GREENPEACE

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The Real Face of the IAEA's Multilateral Nuclear Approaches:

The proliferation of nuclear weapon material & environmental contamination

Mayak, Russia

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Executive Summary

The 1957 statute of the International Atomic Energy Agency (IAEA) dedicates this UN Agency to the worldwide expansion of nuclear power. Both the Agency and the nuclear industry currently face insurmountable obstacles in pursuing this goal, the growing problem of nuclear waste and the threat of proliferation being two of the most pressing.

The IAEA is now seeking to overcome these and other problems through the concept of multilateral control of the nuclear fuel cycle. The debate on multilateralizing parts of the nuclear fuel chain have been underway for decades, however an Expert Group report released in February 2005 provides another chapter in this ongoing debate.[1] This report, also known as the Pellaud Report, is named after the Chairman, Mr. Bruno Pellaud, a former IAEA Deputy Director General. While the debate is ongoing and the report has not inspired consensus among governments, the notion of multilateral control or oversight informs Russian and EU-3 proposals to supply Iran with 'fuel services' if it would abandon any uranium enrichment program on its own soil.

By trying to reduce the number of states operating sensitive facilities, but at the same time proposing a system whereby the nuclear materials would be supplied to countries within the multilateral arrangement, the MNA as described in the Pellaud report is laying the foundations for more proliferation. Initiatives such as a virtual or physical fuel bank will result in increased plutonium commerce and overall global stocks, and by increasing and enhancing reprocessing and enrichment, will add to the environmental, proliferation and security risks posed by nuclear energy.

Multilateral, centralized nuclear facilities will also result in an increase in the number of radioactive waste and nuclear fuel transports, exposing the coastal and transit states and their marine and terrestrial environments to escalating risks. Opposed to the IAEA approach, the Bush Administration is developing a counter proposal for a ‘business led’ approach under the untransparent Nuclear Suppliers Group as well as a still more secretive Global Nuclear Energy Initiative

Greenpeace’s briefing exposes the real consequences of the IAEA’s proposed Multilateral Nuclear Approaches (MNA) and the inherent proliferation risks posed by the U.S. led initiatives. If realized, rather than solving some of the key problems of nuclear power, the MNA and/or Bush plan will increase nuclear proliferation and radioactive contamination of the environment as well as multiply transports of plutonium, nuclear fuel and highly radioactive waste.

The two drivers of the IAEA proposal are increasing nuclear waste volumes and emerging proliferation threats from expanded uranium enrichment and plutonium reprocessing programs. An explicit aim of the IAEA with the MNA debate is to facilitate fuel supplies to a larger group of countries by taking back the spent fuel to regional disposal sites. The Multilateral Approach is being used as a framework for facilitating regional dumps, and an international nuclear waste dump, in the first instance in the Russian Federation’s nuclear facilities in Siberia.

Greenpeace opposes the establishment of a multilateral nuclear waste dump in Russia. As there is no current solution for spent nuclear fuel final storage, countries operating nuclear power reactors should move as early as possible to a phase out of nuclear power. They should establish national, monitored, above ground dry stores, instead of irresponsibly dumping their nuclear waste on a country with a disastrous record for managing nuclear waste. Large-scale contamination of the environment such as at Mayak and Tomsk, and resultant human impacts, will far outweigh any short-term financial benefits for Russia.

[1] Multilateral Approaches to the Nuclear Fuel Cycle: Expert Group Report submitted to the Director General of the International Atomic Energy Agency, INFCIRC/640, 22 February 2005.

In terms of reprocessing and plutonium fuel fabrication, the IAEA is proposing to put under international management the US$21 billion Rokkasho-mura plutonium plant in northern Japan, due to be commissioned in 2006. The facility would then operate as a regional supplier of fuel services, most likely for the Korean peninsula, and even Taiwan.

The IAEA is incapable of safeguarding reprocessing and plutonium fuel plants that would guarantee that weapons material was not diverted for military purposes. The Rokkasho plant is one such facility, with the potential for as much as 240 kilograms of plutonium each year being diverted without the IAEA even looking for it. The plant itself will give Japan as much as 7-8 tons of plutonium each year of full operation.

The Bush plan is premised on the belief that sensitive nuclear plants can be restricted to 'trustworthy' nations, with services being provided only to states judged to be proliferation reliable, and denied to others. Establishing a new international system around the Nuclear Suppliers Group and run on commercial grounds will also permit the massive expansion of nuclear power as advocated by the U.S. As with IAEA plan, there are inherent contradictions and risks with this approach, which no amount of nuclear industry propaganda can resolve.

Proliferation is inherent to nuclear power and there is no safe disposal option for nuclear waste. Instead of trying to solve the unsolvable the international community needs to adopt policies that will begin to reduce the risks and legacies of sixty years of the nuclear age.

Recommendations

Member States should:

- Agree an immediate moratorium on and a timetable for the complete phase out of nuclear reprocessing for civil and military purposes;
- Support the immediate commencement of negotiations on a comprehensive and verifiable fissile material treaty at the Conference on Disarmament;
- Agree on a moratorium on all shipments of plutonium including MOX fuel by sea or land, and a moratorium on all shipments by sea of nuclear waste, until a regime is in place which ensures the protection of the marine environment and the environment, economy and population of coastal States, including prior notification and consultation, environmental impact assessments, a satisfactory liability regime and protection from terrorism attacks;
- Promote timely agreement to prevent the spread of uranium enrichment and plutonium separation technologies and facilities, and seek agreement to reduce with the goal of elimination such technologies and facilities;
- Commit to the management of their nuclear waste within their borders;
- Seek the provision of alternatives that fully respect the right to sustainable development by promoting renewable energy and energy efficiency;

The IAEA should:

- End the promotion of multilateral nuclear approaches, that promote proliferation, multiply nuclear transports and lead to massive contamination of the environment;
- Join in the UN reform process through amendment of the IAEA statute to strengthen the Agency's role in preventing nuclear proliferation containing the dangers of radioactive materials, ending the promotion of nuclear power, a technology which has proven to be dangerous, dirty, and economic insanity.

Under no circumstances should

- Uranium fuel supplies be transferred from Russia to the Bushehr reactor in Iran;
- Radioactive waste, including spent fuel be exported to Russia;
- Rokkasho-mura open.

Key Findings of this report:

1. Proposals for a multilateral arrangement of spent fuel and radioactive waste storage and disposal go back to the early 1970s. All failed due to a combination of legal, political, technical and ethical factors;
2. The IAEA's proposal for 'Multilateral Nuclear Approaches' (MNA) spans the whole fuel cycle, from uranium enrichment to waste disposal, including plutonium separation and MOX supply;
3. The US is proposing similar multilateral approaches under the umbrella of the Nuclear Suppliers Group, called Global Nuclear Energy Initiative, which involves the development of a US plutonium economy and the export of plutonium fuel (MOX);
4. The aim of the IAEA's multilateral approaches is to promote nuclear power;
5. Multilateral approaches will lead to more proliferation, as more countries will get access to nuclear materials, including plutonium contained in MOX fuel;
6. Multilateral approaches will multiply the number of transports of fissile materials and radioactive waste, which is both a proliferation and safety risk;
7. European utilities, governments and the European Commission have started talks with Russia for the export of their highly radioactive waste. This will lead to massive radioactive contamination at reprocessing plants which release large amounts of radioactivity in the environment and increase the plutonium stocks in Russia;
8. Iran's light water reactor (Bushehr) will be capable of producing 260 kg plutonium/year, the equivalent of 32 nuclear weapons, if Russia starts to supply it uranium fuel under the Russian-Iranian Intergovernmental Protocol of Feb. 2005.
9. Japan's new reprocessing plant – under construction at Rokkasho-mura – could produce 80,000 kgs of plutonium by 2020. Japan has no credible plan for using this plutonium, and it will add to the already excessive stockpile of 45,000 kilos. The IAEA is proposing to give Rokkasho-mura a 'multilateral' status, which could involve the export of plutonium fuel (MOX) to South-Korea;
10. Iran's president has recently embraced the concept of 'multilateral approaches' by inviting foreign companies to participate in its uranium fuel industry and by offering support to other nations to develop a nuclear industry.
11. In 2003, the Director General of the IAEA stated that 35 to 40 states are capable of producing a nuclear weapon within a matter of months.

