



# U.S.-Australia Civilian Nuclear Cooperation: Issues for Congress

**Mary Beth Nikitin**  
Analyst in Nonproliferation

**Bruce Vaughn**  
Specialist in Asian Affairs

September 30, 2010

Congressional Research Service

7-5700

[www.crs.gov](http://www.crs.gov)

R41312

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>30 SEP 2010</b>	2. REPORT TYPE	3. DATES COVERED <b>00-00-2010 to 00-00-2010</b>	
4. TITLE AND SUBTITLE <b>U.S.-Australia Civilian Nuclear Cooperation: Issues for Congress</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Congressional Research Service, The Library of Congress, 101 Independence Avenue SE, Washington, DC, 20540-7500</b>		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>			
13. SUPPLEMENTARY NOTES			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>Same as Report (SAR)</b>
			18. NUMBER OF PAGES <b>13</b>
			19a. NAME OF RESPONSIBLE PERSON

## Summary

Australia and the United States have cooperated in the peaceful use of nuclear energy since the mid-1950s. The framework for this cooperation is a civilian nuclear cooperation agreement as required by section 123 of the Atomic Energy Act. President Obama transmitted the proposed text of the latest renewal agreement to Congress on May 5, 2010, along with the required Nuclear Proliferation Assessment Statement (NPAS) and his determination that the agreement promotes U.S. national security. Congress has 30 days of continuous session for consultations with the Administration, followed by an additional 60 days of continuous session to review the agreement. If not opposed by a joint resolution of disapproval or other legislation, then the agreement will be considered approved at the end of this time period. Congress also has the option of adopting either a joint resolution of approval with (or without) conditions or standalone legislation that could approve or disapprove the agreement.

The United States and Australia first concluded a civilian nuclear cooperation agreement in 1957. That agreement was updated in 1979. Australia sells around 36% of its \$1 billion in uranium exports to the United States. The United States is also a major processor of Australian uranium sold to other countries. Australia does not currently possess any nuclear power plants, but it operates one research reactor.

## Contents

Summary of the Proposed Agreement.....	1
Issues for Congress .....	2
Context for Discussion.....	3
Australian Nonproliferation Policy.....	4
Australia and the Nuclear Balance.....	5
Australia's Nuclear Capacity .....	6
R&D Activities .....	7
Research Reactors.....	7
Uranium Enrichment.....	7
Uranium Mining and Milling .....	8
Uranium Sales to India.....	8
Nuclear Power Debate.....	9

## Contacts

Author Contact Information .....	10
----------------------------------	----

## Summary of the Proposed Agreement

On May 5, 2010, President Obama transmitted the proposed text of a renewal of the U.S.-Australian civilian nuclear cooperation agreement to Congress for approval, along with the required Nuclear Proliferation Assessment (NPAS) and his determination that the agreement would promote U.S. national security. The annexed classified NPAS was to be submitted separately. The renewal agreement would replace the agreement in force from July 5, 1979, and expiring on January 16, 2011. The new agreement has an initial term of 30 years from the date of entry into force, and would continue in force for periods of five years each, unless terminated by either party.

According to President Obama's letter of transmittal, the agreement meets all the terms of the Atomic Energy Act<sup>1</sup> and therefore does not require any exemptions from the law's requirements. Therefore, the agreement will enter into effect after a 30-day consultation period and a review period of 60 days of continuous session,<sup>2</sup> unless Congress enacts a joint resolution of disapproval. This period began on May 5, 2010. Congress also has the option of adopting either a joint resolution of approval with (or without) conditions or standalone legislation that could approve or disapprove the agreement.

Section 123 of the U.S. Atomic Energy Act (AEA) of 1954 (42 U.S.C. 2011 et seq.) governs significant nuclear cooperation between the United States and other states.<sup>3</sup> The United States has agreements for civil nuclear cooperation in place with almost 50 countries. Such agreements, known as "123 agreements," provide the framework and authorization for cooperation, but do not guarantee certain exports, technology, or material. Before significant nuclear exports<sup>4</sup> can occur, the State Department, with the advice of the Department of Energy, negotiates an agreement, which must meet criteria listed in Section 123.a., (1) through (9), 42 U.S.C. 2151.<sup>5</sup>

