, Yale Center for International and Area Studies, Yale University, October 26, 2000
- “Nuclear Weapons in South Asia: A Scientist’s Perspective,” Presentation to the Stanford India Association, Stanford University, June 29, 2000
- “Prisoners of the Nuclear Dream: India, Pakistan, and the Making of Nuclear Nations,” Seminar, Program on Science, Technology and Society, Massachusetts Institute of Technology, February 19, 1999
- “Nuclear Energy and Weapons in South Asia,” Seminar, Gettysburg College, January 29, 1998
- “The Effects of Nuclear Explosions - a Case Study of Mumbai,” Seminar, School of International Studies, Jawaharlal Nehru University, New Delhi, February 24, 1997
- “Walking Technicolor Signatures at Hadron Colliders,” Seminar, Center for Theoretical Studies, Indian Institute of Science, Bangalore, July 1992
- “Electroweak Symmetry Breaking, Walking Technicolor, and the SSC,” Seminar, Department of Physics, University of Wuppertal, Germany, February 1992