

# NUCLEAR ENERGY AND GLOBAL GOVERNANCE TO 2030

## An Action Plan



**NUCLEAR ENERGY FUTURES PROJECT**  
**CHAIR: LOUISE FRÉCHETTE    DIRECTOR: TREVOR FINDLAY**



The Centre for International  
Governance Innovation  
Centre pour l'innovation dans  
la gouvernance internationale

Addressing International Governance Challenges



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## AN ACTION PLAN

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LOUISE FRÉCHETTE

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CIGI's Nuclear Energy Futures Project is conducted in partnership with the Canadian Centre for Treaty Compliance (CCTC) at the Norman Paterson School of International Affairs, Carleton University, Ottawa. The project is chaired by CIGI Distinguished Fellow Louise Fréchette and directed by CIGI Senior Fellow Trevor Findlay, director of CCTC. CIGI gratefully acknowledges the Government of Ontario's contribution to this project.

The opinions expressed in this report are those of the author(s) and do not necessarily reflect the views of The Centre for International Governance Innovation, its Board of Directors and/or Board of Governors, or the Government of Ontario.



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## INTRODUCTION

2010 will be a pivotal year for nuclear issues. In April, President Obama will host a Summit on Nuclear Security. In May, parties to the Nuclear Nonproliferation Treaty (NPT) will gather in New York for a review conference and in June, at the G8 Summit hosted by Canada, nuclear proliferation issues will occupy a prominent place on the agenda. Continuing challenges to the nuclear non-proliferation regime by countries such as North Korea and Iran, and growing concerns about the possible appropriation of nuclear material by terrorist groups, arise at a time when there is much talk about a major increase in the use of nuclear energy for civilian purposes.

The much-heralded “nuclear renaissance” was the starting point of the Nuclear Energy Futures project initiated in May 2006. The purpose of this project was three-fold:

- To investigate the likely size, shape and nature of the purported nuclear energy revival to 2030 – not to make a judgment on the merits of nuclear energy, but rather to predict its future;
- To consider the implications for global governance in the areas of nuclear safety, security and nonproliferation; and
- To make recommendations to policy makers in Canada and abroad on ways to strengthen global governance in these areas.

This document presents the project’s key findings and a five-point Action Plan.

## KEY FINDINGS

### NO MAJOR NUCLEAR REVIVAL IS LIKELY TO 2030

On balance, a significant expansion of nuclear energy worldwide to 2030 is unlikely. The significant constraints, while not insurmountable, are likely to outweigh the drivers. It is true that there are signs of life in the nuclear power industry not seen since the 1980s. These are driven by concerns about energy security and climate change and a growing demand for electricity worldwide. Scores of states, including developing countries, have expressed interest in nuclear energy and some have announced plans to pursue it. Several existing nuclear energy states, notably in Asia, are already building new reactors. Uranium remains cheap and abundant. Some official projections envisage a doubling of the current fleet of nuclear reactors by 2030. New technologies are promised, industry is ramping up its capacity and sales pitches and advanced countries are seeing export potential. There is certainly a revival of interest.

Yet globally, while the amount of nuclear-generated electricity may rise, the percentage of total electricity it contributes is likely to fall. Although the number of nuclear reactors will probably rise from the current number, this will likely be offset by the retirement of older plants, despite life extensions to some of them. For the vast majority of states, nuclear power will be as elusive as ever.

Key barriers are:

- **The economics:** These are profoundly unfavourable to nuclear power and have worsened with the economic and financial downturn; nuclear has huge, rising upfront costs; it attracts high interest rates on loans compared to coal and natural gas; cost overruns and construction delays are common; private investors



are wary; and deregulated markets force nuclear to be truly competitive.

- **Fewer subsidies this time:** Governments burned by past experiences, constrained by deregulated markets, facing demands for a level playing field for different energy technologies and strapped for cash in the current economic downturn, are reluctant to provide subsidies.
- **Too slow for climate change:** Nuclear energy is not nimble enough to meet the threat of climate change in the short term: a nuclear power plant can take a decade of planning, regulatory processes, construction and testing before producing electricity. Cheaper, more quickly deployed alternatives, including energy efficiency, will likely prevail; a carbon tax or cap-and-trade system would favour nuclear over coal and gas, but these are likely to be years away.
- **Rethinking the grid:** Demand for energy efficiency is leading to fundamental rethinking of how electricity is generated and distributed that will not be favourable to nuclear energy.
- **Industrial bottlenecks and personnel shortages:** Although industry is scrambling to ramp up capacity quickly, the long-term decline of the sector makes this problematic.
- **Nuclear waste issue unresolved:** Almost 60 years after nuclear electricity was first generated, no country has a sustainable solution; the issue remains strong in public consciousness and stirs opposition to nuclear electricity.
- **Fears about safety, security and nuclear weapons:** Memories of Chernobyl and Three Mile Island, fears about nuclear terrorism since 9/11, the A.Q. Khan nuclear smuggling revelations and attempts by Iran, Iraq, Libya and North Korea to obtain the bomb act as dampeners on a nuclear revival.
- **Additional constraints on aspiring developing countries:** These include poor governance, inadequate infrastructure (notably small, fragile electricity grids),