The proposed agreement would permit the export, subject to licensing, of information, material, equipment, and components for nuclear research and nuclear power production. The agreement would not permit transfer of restricted data, sensitive nuclear facilities, or major critical components of those facilities. Sensitive nuclear technology may be transferred only if the agreement is amended. The proposed agreement does not allow for enrichment of uranium transferred under the agreement to levels of 20% U-235 or greater unless mutually agreed. The

---

<sup>1</sup> Under section 123.a., codified at 42 U.S.C. 2153(a)), Atomic Energy Act of 1946, ch. 724, 60 Stat. 755 (1946), as amended. See also CRS Report RS22937, *Nuclear Cooperation with Other Countries: A Primer*, by Paul K. Kerr and Mary Beth Nikitin.

<sup>2</sup> Days on which either House is in a recess of more than three days (pursuant to a concurrent resolution authorizing the recess) do not count toward the total. If Congress adjourns its session *sine die*, continuity is broken and the count starts anew when it reconvenes.

<sup>3</sup> Nuclear cooperation includes the distribution of special nuclear material, source material, and byproduct material, to licensing for commercial, medical, and industrial purposes. These terms, "special nuclear material," "source material," and "byproduct material," as well as other terms used in the statute, are defined in 42 U.S.C. §2014. See also CRS Report RS22937, *Nuclear Cooperation with Other Countries: A Primer*, by Paul K. Kerr and Mary Beth Nikitin.

<sup>4</sup> Significant nuclear cooperation includes the physical transfer of reactors, reactor components, or special nuclear material, source material, and byproduct material, under license for commercial, medical, and industrial purposes.

<sup>5</sup> The Atomic Energy Act also sets out procedures for licensing exports to states with whom the United States has nuclear cooperation agreements. (Sections 126, 127, and 128 codified as amended at 42 U.S.C. 2155, 2156, 2157.) Even with a 123 agreement in place, each export of nuclear material, equipment, or technology requires a specific export license or other authorization.

current agreement also does not allow for this. In accordance with the Nuclear Nonproliferation Act (NNPA) of 1978, the United States must approve of enrichment of any nuclear material exported from the United States to Australia. The proposed agreement modifies the 1979 agreement by expanding the scope of cooperation to cover nuclear forensics and allows the transfer of nuclear material for radioisotope production. It also updates the physical security requirements to reflect current international standards.

## Issues for Congress

Uranium from Australia makes up 13% of U.S. uranium supplies. Renewal of the 123 agreement with Australia is necessary for continuing this cooperation. Having an agreement in place also facilitates Australia's export of uranium to countries where it will be used in a reactor with U.S. technology. Congress may consider Australia's role in developing multilateral nuclear fuel cycle services or assurances. Australia's strong bilateral relationship with the United States, political stability, and geographic location could be advantageous to the development of multilateral nuclear fuel facilities.

Enrichment technology developed in Australia has been transferred to the United States and is classified by both countries. In the event that Australia reverses current policy and decides to build a uranium enrichment plant on its territory, it would face several obstacles, and the United States would have to reconcile its policies. Uranium enrichment technology holders have committed to a ban on the export of enrichment technology until the Nuclear Suppliers Group decides on criteria for future transfers. It appears that Australia would qualify for transfer under this criteria, but enrichment plants would be a black box or turnkey facility. This type of transfer would be consistent with current U.S. policy. Australian officials have also noted additional concerns, such as cost and finding a local government willing to host a commercial enrichment plant.

As noted above, the Atomic Energy Act of 1954 provides for congressional review of proposed civilian nuclear cooperation agreements. The review comprises two periods of continuous session, one 30 days and one 60 days. The proposed agreement with Australia meets AEA requirements; therefore, it will enter into force after the review period is complete, absent congressional action. CRS estimates that the last day of the required congressional review period would be October 9, 2010 (this date is unofficial, and the sole definitive counters of the review periods are the House and Senate Parliamentarians).