1. Background on Multilateral Nuclear Approaches

Proposals for a multilateral arrangement of spent fuel and radioactive waste storage and disposal go back to the early 1970s with the IAEA study project of 1975-1977 on regional nuclear fuel centers (RNFC) and the Committee on International Plutonium Storage (IPS) which sat from 1978-1982.

In the early days of the nuclear industry, when the supply of fissile materials was seen as a critical factor for a rapid growth of nuclear energy worldwide, arrangements such as the European Supply Agency were installed to guarantee access to uranium enrichment and reprocessing. The dumping of waste from one country on another one is also an old practice. Reprocessing plants such as in La Hague in France have accumulated large volumes of waste from foreign clients, some of them illegally dumped in the leaking site of La Manche. Over decades, West-European utilities have dumped some 100,000 tonnes of depleted uranium tiles in Russia, stored in chemically unstable fluoride gas.

Meanwhile, the nuclear waste issue has grown to the level of a real crisis for the nuclear industry. Therefore, a large group of nuclear countries in 1988 urged the IAEA to step up its efforts to develop a framework for facilitating the development of regional, multilateral or international dumpsites. These countries continue to follow a 'dual track' approach,[2] pursuing national disposal projects – at least to keep up the appearances that a national solution is possible – while more discretely developing an international exit strategy for their nuclear waste

Over almost three decades, one proposal followed the other to cope with the waste, either stemming from the IAEA itself, or from groups of governments, the EU or even private groups. All failed on a combination of legal, political, technical and ethical factors.

1.1. Historical overview of proposals

Proposals	*Partners/sponsor*	*Description*
1970s and 1980s		
Regional Fuel Cycle centers (RFCC)	IAEA	Study group examined the economic, safety, safeguards and security aspects of a multinational approach to nuclear fuel cycle facilities. Ran from 1975-77. [Meckoni et al 1997]
International Spent Fuel Management (ISFM)	IAEA	Expert group discussed the key elements of the international agreements which would need to be drawn up for an international spent fuel venture. Ran from 1979-82. [:IAEA 1982a]
International Plutonium Storage (IPS)	IAEA	Expert group proposed that all separated plutonium in excess of current requirements would be stored under international control. [IAEA 1982b]
Austrian fuel to China or Russia	Austrian Verbundgesellschaft (responsible for planned Zwentendorf reactor)	Contracts were signed with China and also with Russia for the acceptance of all wastes for Austrian power plants. With the cancellation of Zwentendorf and the Austrian decision not to open the plant, these became irrelevant.
1990s		
Spent fuel & plutonium storage (IMRSS)	German and US	German and US institutions initiating concept; International Monitored Retrievable Storage (IMRSS) for SNF and plutonium. Discussed at international

[2] Arius explicitly states on its website: "*A few countries have already recognised the value of shared facilities and, while pursuing their own national programmes, also want to explore the international option in a 'dual track' approach.*"

Proposals	Partners/sponsor	Description
		conferences; no actual negotiations [Starr and Häfele 2000]
Disposal of spent fuel and waste; revenues to be used for nuclear test site remediation.	Marshall Islands to host; customers	Strong opposition from Pacific countries and US; feasibility study started. Initiative terminated in 1999. [Rowa 1998]
Non-proliferation; SNF and plutonium storage; fuel leasing	US Fuel and Security (private) as host, including Russian partner	Proposed storage of SNF & excess plutonium on Palmyra and later Wake Island. Strongly opposed by US Government; supported by Minatom (Russia);abandoned in favour of Non-Proliferation Trust (NPT) [Greenpeace 1997]
International storage and disposal of SNF	IAEA and then an International Working Group	IAEA started initiative. Work continued by experts from South Africa, Germany, Australia, China and Switzerland Feasibility report published [International Working Group 1996]. IAEA Report appeared later [IAEA 1998]
Storage of SNF and waste in East Asian region	Taiwan, South Korea and Japan	Various concepts discussed but no formal initiative [Berkhout 1997]
	China a potential host to Taiwanese SNF	Letter of intent but no formal agreement. [Berkhout 1997]
	North Korea to store Taiwanese LLW	Agreement to accept. Abandoned due to political opposition [Berkhout 1997
Proposals for Russia to host SNF/HLW	A. Suzuki, Global Peace Initiative	Storage and disposal in Russia, Australia or Canada [Suzuki 1998]
	Suzuki, Bunn Norwark	Storage in Far East of Russia [Bunn et al 2001]
	Kurchatov Institute	Emphasis on storage in Krasnoyarsk [Rimsky-Korsakov 2000]
Multinational disposal of SNF and HLW	Pangea: commercial initiative	Studied best geological regions world wide. Western Australia identified as preferred region. Operations ceased 2000. [Miller et al 1999, Black and Chapman 2001]
Disarmament, non-proliferation and remediation	Russian Federation as host; Subject to US-based Trust (NPT) - no reprocessing allowed	Russian support to continue exploration of idea initiative ongoing [Cochran 2000, Cochran and Paine 1998]
Current		
Storage and return of spent fuel, or storage and SNF reprocessing without return of plutonium and HLW	Russian Federation as host (Minatom)	Official Russian policy; Enabling Russian legislation. Russian offer to customers. SNF reprocessing plans. US consent rights to be considered. US opposed to reprocessing.
Fuel leasing	Russian initiative Minatom	Proposed fabrication of excess plutonium into fuel in Russia. Lease fuel and take back SNF to Russia. Initiative ongoing [NDF 2002]
Develop framework for multinational disposal	IAEA	Working group met 3 times with representatives from Czech Republic, Hungary, Germany, Slovenia, South Africa, Switzerland, USA. This was followed by a Technical Committee meeting to review the draft of IAEA 2004
Promotion of multinational storage disposal of radioactive waste	Arius (currently 8 Organisational Members)	Promoting concepts of for international or regional solutions to the disposal of long-lived radioactive waste. Ongoing initiative [Arius 2002, McCombie and Chapman 2002]
Promotion of Central European regional repository	Ljubljana Group	A group of representatives from countries in this region agreed to coordinate their efforts
Promotion of international repository in Russia	Russia-IAEA	The DG of the IAEA and the Russian Minister agreed to organise a conference in 2005 to explore this option
LLW storage and disposal	Kazakhstan Government	Proposal to dispose in disused uranium mine; Kazakhstan Government in favour; debate in

Proposals	Partners/sponsor	Description
		parliament [27]

[Mc Combie October 2004]

1.2 The Pellaud Report

In June 2004, the IAEA established a group of experts under former IAEA safeguards director Bruno Pellaud to evaluate the potential for creating multilateral systems for managing the nuclear fuel cycle. The mandate of the Expert Group was three-fold:

- To identify and provide an analysis of issues and options relevant to multilateral approaches to the front and back ends of the nuclear fuel cycle;
- To provide an overview of the policy, legal, security, economic, institutional and technological incentives and disincentives for cooperation in multilateral arrangements for the front and back ends of the nuclear fuel cycle; and
- To provide a brief review of the historical and current experiences and analyses relating to multilateral fuel cycle arrangements relevant to the work of the Expert Group.

Given its mandate, the report is relatively abstract, so in an attempt to understand the implications of the options recommended for further investigation, it is appropriate to apply them to regions including North-east Asia and the Former Soviet Union.