deficient regulatory systems, weak safety or security culture, inability to attract finance and technology export controls.

In short, despite some powerful drivers and clear advantages, a revival of nuclear energy faces too many barriers compared to other means of generating electricity for it to capture a growing market share to 2030.

## GLOBAL GOVERNANCE IS ALREADY INADEQUATE

A lesser nuclear revival than widely expected might appear to imply that there should be no concerns about global governance of nuclear energy. Nothing could be further from the truth. The existing regimes for nuclear safety, security and nonproliferation, despite improvements in recent years, are still inadequate to meet current challenges, much less new ones:

- All have emerged piecemeal and in an uncoordinated fashion across the decades, reacting to, rather than anticipating, threats and crises; they are rarely considered holistically, despite actual and potential synergies.
- All are under-funded, under-resourced, un-integrated and too often lacking transparency and openness.
- The civilian nuclear industry tends to keep a wary distance from the regimes, while governments and international organizations often fail to consult and involve industrial and other stakeholders, including civil society.
- Each regime also faces its own particular challenges and threats requiring special attention.

### Nuclear Safety

- Since the 1986 Chernobyl accident, nuclear safety has improved worldwide as measured by key indicators. But continuing incidents even in well-regulated countries are worrying; a safety culture is still not universally apparent; complacency is a constant concern; and international sharing of lessons learned from operational experience and incidents is still inadequate.

- The global regime now seems to have all the necessary components in place, with the exception of legally binding agreements for fuel cycle facilities (and research reactors). Peer review seems increasingly effective, International Atomic Energy Agency (IAEA) assistance is extensive and industry has a growing involvement in pursuing best practice.
- The regime does not need wholesale reform or major additions, but rather universal adherence to existing treaties; enhancement and rationalization of existing mechanisms; a proper nuclear liability framework; and increased human and financial resources, including those for regulatory purposes.

### Nuclear Security

- As with nuclear safety, many (although not all) existing nuclear energy states are well practised at ensuring security for their nuclear materials and facilities: incidents have been rare.
- Fears of nuclear terrorism, especially since 9/11, have led to a campaign to secure existing nuclear materials and facilities both in the civilian and military sectors; however, a nuclear revival portends increased amounts of material and facilities, including in transit, that require effective security.
- The international security regime for civilian nuclear energy is newer and much less developed than those for safety and nonproliferation. It has seen marked improvement since 9/11, but it is not yet ready for any form of nuclear revival.
- Key legal instruments are not widely adhered to or in force, peer review is not widely practised and excessive secrecy limits transparency and exchange of best practice and lessons learned.

### Nuclear Nonproliferation

- The regime, although fundamentally solid and well developed, faces the most serious challenges

of all, notably continuing non-compliance by Iran and North Korea, the spectre of continuing nuclear smuggling and concessions made to nuclear-armed India that have weakened the regime's incentives.

- Not all NPT parties have safeguards in force despite their legal obligation to do so and many are still resisting the Additional Protocol.
- The IAEA is under-funded and faces critical personnel shortages, deteriorating infrastructure and progressively outdated technology.
- The discontent of the non-nuclear weapon states with the perceived inequities of the regime risks disrupting yet another NPT Review Conference, in 2010.
- The international community has still not resolved the central contradiction of the NPT: that some states have accorded themselves the right to retain nuclear weapons apparently in perpetuity, while all others are legally bound never to acquire them.

### EVEN A MODEST REVIVAL CAN HAVE A NEGATIVE IMPACT

A revival of the nuclear industry on even a modest scale, limited to the existing nuclear energy states and a handful of inexperienced new ones, poses risks in all three areas of nuclear governance. In order to avoid mistakes made at the outset of the nuclear age, some of which led to disaster, steps should be taken immediately to strengthen global governance across the board. One more major nuclear accident, one more state that develops nuclear weapons under the guise of generating electricity or one more 9/11, but nuclear this time, is one catastrophe too many.