On June 15, 2010, House Foreign Affairs Committee Chairman Howard Berman and Ranking Member Ileana Ros-Lehtinen introduced H.J.Res. 88, which provides for the approval of the U.S.-Australia agreement. The House Foreign Affairs Committee held a hearing on September 24, 2010 about nuclear cooperation agreements, including the proposed renewal agreement with Australia.<sup>6</sup>

Once the congressional calendar for the remainder of 2010 became clearer in mid-September, some raised concerns that the 90-day period for congressional review of the U.S.-Australian renewal agreement would not be met. In this case, four scenarios are possible for approval for the

---

<sup>6</sup> House Foreign Affairs Committee Hearing, "Nuclear Cooperation After Iran and Khan: Are We Asking Enough of Current and Future Agreements?" September 24, 2010.

agreement: (1) re-submittal of the agreement in the 112<sup>th</sup> Congress; (2) passage of a joint resolution of approval that would include language that waived the required 90-day review period; (3) separate legislation approving the proposed agreement with language to waive the 90-day requirement; (4) changes to the congressional calendar so that the lame duck session would contain enough days for the 90 day review period to lapse. Congress could also pass a joint resolution of disapproval or include its disapproval in separate legislation.

Senator Richard Lugar introduced a bill, “To provide for the approval of the Agreement Between the Government of the United States of America and the Government of Australia Concerning Peaceful Uses of Nuclear Energy” (S. 3844), on September 27, 2010. It would approve the agreement notwithstanding the congressional review requirements of section 123 of the Atomic Energy Act. Other provisions of the AEA would apply. This bill would have the proposed agreement come into force on or after October 8, 2010.

Notwithstanding the provisions for congressional consideration of a proposed agreement for cooperation in subsection d. of section 123 of the Atomic Energy Act of 1954 (42 U.S.C. 2153), the Agreement Between the Government of the United States of America and the Government of Australia Concerning Peaceful Uses of Nuclear Energy, done at New York May 4, 2010, may become effective on or after October 8, 2010, as if all the requirements in such section 123 for consideration of such agreement had been satisfied, subject to subsection (b) of this section.

(b) Applicability of Atomic Energy Act of 1954 and Other Provisions of Law.—Upon coming into effect, the agreement referred to in subsection (a) shall be subject to the provisions of the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) and any other applicable United States law as if such agreement had come into effect in accordance with the requirements of section 123 of the Atomic Energy Act of 1954.

## Context for Discussion

The context for discussion of U.S.-Australian civilian nuclear cooperation is one set inside a very strong alliance relationship between the United States and Australia that stems from the two nations’ shared democratic values, cultural and historic ties, and strategic outlook. According to U.S. Ambassador to Australia Jeffrey Bleich, “the relationship between the United States and Australia is one of our strongest and most productive international alliances. It is a bond solidified during the Pacific battles of World War II and strengthened over the ensuing decades.”<sup>7</sup> The President’s National Security Strategy document describes Australia, along with our other allies in Asia, as the “bedrock of security in Asia and a foundation of prosperity in the Asia-Pacific region.”<sup>8</sup>

The Australia New Zealand United States (ANZUS) treaty was signed in 1951 and entered into force in 1952.<sup>9</sup> A key aspect of the alliance with Australia today is the annual Australia-U.S. Ministerial (AUSMIN) meetings. These consultations have been held since 1985 and are attended by the Secretary of Defense and the Secretary of State from the United States, as well as the Australian Defense Minister and Minister for Foreign Affairs. The United States and Australia

---

<sup>7</sup> Jeffrey Bleich, “Statement Before the Senate Foreign Relations Committee,” Washington, DC, November 5, 2009.

<sup>8</sup> “National Security Strategy, The White House, Washington, DC, May 2010.

<sup>9</sup> For a text of the ANZUS Treaty, see [http://avalon.law.yale.edu/20th\\_century/usmu002.asp](http://avalon.law.yale.edu/20th_century/usmu002.asp).

conduct joint combined military training exercises, have exchange officers in each others' armed forces, and work to standardize equipment and operational doctrine.<sup>10</sup> In recent years, Australia invoked the ANZUS Treaty after the attacks on the United States in 2001, and Australian troops fought with U.S. troops in Iraq and Afghanistan.

Australia has the largest non-NATO military contingent in Afghanistan<sup>11</sup> and fought alongside the United States in Vietnam, Korea, World War II, and World War I, as well as in Iraq and Afghanistan. Australia has also played a key role in promoting regional stability in places such as Timor Leste, the Solomon Islands, and Bougainville. The United States and Australia have a very close intelligence relationship. The United States and Australia also concluded a Free Trade Agreement, which came into force in 2005. The two nations signed a Defense Trade Cooperation Treaty in 2007 that would facilitate the trade of defense-related equipment and technology. The U.S. Senate has not yet voted on ratification of this treaty. For all of the above reasons, and others, the United States and Australia share a special relationship that includes a high degree of trust.