What is new about the recent debate on Multilateral Approaches is that the scope has been broadened from the waste preoccupation of the 1970s to include the whole fuel cycle, including enrichment and reprocessing. . The current iteration spans the whole fuel cycle from front-end to back-end.

The Pellaud Report is fatally flawed in that it assumed that the inherent contradiction of the proliferation of nuclear material and the control of nuclear weapons can be effectively addressed by continuing reprocessing and enrichment but by restricting the places in which these activities take place.

By trying to reduce the number of states operating sensitive facilities, but at the same time proposing a system whereby the nuclear materials would be supplied to countries within the multilateral arrangement, the Pellaud report is laying the foundations for more proliferation by proposing enrichment services, reprocessing services, spent nuclear fuel management and radioactive waste management and disposal

If allowed to proceed, multilateral, centralized nuclear facilities will certainly result in an increase in the number of radioactive waste and nuclear fuel transports, exposing coastal states and the marine environment to escalating risks, to which they have shown increasing resistance in past years, and will still result in increasing plutonium in commerce and in stocks worldwide.

It will move the world further from the goal of disarmament, by increasing and enhancing reprocessing and enrichment, and in doing so will add to the environmental, proliferation and security risks posed by nuclear energy.

The key elements of the Pellaud Report

- Reinforces existing commercial market mechanisms on a case-by-case basis through long-term contracts and transparent suppliers' arrangements with government backing. Examples would be: commercial fuel banks, fuel leasing and fuel take-back and commercial offers to store and dispose of spent fuel

- Develops and implementing international supply guarantees with IAEA participation. Different models should be investigated, notably the IAEA as guarantor, e.g. as administrator of a fuel bank.

- Promoting voluntary conversion of existing facilities to MNAs, and pursuing them as confidence-building measures, with the participation of NPT non-nuclear weapon States and nuclear weapon States, and non-NPT States

- Creating, through voluntary agreements and contracts, multinational, and in particular regional, MNAs for new facilities based on joint ownership, drawing rights or co-management for front-end and back-end nuclear facilities, such as uranium enrichment; fuel reprocessing; disposal and storage of spent fuel (and combinations thereof). Integrated nuclear power parks would also serve this objective.

- The scenario of a further expansion of nuclear energy around the world might call for the development of a nuclear fuel cycle with strong multilateral arrangements — by region or by continent — and broader cooperation involving the IAEA and the international community.

IAEA Infcirc/640, February 22nd, 2005

With the threat of nuclear terrorism and nuclear proliferation and being identified by the US President and the UN Secretary General as one of the most important threats to world security today, the very foundations of the civil nuclear industry are being seriously questioned. The reliance of the industry on highly enriched uranium and production of plutonium in reprocessing brings about an inherent contradiction with non-proliferation objectives. Verification has been shown to be inherently fallible time and time again, while technology and know-how has spread. The IAEA is thus faced with crucial dilemmas: such as should it support Iran in its 'inalienable right' to develop nuclear energy for peaceful purposes or should Iran be exempted from the most sensitive technologies? And how to address the IAEA's historical role in facilitating the proliferation of dual-use nuclear technology to 'sensitive' countries? Should the IAEA accept criteria that holds that plutonium separation is acceptable for Japan and western countries and not for others?

The new nuclear trade envisioned by the Pellaud report including a future scenario detailed above would create even greater nuclear proliferation and security problems. Northeast Asia will be awash with even greater quantities of weapons material. In the meantime their programs will continue to develop, absorbing valuable resources, and benefiting from direct assistance from those nations most prominent in warning of the dangers of nuclear proliferation – the UK, the U.S. others.

The implication for nuclear safeguards on reprocessing plants and plutonium fuel plants (already suffering major doubts today) are barely discussed, maybe due to the fact that so many of the experts advising Pellaud are from countries which operate their nuclear facilities outside of IAEA safeguards.

IAEA concerns about the threat of plutonium are not new phenomena. Fifteen years ago, the Agency Deputy Director William Dircks rocked the nuclear establishment with his warning that the ***"…in the foreseeable future the supply of plutonium will far exceed the industrial capacity to absorb plutonium into peaceful, commercial nuclear industrial activities…excess of isolated plutonium from civilian nuclear power programmes poses major political and security problems worldwide."*** William J. Dircks, Deputy Director General, IAEA, Vienna, April 1992.

In this same period of time, as predicted by Dircks, commercial plutonium stocks have increased to

over 270 tons[3], and in the case of Japan increased fivefold. The IAEA has played its part in actively encouraging these programs, while at the same time Dr ElBaradei warns of their dangers. The latest initiative from the IAEA under Bruno Pellaud, as with the promotion of plutonium and fast reactor technology by the IAEA is in the same tradition – misleading, confused and dangerous for the peace and security of the planet.

The answer to these dilemmas is clear, although seldom explicitly discussed. Article 2 of the IAEA statute of 1957 requires the Agency "*to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world*" which too often has been interpreted as having priority over the safeguarding of nuclear materials and non-proliferation tasks assigned to it. The IAEA mandate reflects an historically specific moment in science and politics when nuclear power was still an emerging technology and risks were gravely underestimated. The IAEA should be reformed in the context of overall UN reform process underway to address this conflict of interest, in order to confirm the Agency's mandate to contain the dangers of radioactive materials, to the extent that is possible, rather than enabling the creation of more materials. The challenge for the IAEA is how to confront proliferation as one of the pre-eminent challenges of today, instead of turning to failed policies, which facilitate the production of nuclear material, as it has done in the past. To dress up the past failed policies as 'Multilateral Nuclear Approaches' (MNA) will not succeed. It is time for the IAEA to admit that the production of highly enriched uranium (HEU) and plutonium cannot be justified and must be stopped.

There are some signs of hope. There are signs that the IAEA and some Member States appreciate the critical proliferation threat the world is facing today. While the nuclear industry continues to portray nuclear power as the solution to climate change, disease and hunger in the world, others are more realistic and appreciate the inherent problems of this technology. For example, IAEA Director-General ElBaradei said that

> *"Under the current regime, therefore, there is nothing illicit in a non-nuclear-weapon state having enrichment or reprocessing technology, or possessing weapon-grade nuclear material. And certain types of bomb-making expertise, unfortunately, are readily available in the open literature. Should a state with a fully developed fuel-cycle capability decide, for whatever reason, to break away from its non-proliferation commitments, most experts believe it could produce a nuclear weapon within a matter of months. In 1970, it was assumed that relatively few countries knew how to acquire nuclear weapons. Now, with 35-40 countries in the know by some estimates, the margin of security under the current non-proliferation regime is becoming too slim for comfort. We need a new approach."* - The Economist, 20

1.3 The Nuclear Suppliers Group and the Global Nuclear Energy Initiative

While the IAEA is promoting its multilateral approach, the Bush administration is reportedly developing a counter proposal as part of its larger strategy to expand nuclear power domestically and worldwide. In July 2005, it was reported that the Bush Administration would propose that global nuclear services be promoted through the little known Nuclear Suppliers Group. While few details are in the public domain at this stage, a senior U.S. official suggested establishing,

"*a multinational "commercial consortium" backed by governments of a group of nuclear supplier*

[3] See, Declarations of the Permanent Missions to the IAEA, published under the reference No 549 of the IAEA "Information Circular", see http://www.iaea.org/Publications/Documents/Infcircs .

nations to manage and control nuclear fuel recycling, including uranium enrichment".[4]

While no formal position has been issued by the United States, it appears that the Bush Administration is opposed to the IAEA approach. Preferring instead, "*an approach that accommodates the commercial nature of providing fuel...(and which will) bring businesses into this debate and find solutions".*

The current U.S. administrations opposition to the IAEA, an in particular its Director General ElBaradei, is well known. This will be one explanation for its opposition to the IAEA's multilateral approach, but is also not the only reason. National governments of the major nuclear industrial powers have long standing policies of not fully embracing the IAEA, in particular when defending the rights of their industries to operate without interference from Vienna. From this perspective the advocacy of the Nuclear Suppliers Group to manage international nuclear fuel services is a logical counter proposal for the U.S. to make.