The direst threats include the following:

- Nuclear reactors will be sold to states that lack capacity and experience, including the necessary physical and administrative infrastructure, a legislative and regulatory framework, customs and border controls, a safety and security culture and an enforcement

capacity, notably rapid response to accidents or security threats; poor governance generally, and corruption and crime in particular, will be barriers to quickly meeting these requirements.

- Existing nuclear energy states, in their rush to add new capacity, will neglect key safety and security requirements, dilute their safety and security cultures and fail to boost the capacities of their regulators.
- A tiny number of states will seek civilian nuclear energy in order to acquire capabilities that could assist them in getting nuclear weapons in the future (the “nuclear hedging” problem); the Middle East is of special concern given Iran’s perceived nuclear weapon aspirations.
- Sensitive nuclear technologies, especially uranium enrichment and reprocessing of spent nuclear fuel to produce plutonium, will spread to increasing numbers of states, running the risk of giving them the key ingredients for nuclear weapons.

## A FIVE-POINT ACTION PLAN

### **(1) Nuclear Safety: ensure that all states are committed to and capable of implementing the highest nuclear safety standards**

- All aspirant nuclear energy states should accede to the international nuclear safety agreements as soon as possible and begin implementing them.
- A treaty requiring the application of international safety standards to all nuclear fuel cycle facilities should be negotiated as soon as possible.
- Peer review processes should be strengthened and become mandatory, especially for new entrants.
- An international regulators body should be established.

- The nuclear liability arrangements should be integrated and reformed.
- A Global Nuclear Safety Network should be established encompassing all stakeholders, including industry, to strengthen lessons learned and operational feedback.

### **(2) Nuclear Security: ensure that all nuclear material and facilities are secure from unauthorized access or terrorist seizure or attack**

- The Amendment to the Convention on the Physical Protection of Nuclear Material should be brought into force as soon as possible so that international protection standards are applied domestically in each state.
- The United Nations Security Council’s role in civilian nuclear energy security, via its 1540 Committee, should be clarified and enhanced.
- The April 2010 Nuclear Security Summit should address the security of the civilian nuclear power sector, not just nuclear legacy and weapons issues.
- A true global security community for the nuclear energy sector should be established involving all stakeholders.

### **(3) Nuclear Nonproliferation: ensure that a nuclear revival does not contribute to the proliferation of nuclear weapons**

- Nuclear safeguards should be further strengthened: all states should have comprehensive safeguards agreements and the “gold standard” Additional Protocol; an Additional Protocol-plus should be pursued.
- The Director General of the IAEA should be enjoined to request special inspections when serious non-compliance or noncooperation is evident.
- The IAEA should confirm its right to seek to detect weaponization activities.
- Efforts to establish a Nuclear Fuel Bank should be pursued; existing nuclear energy states should commit themselves now to eventual multilateralization of the fuel cycle if there is to be any chance of dissuading



additional states from acquiring sensitive technologies.

- The most obvious next steps in nuclear disarmament should be urgently pursued: the Comprehensive Nuclear Test Ban Treaty; a Fissile Material Cut-Off Treaty; and deeper cuts in American and Russian nuclear forces, followed by the early involvement of other states in reducing their nuclear weapons arsenals.

#### **(4) IAEA: re-enforce its centrality through increased funding, modernization and reform**

The IAEA is central to the entire global governance regime. Always considered paramount in nuclear safeguards, it has proved increasingly vital in nuclear safety, following Chernobyl, and in nuclear security, following 9/11. States which have previously been lukewarm to the IAEA in any of these areas need to recognize that, while not perfect, it has the greatest legitimacy and the highest levels of experience and capacity of any international body in the nuclear field.

Considering that nothing short of international peace and security is at stake, the organization is a veritable security bargain. The IAEA deserves increasing support as follows:

- Its budget should be doubled by 2020 and be regularly increased to 2030.
- A crash program should be undertaken to upgrade its verification technology and infrastructure with a one-off injection of US\$50 million.
- Nuclear safety and security programs should be funded from its regular budget rather than voluntary contributions.
- It should be mandated to coordinate international advice and assistance to new nuclear energy states.
- It should be permitted to expand and renew its human resources by being exempted, when necessary, from constraining UN rules.