## **Australian Nonproliferation Policy**

Australia also is a strong partner to the United States in nonproliferation policy. Australia has been a staunch supporter of the Non-Proliferation Treaty (NPT) since its adherence in 1973. Australia has promoted strengthened International Atomic Energy Agency (IAEA) safeguards on civilian nuclear activities and was the first to sign the Additional Protocol, which strengthened IAEA monitoring. Australia is also a member of the Nuclear Suppliers Group (NSG), an export control coordination body.<sup>12</sup>

Australia has developed stricter standards for nuclear trade than the export control regimes currently call for; for example, requiring an Additional Protocol to be in force for any country importing uranium from Australia. Over the past four decades, Australia has developed a bilateral safeguards system for uranium exports. A bilateral safeguards agreement is required, and countries may only retransfer Australian uranium to other countries that also have a bilateral safeguards agreement with Australia.<sup>13</sup>

In recent years, the international community has debated ways to foster the growth of nuclear energy while minimizing proliferation risks of the spread of sensitive nuclear technologies.<sup>14</sup> Australia has supported development of multilateral fuel assurance mechanisms while stating that a well-functioning market provides the best assurance of supply. At the 2010 NPT Review Conference, an Australian representative said that "Australia does not consider it necessary or desirable for each state with a nuclear program to develop national enrichment or reprocessing

---

<sup>10</sup> "Background Note: Australia," the Department of State, November 23, 2009.

<sup>11</sup> Australian Government, Department of Defence Media Release, "Republic of Korea Joins ISAF as a Non NATO Contributing Nation," April 22, 2010.

<sup>12</sup> See also CRS Report RL31559, *Proliferation Control Regimes: Background and Status*, coordinated by Mary Beth Nikitin.

<sup>13</sup> "Australia's Network of Nuclear Safeguards Agreements," Australian Department of Foreign Affairs and Trade, [http://www.dfat.gov.au/security/nuclear\\_safeguards.html](http://www.dfat.gov.au/security/nuclear_safeguards.html).

<sup>14</sup> CRS Report RL34234, *Managing the Nuclear Fuel Cycle: Policy Implications of Expanding Global Access to Nuclear Power*, coordinated by Mary Beth Nikitin.



facilities ... it would be a perverse outcome from the standpoint of international security to see a proliferation of national fuel cycle facilities.”<sup>15</sup> This is in line with current U.S. policy. The Nuclear Suppliers Group is currently debating criteria for future transfers of enrichment or reprocessing technologies.

Political division on nuclear power and to what extent Australia should pursue sensitive fuel cycle technologies was evident in earlier periods. Former Liberal Prime Minister John Gorton sought to keep Australia’s nuclear options open, though it did not eventuate. He reportedly signed a secret deal with France to construct a uranium enrichment facility in Australia. A plan to develop a nuclear reactor at Jervis Bay was also considered. These plans were reversed by the election of Labor Party candidate Gough Whitlam, who was elected in 1972. Australia subsequently ratified the NPT in 1973. The Labor perspective on nuclear weapons was further promoted by Australian support for the South Pacific Nuclear Weapons Free Zone Treaty in 1985. Anti-nuclear sentiment in Australia was also influenced to an extent by the anti-nuclear movement in New Zealand, which led to New Zealand’s de facto ouster from the ANZUS alliance in the mid-1980s and by the resumption of nuclear testing by France in French Polynesia in 1995.<sup>16</sup> Today, Australia remains a strong advocate of nuclear disarmament in international fora.

## Australia and the Nuclear Balance

While Australia is today a strong proponent of nuclear disarmament, arms control, and non-proliferation, this policy has evolved over time. As Rod Lyon has pointed out,<sup>17</sup> Australia’s posture on nuclear weapons has been to a large extent determined by Australia’s perceived “fit” in the regional and global strategic context. As the strategic environment changed from World War II to the era of the cold war to the present, Australia shifted from being a “possible nuclear proliferator, to a supporter of extended nuclear deterrence (which it benefits from under the ANZUS alliance) to an important advocate of global nuclear arms control.”<sup>18</sup>