The Nuclear Suppliers Group, also called the London Club, emerged in the 1970's as a result of two significant developments in nuclear power: India's nuclear weapons test in 1974 and plans for a major global expansion of nuclear power. The shock of India's test which had been assisted by 'peaceful' nuclear transfers from Canada and the United States triggered fears that an expanded nuclear power program would bring about further proliferation.

Seven of the major industrial nuclear supplier states[5], sought to bring more order to nuclear trade, including binding France into global norms. The conventional explanation for the NSG is that they were seeking to constrain further proliferation. In 1978, after a few years of consultation they issued the London Guidelines in a document to the International Atomic Energy Agency. The guidelines laid out the principles, which would apply to future exports of nuclear technology and materials, and that these would be provided on condition of application of IAEA safeguards.

Of particular relevance to the current initiatives from the IAEA and the U.S. is that the NSG nearly thirty years ago, also encouraged alternatives to national nuclear facilities. Specifically,

"*If enrichment or reprocessing facilities, equipment or technology are to be transferred, suppliers should encourage recipients to accept, as an alternative to national plants, supplier involvement and/or other appropriate multinational participation in resulting facilities. Supplier, should also promote international (including IAEA) activities concerned with multinational regional fuel cycle centers."*[6]

In addition to the advocacy of the NSG it has been reported that the White House is, *"developing a new global nonproliferation policy framework that could accommodate the nuclear power ambitions of India and other emerging Third World powers."*[7]

The secretive proposal has been named the 'Global Nuclear Energy Initiative', while no significant details have yet been made public, its advocates are reported to justify the approach on the grounds that by providing India and other countries with nuclear fuel, the U.S.-led program, *"…would eliminate the need for other countries to develop uranium enrichment or reprocessing facilities that are needed to manufacture reactor fuel—or the fissile materials needed for nuclear weapons. Thus, the international community could effectively prevent the spread of dangerous enrichment or reprocessing technologies, with any nation found to be developing such facilities assumed to be*

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[4] Paul Longsworth, deputy administrator for defense nuclear nonproliferation at the National Nuclear Security Administration, as reported in Kyodo News, Washington DC, July 21st 2005.

[5] United States, the Soviet Union, United Kingdom, France, Federal Republic of Germany, Canada, Japan, and France.

[6] See, article 7, 'Special controls on sensitive exports', contained in Guidelines for Nuclear Transfers, Infcirc/254, agreed at London on 21st September 1977.

[7] See, Administration Eyes Sweeping Nuclear Waste Initiative King Publishing, by Jeff Beattie/George Lobsenz, Energy Daily August 2005

doing so for weapons purposes and not for energy purposes, as has been claimed by Iran."[8]

But as with the NSG, and the intermittent efforts of the IAEA over decades to establish multilateral fuel cycle centers, the prospects for such proposals being successful in curtailing nuclear proliferation are zero, and in fact miss the point as to why they are being advocated.

As already stated the NSG (and the debate about MNA's) was established in the aftermath of India's nuclear weapons test and the backdrop of growing nuclear power. Thirty years on, nuclear proliferation threats are top news items on a daily basis – Iran and North Korea being the topical ones at present. At the same time the nuclear industry, together with the Bush administration and other governments, as well as the IAEA, are stepping up their efforts to promote nuclear power. Those advocates of nuclear power expansion recognize that without being seen to address proliferation problems prospects for nuclear power expansion are severely undermined.

But as with earlier efforts, the inherent link between nuclear energy and nuclear weapons proliferation cannot be separated.

[8] ibid.

2. Global overview

2.1. Overview of international radioactive waste dumping

A select group of countries have been dumping large amounts of radioactive waste on other countries' territories over the history of the nuclear industry. Most important are the reprocessing plants, which have accumulated large amounts of reprocessing wastes. Under older reprocessing contracts, there was often not a 'return clause' included. More recent contracts have included such clauses that oblige the taking back of waste to the country of origin but even then, the majority of the waste volumes generated in the plant remained – sometimes illegally – in the reprocessing country. In the section below, we give a more detailed assessment of European reprocessing and radioactive material transfers.

Examples of transfers of radioactive materials between countries[9]

When	*Type*	*Description*
from 1950 on (to the late 1970's in France and the UK and later in the Russian Federation)	Reprocessing with no return of wastes	UK and French reprocessors dealt with customers (Germany, Italy, Netherlands, Japan, Sweden, Switzerland, and Belgium) with no requirement to return wastes. After 1976, there were no further contracts without a waste return option.
		Belgian reprocessing & storage at Eurochemic with no return of wastes. Eurochemic was decommissioned after a short operating period.
		The Soviet Union delivered fuel to its satellite countries and accepted returned fuel for reprocessing and disposal. Since the break up of the Soviet Union, the Russian Federation has to offer this service on a commercial basis. For example, in 1998/9, 132 damaged fuel elements were removed from Slovakia.
1976–	Reprocessing with substitution	UK and French reprocessors agreed with their customers that various wastes from reprocessing can be substituted, resulting in exchanges of specific radionuclides with equal activity or toxicity.
ongoing	Shipment of research reactor fuels	The USA has agreed to repatriate spent fuel supplied to research reactors. Transfers have already occurred from many countries to the USA and also to the Russian Federation.
1986	Bilateral Exchange agreement	Germany and Sweden agreed that the former would take up unused reprocessing contracts and that Sweden would accept spent MOX fuel from Germany.
2000	Acceptance of Specific waste streams	Radium containing LLW that did not meet the Spanish acceptance conditions at El Cabril was shipped to Hanford in the USA for disposal.
ongoing	Sealed sources	Sealed radiation sources were delivered to customer countries for many years with no requirement for accepting the spent

[9] IAEA, Developing Multinational Radioactive Waste Repositories: Infrastuctural Framework and Scenarios of Cooperation, October 2004, IAEA-TECDOC-1 413, at http://www-pub.iaea.org/MTCD/publications/PDF/te_1413_web.pdf, table 1, page 7.

		sources back into the country of origin. Recently, efforts have been made to encourage return, to ensure better traceability and environmentally proper disposal.
ongoing	Uranium processing	Depleted uranium residues that arise in enrichment plants and the wastes from fuel fabrication are not returned to countries requesting these services

[Mc Combie October 2004]

2.2. European policies on export, import and transfer of radioactive waste

Many European countries keep the option open for exporting their radioactive waste. Mostly, this is under a 'dual track' approach: pursuing the development of a national repository, while also supporting the development of multilateral nuclear dump sites, in which case the export to Russia is seen as the most realistic option.

The most relevant initiatives today are:

1. **ARIUS**, Association for regional and international underground storage. Arius was set up in Switzerland by waste management organisations from several countries as a non-commercial body to promote the concept of regional and international facilities for storage and disposal of all types of long-lived nuclear wastes.
2. **SAPIERR**, Support action, pilot initiative for European regional repositories. SAPPIER is a project within the 6th framework programme of the EU, which is designed to explore the feasibility of regional repositories in the EU.
3. **Ljubljana Initiative Group**. This is a group of representatives of mainly governmental organisations in central European countries interested in the concept of regional central European repositories.
4. **IAEA – Russia Initiative**. The Director General of the IAEA and and Rosatom organised a conference in Moscow on 'Multilateral Technical and Organizational Approaches to the Nuclear Fuel Cycle Aimed at Strengthening the Non-Proliferation Regime' from 13-15th of July 2005.[10]

Overview of policies of European countries on Export, import and transfer of radioactive waste (RAW) and spent nuclear fuel (SNF)

Country	Disposal Policy for HLW[11]/SNF Attitude towards international repository	Import of foreign RAW for disposal permitted ?	Export of RAW permitted ?
Austria	Return to USA (research reactor only)	No	Yes (conditions)
Belgium	Dual track 1st priority national	Yes (conditions)	Yes (conditions)

[10] International Conference on Multilateral Technical and Organizational Approaches to the Nuclear Fuel Cycle Aimed at Strengthening the Non-Proliferation Regime, 13 - 15 July 2005, Moscow, Russia at http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=1001.