#### **(5) Stakeholder involvement: ensure that all partners, especially industry, participate in judiciously managing a nuclear revival**

Governments appropriately retain the right to approve or reject the export of nuclear reactors or nuclear materials and other technologies by companies under their jurisdiction. But industry cannot absolve itself of responsibilities by pretending that nuclear safety, security and nonproliferation are issues of “high politics” that are entirely within the purview of governments. Industry has a strong self-interest in working more closely with governments, the IAEA and other international bodies in ensuring that any nuclear revival does not rebound on its fortunes through a serious accident, terrorist incident or nuclear weapons breakout.

#### **This suggests the following recommendations:**

- An international forum should be convened or an existing one adapted that brings together all states and companies involved in international nuclear power reactor sales in order to harmonize the criteria for proceeding with such sales.
- Such a forum should consider an industry code of conduct for nuclear reactor sales that restricts them to states which:
  - Are in full compliance with IAEA safeguards and an Additional Protocol;
  - Are party to the major safety and security conventions;
  - Accept and implement high safety and security standards, including by participating in peer reviews;
  - Have established an appropriate national regulatory system; and
  - Comply with UN Security Council Resolution 1540's reporting requirements.
- In addition, reactor vendors should take into account governmental stability, the quality of governance, regional security and a state's voluntary renunciation of sensitive nuclear technologies.

## CONCLUSION

Global governance in the nuclear realm is already facing significant challenges even without the prospect of a nuclear energy revival. It is the obligation of the international community, governments, the nuclear industry and other stakeholders to do everything possible to ensure that a rise in the use of nuclear-generated electricity does not jeopardize current efforts being made to strengthen nuclear safety, security and nonproliferation. Indeed, the desire of states for the perceived benefits of nuclear energy should be levered to further reinforce global governance.

The deal for aspiring states should be: if you want civilian nuclear power, you have to agree to the highest international standards for avoiding nuclear accidents, nuclear terrorism and diversion of materials to nuclear weapons. The deal for existing advanced nuclear states should be: if you want the newcomers to comply with a newly strengthened global regime that was not in place when you first acquired nuclear energy, you have to multilateralize the fuel cycle and disarm yourselves of nuclear weapons.

## ABOUT CIGI

The Centre for International Governance Innovation is an independent, nonpartisan think tank that addresses international governance challenges. Led by a group of experienced practitioners and distinguished academics, CIGI supports research, forms networks, advances policy debate, builds capacity, and generates ideas for multilateral governance improvements. Conducting an active agenda of research, events, and publications, CIGI's interdisciplinary work includes collaboration with policy, business and academic communities around the world.

CIGI conducts in-depth research and engages experts and partners worldwide from its extensive networks to craft policy proposals and recommendations that promote change in international public policy. Current research interests focus on international economic and financial governance both for the long-term and in the wake of the 2008-2009 financial crisis; the role of the G20 and the newly emerging powers in the evolution of global diplomacy; Africa and climate change, and other issues related to food and human security.

CIGI was founded in 2002 by Jim Balsillie, co-CEO of RIM (Research In Motion) and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario. CIGI gratefully acknowledges the contribution of the Government of Canada to its endowment fund. Support from the Government of Ontario includes a major financial contribution to the Nuclear Energy Futures project.

Le CIGI a été fondé en 2002 par Jim Balsillie, co-chef de la direction de RIM (Research In Motion). Il collabore avec de nombreux partenaires stratégiques et leur exprime toute sa reconnaissance pour leur soutien. Il remercie tout particulièrement le gouvernement du Canada pour sa contribution à son Fonds de dotation, de même que le gouvernement de l'Ontario, dont l'appui comprend une aide financière majeure au projet Perspectives de l'énergie nucléaire.

### PUBLICATIONS TEAM

Senior Director for Publications: Max Brem  
 Publications Coordinator: Jessica Hanson  
 Media Designer: Steve Cross  
 Copyeditors: Matthew Bunch and Tammy McCausland

### MEDIA CONTACT

For media enquiries, please contact:  
 Mary-Lou Schagena  
 Communications Specialist  
 Tel: +1.519.885.2444 x238, [mschagena@cigionline.org](mailto:mschagena@cigionline.org)



The Centre for International  
 Governance Innovation  
 Centre pour l'innovation dans  
 la gouvernance internationale

57 Erb Street West  
 Waterloo, Ontario N2L 6C2, Canada  
 tel +1 519 885 2444 fax +1 519 885 5450  
[www.cigionline.org](http://www.cigionline.org)