During the post-World War II period through the 1950s, Australia worked closely with its traditional security partner, the United Kingdom, including allowing Britain to conduct nuclear tests at an island off its northwest coast and in the desert.<sup>19</sup> Australian scientists worked in the British nuclear atomic bomb research program, and former Prime Minister Menzies reportedly saw such cooperation as an opportunity to gain knowledge of nuclear weapons development.<sup>20</sup> Australia received a nuclear research reactor from Britain in 1958.<sup>21</sup> It is apparently in the period after World War II and prior to closer Anglo-U.S. nuclear cooperation that Australia, as part of

---

<sup>15</sup> Statement by Mr. Jeremy Kruse to Main Committee III regarding the IAEA Peaceful Uses Initiative, as part of the 2010 Review Conference of the Parties to the Treaty on the Non-proliferation of Nuclear Weapons, as delivered on May 10, 2010.

<sup>16</sup> Jeffrey Lantis, “Elections and Enduring Realities: Australia’s Nuclear Debate,” *Arms Control Today*, April 2008.

<sup>17</sup> Rod Lyon, “Australia: Back to the Future,” in Muthiah Alagappa ed. *The Long Shadow: Nuclear Weapons and Security in 21<sup>st</sup> Century Asia* (Stanford: Stanford University Press, 2008).

<sup>18</sup> Rod Lyon, “Australia: Back to the Future,” in Muthiah Alagappa ed. *The Long Shadow: Nuclear Weapons and Security in 21<sup>st</sup> Century Asia* (Stanford: Stanford University Press, 2008).

<sup>19</sup> Lorna Arnold, *A Very Special Relationship: British Atomic Weapon Trials in Australia* (London: Her Majesty’s Stationery Office, 1987).

<sup>20</sup> Jeffrey Lantis, “Elections and Enduring Realities: Australia’s Nuclear Debate,” *Arms Control Today*, April 2008.

<sup>21</sup> Jeffrey Lantis, “Elections and Enduring Realities: Australia’s Nuclear Debate,” *Arms Control Today*, April 2008.

Britain's attempt to resurrect its empire, worked most closely with the United Kingdom in Britain's efforts to acquire its own nuclear deterrent to the Soviet Union.<sup>22</sup>

Australia's security environment became more precarious in the 1960s, which may have led it to consider its strategic options. Key events influencing this included China conducting its first nuclear test in 1964, the British announcement of its strategic departure from East of Suez in 1967, and the United States articulating the Guam Doctrine limiting U.S. ground troop support in 1969 while the war in Vietnam continued.

Australia's involvement in joint intelligence, communications, and early warning facilities with the United States made it a potential nuclear target of the Soviet Union during the cold war.<sup>23</sup> The Defense Support Program (DSP)<sup>24</sup> facility at Nurrungar, South Australia, was part of a constellation of geosynchronous satellites and ground tracking stations designed to detect the launch of ballistic missiles. Early warning of missile attack strengthened America's nuclear missile second strike capability, thereby strengthening nuclear deterrence. DSP later played a role in detecting Iraqi Scud missile launches during Operation Desert Storm. The Very Low Frequency (VLF) station involved in communications with American submarine deployments in the region at Northwest Cape, West Australia, and the signals intelligence collection facility at Pine Gap, Northern Territory, also played a key role in helping to maintain the bi-polar strategic balance of the cold war.

## Australia's Nuclear Capacity

Although Australia is a major uranium exporter, it does not have any uranium enrichment plants, fuel fabrication facilities, or nuclear power plants. It currently operates a research reactor at Lucas Heights, used primarily for medical isotope production. The Australian Atomic Energy Commission (AAEC) was formed in 1952. The AAEC was replaced in 1987 by the Australian Nuclear Science and Technology Organization (ANSTO).<sup>25</sup> By statute, ANSTO cannot conduct any research in the design or production of nuclear weapons. Its main research facility, the Lucas Heights Research Establishment, opened in 1958. It was the site of Australia's first nuclear reactor, the High Flux Australian Reactor (HIFAR). Research and development work on uranium enrichment technology was also carried out at Lucas Heights (see below).