[11] HLW: High Level Waste

Country	Disposal Policy for HLW[11]/SNF Attitude towards international repository	Import of foreign RAW for disposal permitted ?	Export of RAW permitted ?
Bulgaria	Return to Russia	No	Yes
Croatia	No official policy	No	Open
Czech Republic	Dual track 1st priority national	No	Yes (conditions)
Finland	National only	No	No
France	National only	No	Yes (conditions)
Germany	National only	Yes (conditions)	Yes (conditions)
Hungary	Dual track	No	Yes
Italy	No official policy	No	Yes (for treatment)
Latvia	Dual track	No	Yes (conditions)
Lithuania	Dual track	No	Yes (conditions)
Netherlands	Dual track	Left open	Left open
Romania	No official policy	No	Yes (conditions)
Slovakia	Dual track 1st priority national	Yes (conditions) for treatment, not for disposal	Yes (conditions)
Slovenia	Dual track	Yes (conditions)	Yes (conditions)
Spain	No official policy	Yes (conditions)	Yes (conditions)
Sweden	National only	Yes (small quantities)	Yes (conditions)
Switzerland	Dual track 1st priority national	Yes (conditions)	Yes (conditions)
UK	No official policy	Left open	Left open

Source: McCombie, Boutellier 2004[12]

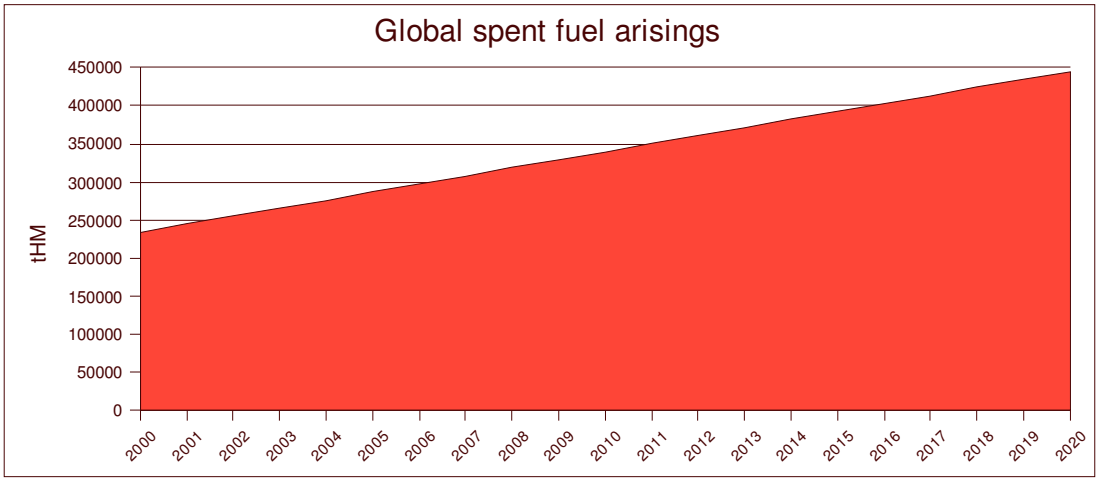
2.3. Spent Fuel Increasing Around the World and the Consequences for MNA

By the beginning of 2003, the total amount of spent fuel cumulatively unloaded from reactors worldwide was close to 255,000 tHM (tonnes of heavy metal). Every year, another 10,500 tHM is added and by 2010, the IAEA is expecting an increase to 11,500tHM/year. By the year 2010, the total amount may grow to 340,000 tHM and by 2020 to 445,000 tHM.[13] Asia, Africa and East Europe are expected to double the amount of spent fuel to be stored in the coming decade.[14]

[12] Charles McCombie, Christina Boutellier, "Problems of an international repository for radioactive waste: Political and legal aspects of international repositories," at http://www.arius-world.org/pages/pdfs_pub/INLA-paper%2027-09-04.pdf.

[13] Fukuda K., Danker W., Lee J.S., Bonne A., M.J. Crijns, *IAEA overview of global spent fuel storage* . Vienna, IAEA, Department of Nuclear Energy, 2003, at http://www.iaea.org/NewsCenter/Features/UndergroundLabs/Grimsel/storageoverview.pdf, 4.

[14] Fukuda, 5.



source: [IAEA 2003a]

At the beginning of 2003, about 84,000 tHM had been reprocessed and 171,000 tHM of spent fuel were stored. The global reprocessing capacity is at around 4,000 tHM , but is only operating at partial capacity. The maximum estimated global reprocessing capacity in 2010 is 7600 tonnes per year.[15] The Russian RT-1 facility at Mayak uses only 34-40% of its capacity the Thorp plant in the UK was been shut down in April 2005 after a spill of liquid radioactive waste and its re-start is uncertain, the French plant at La Hague has been operating at about 60-70% of its capacity over the last years (see section below) and the start-up of the Japanese Rokkasho plant is still uncertain.

We may thus expect that the vast majority of high-level waste will arise in the form of spent fuel and will be stored at interim storage sites for at least 50 years, with up to 100 years or more for cooling. For spent MOX fuel, this period could need to be further extended due to its higher heat generation.

Global spent fuel and storage capacities by region[16]

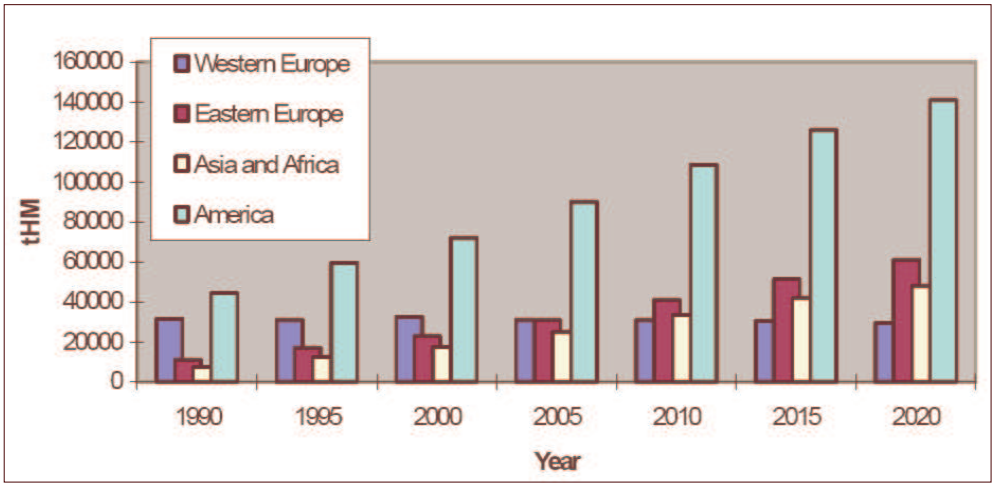
Region	Amount on Jan. 1st 2003	Storage capacity on Jan. 1st 2003	Storage under construction	Total storage
West Europe	36100	71800	4000	75800
East Europe	27700	34200	11900	46100
America	83300	104800	6800	111600
Asia & Africa	23900	33000	1300	34300
Total	171000	243800	24000	267800

The IAEA is projecting spent fuel for each region:

- For East Europe and Asia & Africa, the amount of spent fuel will double in the coming 10 years.
- West Europe will show slight decreasing quantities of spent fuel to be stored, due to reprocessing of spent fuel. Consequently, a higher amount of vitrified high-level waste and other reprocessing waste categories will have to be stored. We consider this as a large overestimation by the IAEA of reprocessing in Europe.
- America will store all discharged fuel.

[15] See David Albright, Frans Berkhout and William Walker Plutonium and Highly Enriched Uranium 1996 World Inventories, Capabilities, and Policies

[16] Tonnes HM (Heavy Metal) Fukuda, 6.



Spent fuel stored by region [IAEA 2003a]

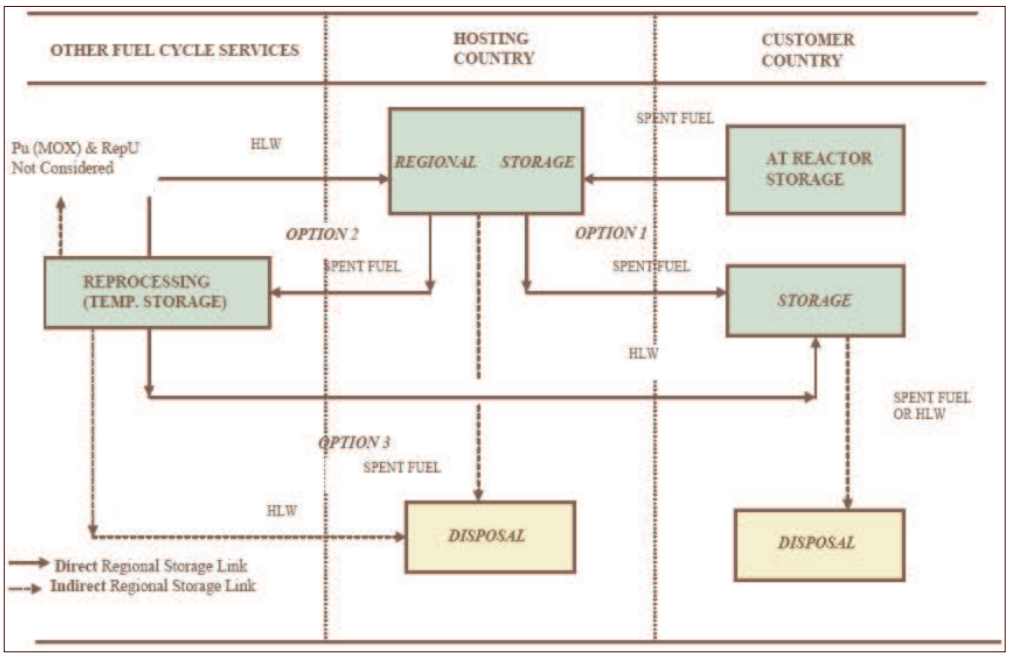
2.4. Spent fuel stored by region

With the global world storage capacity for spent fuel at about 244 000 tHM, there is topically an excess capacity of about 73 000 tHM at existing sites. On a worldwide basis, the IAEA is not foreseeing any capacity problems. However, on the national or regional level, or at the utility level, there are stressing capacity problems, e.g. in East Europe.

These national capacity shortages can drive countries or utilities towards:

- reprocessing, in which case spent fuel is removed from the reactor site and either stored for a longer period at the reprocessing site either awaiting reprocessing for a longer period or being reprocessed in which case large volumes of reprocessing wastes would remain in the reprocessing country and a smaller volume of highly radioactive waste could be returned and sent to a dedicated storage site for these categories of waste; and
- a multilateral approach to underwrite the lack of national capacity. This case is especially topical for Central Europe, where export is considered from Paks (Hungary) to Mayak (Russia) and from Kozloduy (Bulgaria) to Krasnoyarsk (Russia).

It should be noted that reprocessing contracts can be used as a cover for final dumping in the reprocessing country and a first step towards a genuine multilateral approach. This is especially the case for the spent fuel from Italy to be reprocessed either in France or the UK and for the so-called reprocessing contracts with Russia. With the start-up of the reprocessing plant at Krasnoyarsk (RT-2) being postponed for 20 or even 30 years, any transport of foreign spent fuel to this site would de-facto turn into a dumping contract, even if today the Russian law does not allow final disposal of waste on its territory. This strategy has also been identified by the Pellaud Commission of the IAEA and is presented in the following chart:



Schematic drawing of a regional spent fuel storage system in the context of the nuclear fuel cycle. [IAEA, Feb.2005]

2.5. The multiplication of nuclear transports

It has been noted above that the MNA will multiply transports of nuclear fuel and highly radioactive waste, by sea and by land. This much is obvious: fewer, bigger reprocessing sites will require the transport of nuclear material and waste between different centers. Waste will travel from nuclear power stations to repositories, to reprocessing centers, and then again as nuclear fuel. Low and high level waste resulting from the reprocessing will itself have to be transported.

The Pellaud report stated on page 62 that "*There was recognition that fewer, bigger sites would probably mean more shipping and transporting of nuclear material and, other things being equal, more transport would mean more chances for accidents*"[17]. It also noted that "*The additional establishment of regional arrangements could reduce the transportation risk for separated fissile material and enhance security, in comparison to intercontinental shipments, but could increase the transportation risk in comparison to national facilities.*" (page 65.) Almost all scenarios suggested increased transportation requirements (see pages 68, 69, 79, 81, 89, 90.) It acknowledged that "*Regional facilities would involve transportation of spent fuel over long distance with its associated obstacles*." The Pellaud Report went on to state that "*therefore, in the views of some States, it is desirable to co-locate nuclear power plants, reprocessing plants, MOX fuel (or mixed metal fuel) fabrication plants and fast reactors to use the MOX fuel. Transportation of spent fuel, if any, should be over short distances*." (page 92.)

Pacific Pintail transports plutonium fuel from Japan to the UK (Sellafield), condemned by 80 on route governments citing environmental, security and safety concerns [Greenpeace 2002]

These plans come at time when opposition to nuclear transports has reached an all time high. As recently as the Outcomes document of the Millennium Development Goal+5 Summit held in New York noted that

> *"...that cessation of transport of radioactive materials through small island developing States regions is an ultimate desired goal of small island developing States and some other countries."*[18]

This wording reflected the decision reached by Small Island States in the Mauritius Strategy[19] to

[17] Citing a 1977 IAEA study, the Regional Nuclear Fuel Cycle centers study (REGIONAL NUCLEAR FUEL CYCLE centers, Vol. 1, Summary, 1977 Report of the IAEA Study Project, IAEA, Vienna (1977))

[18] http://www.un-ngls.org/un-summit-DOD.doc

[19] The Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island States (Port Louis, 13 January 2005), at found at http://www.un.org/smallislands2005/pdf/sids_strategy.pdf.

implement the Barbados Programme of Action[20] for their sustainable development. The SIDS, including the Caribbean, the Pacific, and the AIMS (Atlantic, Indian Ocean, and Mediterranean and South China Seas) regions, were united in their opposition to the transport of radioactive material through their regions.

These coastal States cannot be expected to sit-by while shipments of nuclear waste and nuclear material are massively increased by the international community. At the 2005 Review Conference of the Nuclear Proliferation Treaty (NPT) meeting in May 2005 important statements were made on nuclear shipments by a number of States. Chile[21] drew attention "to the potentially disastrous effects that an accident could have on the population, the maritime environment and the economy of coastal States, whose fishing industry is vital to their development. Samoa[22] on behalf of the Pacific Island Forum cited the SIDS Mauritius strategy, and emphasised the need for continuing action, in particular on the further development and strengthening of the international regulatory regimes. They noted that fisheries and tourism would be totally devastated by negative publicity following an incident. The Marshall Islands stated that it remains concerned that the present international arrangements for liability and compensation do not adequately address the risks posed by the shipment of radioactive materials.[23]

We have already seen significant protest at the shipment of fuel between Europe and Japan, and can expect considerably more shipments, both by land and by sea and even by air, if the Pellaud report recommendations are implemented.