The nuclear fuel cycle begins with mining uranium ore and upgrading it to yellowcake. Because naturally occurring uranium lacks sufficient fissile <sup>235</sup>U to make fuel for commercial light-water reactors, the concentration of <sup>235</sup>U must be increased several times above its natural level of 0.7% in a uranium enrichment plant. A nuclear power plant operator or utility typically purchases yellowcake and contracts for its conversion to uranium hexafluoride, then enrichment, and finally fabrication into fuel elements. Australia exports its uranium after the mining and milling stage. Commercial enrichment services are available in the United States, Europe, Russia, and Japan. Fuel fabrication services are even more widely available. As noted above, Australia requires a bilateral safeguards agreement with uranium-importing countries to ensure its peaceful use.

---

<sup>22</sup> Wayne Reynolds, *Australia's Bid for the Atomic Bomb* (Melbourne: Melbourne University Press, 2000).

<sup>23</sup> Cameron Stewart et al., "US Aussie Spy Base Revelations," *The Australian*, February 18, 1999.

<sup>24</sup> Jeffrey Richelson, *America's Space Sentinels*, University of Kansas Press (1999).

<sup>25</sup> [http://www.ansto.gov.au/discovering\\_ansto/history\\_of\\_ansto](http://www.ansto.gov.au/discovering_ansto/history_of_ansto).

## R&D Activities

### Research Reactors

Australia currently operates one research reactor. The Open Pool Australian Lightwater (OPAL) reactor was commissioned in 2007. It is a low-enriched uranium (LEU)-fueled 20-megawatt research reactor. It produces radioisotopes for medical purposes, among other research functions.<sup>26</sup> An older reactor, High Flux Australian Reactor (HIFAR), is in the process of being decommissioned (by 2018). Another research reactor, Moata, was decommissioned in 1995.

### Uranium Enrichment

The AAEC conducted research into enrichment technologies starting in the 1960s. Work was done on both centrifuge and laser isotope separation enrichment. There had been discussions in the 1970s about whether Australia should partner with Japan or others to build an enrichment plant in Australia for the purpose of exporting enriched uranium hexafluoride, which would be fabricated into fuel for power plants. These plans were highly controversial within Australia, were objected to by the United States, and were never completed.<sup>27</sup>

The Hawke government terminated uranium enrichment R&D by the AAEC in 1986 and shut down and dismantled Australia's laboratory-scale centrifuge enrichment plant. Australia continued to participate in the Hexapartite Safeguards Project, the purpose of which was to improve the IAEA's safeguards capability for enrichment plants. AAEC had also conducted research on molecular laser isotope separation (MLIS) enrichment, but discontinued its research.

Beginning in 1990, Silex Systems, Ltd. (Silex Systems) began R&D work on laser enrichment technology in a lab it leased at the Lucas Heights complex. The technology was proven on a laboratory scale in 1994 (known as SILEX, or Separation of Isotopes by Laser Excitation).<sup>28</sup> In 1996, the United States Enrichment Corporation (USEC, Inc.) signed an agreement for the development and licensing of SILEX technology for uranium enrichment. In 1999, the United States and Australia signed an agreement that allowed for the transfer of SILEX technology to the United States.<sup>29</sup> The SILEX technology was classified by both governments in 2001.

The U.S.-Australian SILEX agreement allows for technology export to United States but limits cooperation within the territory of Australia to research and development of SILEX technology. The agreement prohibits the construction of an enrichment facility with this technology in Australia unless the agreement is amended (Article 2.3). According to the Nuclear Proliferation Assessment Statement attached to the proposed agreement, Silex Systems stopped lab work on uranium enrichment in Australia but continues to support technology development in the United States. In 2006, GE/Hitachi Nuclear Energy signed an agreement with Silex Systems to license and commercialize laser separation technology for LEU production in the United States.

---

<sup>26</sup> [http://www.ansto.gov.au/discovering\\_ansto/anstos\\_research\\_reactor](http://www.ansto.gov.au/discovering_ansto/anstos_research_reactor).

<sup>27</sup> Wayne Reynolds, "Australia's quest to enrich uranium and the Whitlam Government's loans affair," *The Australian Journal of Politics and History*, vol. 54, no. 4 (December 2008).

<sup>28</sup> "Company History" page at <http://www.silex.com.au/>.

<sup>29</sup> Agreement for Cooperation Between Australia and the United States of America Concerning Technology for the Separation of Isotopes of Uranium by Laser Excitation.