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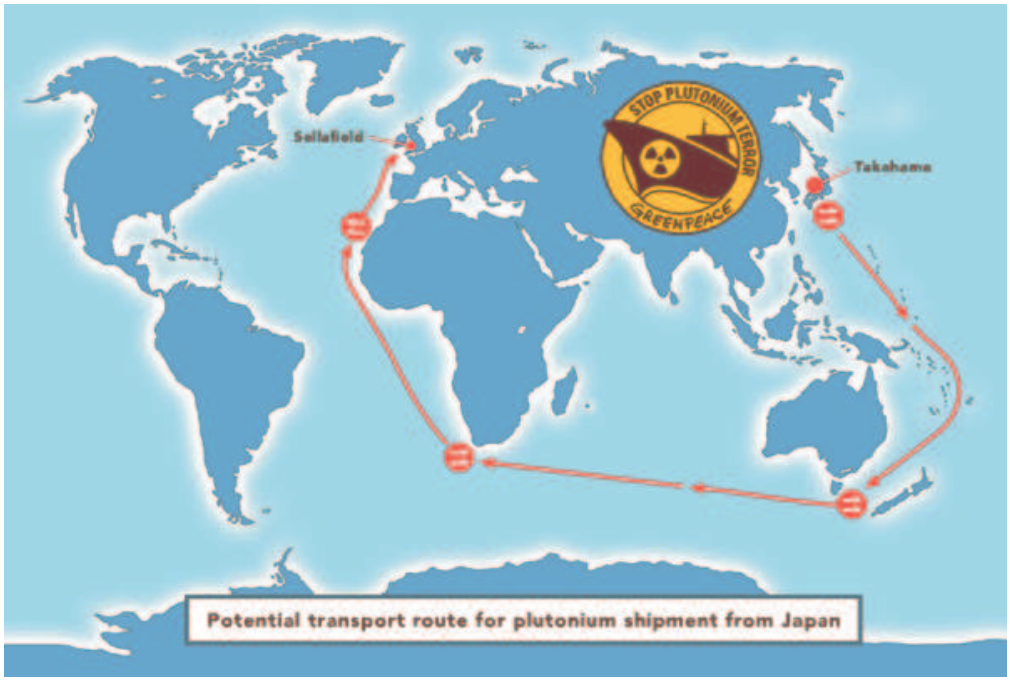
[20] Programme of Action for the Sustainable Development of Small Island Developing States (Bridgetown, 6 May 1994) ('BPOA'), **in** *Report of the Global Conference on the Sustainable Development of Small Island Developing States (Bridgetown, Barbados, 25 April-6 May 1994)* **(A/CONF.167/9, October 1994).**

[21] Statement by H.E. Mr. Alfredo Labbe of Chile to Committee III of the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 23 May 2005.

[22] Statement by H.E. Mr Ali'ioaiga Feturi Elisaia, Permanent Representative of Samoa to the United Nations, to the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 4 May 2005.

[23] Statement by N.E. Mr. Alfred Capelle, Permanent Representative at the 2005 Review Conference of the Parties, to the Treaty on the Non-Proliferation of Nuclear Weapons, 5 May 2005.



Potential transport route for the 2002 plutonium shipment from Japan to the UK [Greenpeace 2002]

3. Cases of International dumping, waste trafficking and reprocessing

3.1. The Export of Spent Fuel to Russia

In contrast to other governments, the Russian government – represented by the Russian Ministry for Atomic Energy (Minatom) – is actively promoting Russia as an international Spent Nuclear Fuel (SNF) storage and disposal country. However, like other countries, Russia doesn't have a final repository for SNF. Imported SNF would be first transported for interim storage to Mayak and/or Krasnoyarsk. Four candidate sites for a final repository are under investigation by Minatom:

- Deep disposal in granite at Zheleznogorsk/Krasnoyarsk;
- Deep disposal in porphyrite at Mayak/Southern Urals;
- Disposal in permafrost at Novaya Zemlya;
- Deep disposal in granite formations at Kola Peninsula.

a) The Minatom scheme (White Paper Valentin Ivanov):

In March 2000, Greenpeace revealed a Minatom White Paper proposing an initial import of 20,500t SNF. Half of the expected revenue estimated at US$21bn will be used for the SNF repository and management, the remainder, according to Minatom, will be profit. Potential customer countries identified in the Minatom Paper are:

Asia	Western Europe	Eastern Europe
Japan	Switzerland	Bulgaria
Taiwan	Spain	Hungary
South Korea	Germany	Czech Republic
China		Yugoslavia
Vietnam		
Iran		
Thailand		

The Minatom White Paper envisages nuclear reprocessing of the bulk of the imported SNF (16,000t out of the imported 20,500t). Reprocessing will only compound Russia's nuclear nightmare, as it leads to an increase in the volume of radioactive wastes requiring long term management, much of which is in a highly volatile liquid form. The reprocessing of one ton of spent fuel results in 45m3 of high level waste, 150m3 of medium level waste and 2,000m3 of low level liquid waste. The process also generates a further 7,500kg of solid radioactive waste.

b) The law of 2001:

Greenpeace opposes a multilateral nuclear waste dump in Russia:

- As there is no current solution for SNF final storage, countries operating nuclear power reactors should move as early as possible to a phase out of nuclear power. For the waste that they have created, they should establish national, monitored, above ground dry stores, instead of irresponsibly dumping their nuclear waste on a poor country with a disastrous record for storing nuclear waste.
- As proposed in the Minatom White Paper, as well as its nuclear strategy, the idea behind SNF imports to Russia is to finance new reprocessing facilities and fast breeder reactors.

Russia wants the money to pursue the out-dated 'cold war' concept of a plutonium economy. While the NPT scheme excludes reprocessing of imported SNF, it is most unlikely that Russia would not use revenue from the SNF import for its reprocessing/fast breeder programme.

- Even if of the income from SNF import and disposal $7.2 billion for “regional social-economic and ecological problems” (Minatom document) was actually used for environmental remediation, the damage done to the Russian environment by final disposal and reprocessing of thousands of tons SNF would by far outweigh any benefits.

[Greenpeace, 2002]

c) Supply of uranium fuel to Iran and return of spent fuel

On Feb. 27th 2005, Russia and Iran agreed on nuclear fuel deliveries for the controversial Bushehr reactor in Iran. The two countries signed an Intergovernmental Protocol on a return of spent nuclear fuel. Russia will take back the fuel 5 years after unloading from the reactor.

Rumyantsev, head of Rosatom stated that: "*Under the documents signed on Sunday, Iran pledges to hand over worked-out nuclear fuel from Bushehr to Russia, while Russia pledges to accept it for long-term storage and processing*".[24]

According to Rumyantsev, the first unit of the Iranian power plant will be put into operation by the end of 2006, and fuel delivery will take place some six months before this. He further specified that around 100 tons of fuel would be delivered.

This spent fuel return agreement has been presented as a non-proliferation guarantee. However, from a technical point of view, it is entirely irrelevant.

[24] ITAR-TASS 27 feb. 2005

The Bushehr reactor has a uranium fuel inventory of 103 tHM[25]. Assuming a burn up of 40-45 GWd/y and a cycle of 12 months, some 26 tHM will be unloaded every year. This fuel will contain about 1% plutonium, or 260 kgs. After 5 years, Iran will have 129 tHM of spent fuel in intermediate storage, or 1288 kgs plutonium. If Iran would have the intention to produce nuclear weapons, its spent fuel inventory would be enough for the fabrication of 161 nuclear weapons. At any time under the Intergovernmental Protocol, Iran will thus have far more plutonium than it could ever use if it had military ambitions.