GE/Hitachi's Global Laser Enrichment (GLE) subsidiary received a license from the Nuclear Regulatory Commission (NRC) for the building of a test facility in 2008. The "Test Loop" facility was built at GE's fuel fabrication facility in Wilmington, NC. GLE has applied for a commercial license from the NRC.<sup>30</sup>

Debate over whether Australia should have its own commercial uranium enrichment facility was reignited after Prime Minister Howard expressed support for the idea in 2006.<sup>31</sup> Howard argued that since Australia possesses the largest uranium reserves in the world, it would make economic sense to enrich uranium before exporting it, thereby adding to its value. John Carlson, director-general of the Australian Safeguards and Non-Proliferation Office, responded to press speculation at the time: "there are a number of uncertainties, including Australia's lack of an established enrichment technology and the license costs for imported technology, whether there would be investors prepared to outlay the substantial capital costs involved, and whether a State government would be willing to host an enrichment facility."<sup>32</sup> The present Australian government under the Labor Party appears to oppose building a uranium enrichment facility in Australia.

## Uranium Mining and Milling

Australia has the world's largest reserves of uranium, with an estimated 23% or more of total reserves,<sup>33</sup> and is the world's third-largest exporter of uranium. The mining sector has become an increasingly important aspect of Australia's economy, accounting for 7% of GDP and 43% of exports. Mining is also thought of by many in Australia as one of the key reasons why Australia was able to avoid the recent global financial crisis.<sup>34</sup> As such, the Australian electorate may be in favor of exploring opportunities to expand mining exports, which could include the export of uranium to India. Australia provides 13% of U.S. uranium imports. More than 85% of Australia's uranium exports go to the United States, the European Union, and Japan.<sup>35</sup> Australia reached an agreement to sell uranium to China in 2006.<sup>36</sup> The Australian government is concluding arrangements for the export of uranium to Russia.

## Uranium Sales to India

The Labor government of former Prime Minister Kevin Rudd opposed the export of uranium to India because India has not signed the NPT. Rudd was replaced by an intra-party change of leadership in June 2010 by Julia Gillard. She subsequently won a national election and remains

---

<sup>30</sup> The NRC's estimated 30-month review period began in August 2009. Silex Annual Report 2009, <http://www.silex.com.au/SilexAR2009.pdf>.

<sup>31</sup> Raymond Bonner, "Call to Enrich Uranium in Australia Stirs Debate," *The New York Times*, August 2, 2006; "Uranium enrichment program revived after 20 years," *Australian Broadcasting Corporation*, June 14, 2007.

<sup>32</sup> "The Prospects for Uranium Enrichment in Australia—Correcting the Record," Statement by Mr. John Carlson, Director-General, Australian Safeguards and Non-proliferation Office, June 18, 2007, [http://www.dfat.gov.au/media/releases/department/d010\\_07.html](http://www.dfat.gov.au/media/releases/department/d010_07.html).

<sup>33</sup> "Australia's Uranium," January 2010, <http://www.world-nuclear.org/info/inf48.html>.

<sup>34</sup> "Heroes in Hard Hats," *The Sydney Morning Herald*, May 22, 2010.

<sup>35</sup> Unclassified Nuclear Proliferation Assessment Statement Pursuant to Section 123 a. of the Atomic Energy Act of 1954, as Amended with Respect to the Proposed Agreement between the Government of the United States of America and the Government of Australia Concerning Peaceful Uses of Nuclear Energy, May 4, 2010.

<sup>36</sup> "Australia, China Sign uranium Deal," *CNN*, April 3, 2006.

Prime Minister. Her position on the issue is not yet clear. The John Howard government, in power until 2007, had supported uranium exports to India. The Nuclear Suppliers Group (NSG) decided in September 2008 to allow civilian nuclear exports to India under certain conditions. Australia did not actively block this consensus decision, but the Rudd government announced in September 2008 that Australia would not export uranium to India, despite the NSG rule change. Australian Liberal Party opposition leader Tony Abbott has stated that he would reverse this policy and begin exports of uranium to India as part of an effort to expand Australia's ties to the region. Opinion polls conducted in May 2010 had Rudd and Abbott either even or with Abbott slightly ahead of Rudd.<sup>37</sup> The next Australian federal election will elect members of Parliament of Australia and must be held on or before April 2011. A Joint Feasibility Study recommended a bilateral free trade agreement with India in May 2010. India is Australia's fastest-growing export market.<sup>38</sup> Expanding trade and other ties with India could help Australia diversify its export markets, which have relied heavily on sales to China. Over the next 20 years, India will, according to some estimates, rapidly expand its middle class and embark on major infrastructure projects, which could fuel another resource boom in Australia.<sup>39</sup>

## Nuclear Power Debate

The lead-up to the parliamentary elections of 2007 highlighted differences between the Kevin Rudd-led Labor Party and the Liberal-National Coalition led by former Prime Minister John Howard on nuclear energy policy. At the time, then Shadow Minister for Climate Change and the Environment Peter Garrett, formerly of the rock band Midnight Oil, warned that nuclear power was a bad idea for Australia, even given the demands of global warming, while Rudd declared nuclear power "not an option."<sup>40</sup> Bob Brown, the leader of the Green Party in Australia, is against nuclear power, as are many within the Labor Party.

Former Prime Minister John Howard stated in 2006 that he was of an "open mind" on nuclear power for Australia and that he believed that the "nuclear energy scene will change significantly in Australia."<sup>41</sup> The former Howard Liberal-National Coalition government selected Dr. Ziggy Switkowski to chair a uranium mining, processing, and nuclear energy review in 2006. The review's report viewed nuclear power as "a practical option for part of Australia's electricity production."<sup>42</sup> The report also noted that Australian demand for electricity will double by 2050 and that over this period, two-thirds of Australian power generation will need to be upgraded or replaced. While advocates of nuclear power remain within the Liberal-National Coalition, it appears that there was less support for the nuclear option within the coalition after Howard's defeat in 2007 than there was while he was prime minister.<sup>43</sup> The unpopularity of his position on

---

<sup>37</sup> "Australia's Abbott Wants Japan Trade Deal, India Uranium Sale," *Bloomsburg Business Week*, May 26, 2010.

<sup>38</sup> "Free Trade Pact with India More Likely," *Australian Associated Press*, May 5, 2010.

<sup>39</sup> Robin Bromby, "Massive Indian Expansion to Fuel Ongoing Resource Demand," *The Australian*, May 17, 2010.

<sup>40</sup> Jeffrey Lantis, "Elections and Enduring Realities: Australia's Nuclear Debate," *Arms Control Today*, April 2008.

<sup>41</sup> Michael Perry, "Australia May Develop Nuclear Power—Howard," *Ezilon.com* May 20, 2006.

<sup>42</sup> Department of the Prime Minister and Cabinet, *Uranium Mining, Processing and Nuclear Energy—Opportunities for Australia?* Report to the Prime Minister by the Uranium Mining, Processing and Nuclear Energy Review Task Force, Commonwealth of Australia, 2006.

<sup>43</sup> Steve Lewis, "MacFarlane Says Australia Must Adopt Nuclear Power," *Courier Mail*, August 19, 2008.

nuclear power in the lead-up to the 2007 elections apparently forced Howard to modify his position.<sup>44</sup>

As Australia has become increasingly concerned about carbon emissions, a new consideration of nuclear power has emerged from some advocates. The low cost of Australian coal, relative to the cost of nuclear energy, appears to be a contributing factor as to why nuclear power has not been pursued. Dr. Switkowski has argued that a cost of carbon of \$15 to \$40 per ton would make nuclear power viable for Australia. Switkowski currently heads the Australian Nuclear Science and Technology Organization.<sup>45</sup> Australia has been considering a Carbon Pollution Reduction Scheme (CPRS), which in April 2010 the Rudd government shelved until at least 2013.<sup>46</sup> While the emissions trading scheme has been set aside for the moment, Australia continues to seek to reduce its carbon emissions.

## **Author Contact Information**

Mary Beth Nikitin  
Analyst in Nonproliferation  
mnikitin@crs.loc.gov, 7-7745

Bruce Vaughn  
Specialist in Asian Affairs  
bvaughn@crs.loc.gov, 7-3144

---

<sup>44</sup> Jewel Topsfield, "Howard's Nuclear Meltdown," *The Age*, August 24, 2007.

<sup>45</sup> Australian Government, Australian Nuclear Science and Technology Office, <http://www.ansto.gov.au>.

<sup>46</sup> "Australia Cans its Carbon Emissions Trading Scheme for Now," *East Asia Forum*, May 13, 2010.