The critical issue is that Iran – if it ever intends to reprocess the spent fuel – could withdraw from the Nuclear Non-Proliferation Treaty following North Korea's example. Even if Russia would interrupt fuel supplies and the UN would seek to impose sanctions, Iran could separate plutonium and produce nuclear weapons in a few months time.

3.2. Proliferating the Nuclear Fuel Cycle - Japan and North-East Asia

As stated earlier, the IAEA is the international body tasked by its statute and through the NPT with both promoting the use of nuclear energy worldwide, while also applying police type methods to safeguard nuclear material against diversion to military use.

The relationship between expanding nuclear programs and proliferation risk is no better highlighted than in North-east Asia.

The nuclear dynamic that exists between countries in the region in particular the Korean Peninsula and Japan, is further complicated by U.S.-Chinese relations. While most international attention has focussed on the nuclear program of North Korea, Japan and South Korea have large nuclear power programs, and in the case of Japan the complete nuclear fuel cycle, including plutonium reprocessing and uranium enrichment. As international efforts continue to reign in North Korea's plutonium operations at Yongbyon, Japan is on a short-time table to the opening of the world's most expensive nuclear facility – the Rokkasho-mura plutonium reprocessing plant.

Aerial photograph of Rokkasho-mura reprocessing complex, in Aomori Prefecture, northern

Honshu, Japan. The large tower to the left is the discharge stack for the release of aerial radioactive gases. Future risks under the IAEA Multilateral Approach is that the plant is used to reprocess South Korean spent fuel. The photograph was taken during a Greenpeace baseline radiation sampling operation from an industrial kite in November 2002, Gavin Newman/Greenpeace.

According to official figures given in 2004, the US$21 billion Rokkasho plant is expected to separate just under 5 tons fissile plutonium each year of full operation. (Fissile refers to the plutonium in the isotopes 239 and 240, which in reactor grade plutonium produced in power reactors is in the range of 70% of the total plutonium.) This is around 7-8 tons total plutonium.

On the basis that the intention of its operator Japan Nuclear Fuel Limited (JNFL), is to operate Rokkasho at full capacity, and that testing of both uranium and spent fuel proceeds without major incident through 2005 and 2006, then throughput is expected to be as follows:

Rokkasho Spent Fuel Schedule and Plutonium Separation		
Year	Spent fuel in tons	Plutonium kilograms (tot)
2007	200	2,000
2008	400	4,000
2009	600	6,000
2010	800	8,000
2011-2020	8000	80,000

Figures based upon NAC report on operational plan for Rokkasho, 1995; and on 6 July 2004 response to Diet Question by Hidekatsu Yoshii, as reported by CNIC, Tokyo. Japan mid-2004 had 12,000 tons of spent fuel located at both reactor sites and the spent fuel storage area at Rokkasho.

One major problem for Japan, the IAEA and the international community is that Japan already has a large-stockpile of plutonium with its plans to use it in MOX fuel in disarray and no credible plans to be able to use even a fraction of it.

If we take the current available plutonium stockpile of Japan at 45,000kg and add the cumulative supply of plutonium to 2020 from Rokkasho operation, 100,000kg, giving a supply of 145 metric tons of plutonium, it is clear that Japan is set to become the world's largest holder of weapons-usable plutonium, far surpassing that contained in the United States nuclear weapons arsenal of 100 tons.

"I admit that we have excessive amounts of plutonium, but our purpose is for research," Yuichi Tonozuka, president of the Japan Nuclear Cycle Development Institute, April 2005.

According to the official figures from the Ministry of Economy, Trade and Industry (METI), Japanese MOX will be loaded into conventional light water reactors containing 5-8 tons (fissile) per annum on the basis that all 15-18 reactors slated for MOX are operational. This was originally intended to be the plan from 2010.

On the official figures, 8-10 tons plutonium will be used each year from 2010 equal to 80-100 tons total plutonium demand by 2020. Add in plutonium demand for fuelling the Monju fast breeder reactor at 300kg total each year requiring 4 tons by 2020. Compared with planned supply of 145 tons, Japan will still retain a surplus stockpile of 41 tons. However, on past experience and the impossibility of operating 18 reactors by 2010 with MOX fuel, it would be prudent to look at a more likely (if still conservative) scenario.

At seven reactors loaded with MOX by 2010, demand on METI figures would be just under half of official projection, at 4-5 tons per year, requiring upwards of 50 tons during the period up to 2020.

Thus total demand for thermal MOX between 2005 and 2020 would be around 55 tons of plutonium. Thus surplus stockpile of plutonium in 2020 would be 90 tons. This is in the same range as contained in the U.S. nuclear weapons arsenal and stockpile. Clearly Japan, already in violation of its plutonium no-stockpile policy, is heading for even greater plutonium stockpiles.[26]

Any other major delay in Japan's MOX program – and the entire history is one of delay - and the excess stockpile will only grow further.

a) Rokkasho's role in the IAEA Multilateral plan

Aware of the impending start up of Rokkasho, the IAEA's plan for multilateral fuel cycle facilities takes on a particular resonance in North-east Asia. Over the past two years as Dr ElBaradei has talked more about the need for greater control over the fuel cycle, and in aftermath of the release of the Pellaud report, the relationship between the plan and Japan's nuclear program has generated speculation as to what impact the IAEA's plan, if implemented, would have on Rokkasho operation. There remain almost no details in the public domain. In July however, the IAEA confirmed that it will propose to place Rokkasho, along with up to nine other sensitive nuclear facilities under international management by 2010. The proposal will be made to the IAEA Board of Directors in Vienna in late September.[27]

Facilities under the IAEA scheme would provide services to other countries not in possession of reprocessing or enrichment plants.

While diplomatic sources report that the Japanese government is opposed to the idea,[28] the logic from the perspective of the IAEA is clear. Plans for nuclear power plant expansion globally are greatest in North-east Asia. Not only in Japan is spent fuel and the plutonium contained within seen as a resource, but also in South Korea. As of 2005 South Korea had acquired more than 7500 tons of spent fuel. Japan's commitment to continue plutonium reprocessing and stockpiling is cited by South Korean officials as justification for acquiring the same. It can be surmised that the IAEA sees the current block on South Korea obtaining plutonium as not sustainable.[29] In addition, plans for advanced nuclear programs based around fast reactor and reprocessing are being researched in both South Korea and Japan. While the United States remains opposed to the operation of a reprocessing plant on the Korean peninsula, Rokkasho could play a regional role in managing the growing problem of high level waste spent fuel. This would involve the shipment of spent fuel from the Korean peninsula for storage and eventual reprocessing. In that sense Rokkasho would operate in a similar way to the European plants at Sellafield and la Hague.[30] After reprocessing, the separated plutonium would be manufactured into MOX fuel and returned as and when required to be loaded into Korean nuclear reactors.[31]

That is the theory. In reality none of this is straightforward.

Whether or not Rokkasho is placed under international management, Japan will come under

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[26] The Japanese government in response to political pressure over its plutonium program declared in the early 1990's that it would not hold more plutonium than was necessary for commercial use. The government's 'no plutonium stockpile' taken with their declared supply and demand figures for plutonium were meant to reassure the international community, particularly in East Asia, that Japan would only possess sufficient plutonium to meet commercial requirements. However, almost from day one, Japan has possessed well in excess of its requirements, and as the 1990's unfolded the imbalance only grew more substantial.

[27] AFX News Limited, Tokyo, IAEA wants to bring 8-10 nuclear facilities under its control - report 07.17.2005.

[28] *Ibid*.

[29] The IAEA also faces the challenge that the Rokkasho-mura plant alone will absorb up to 20% of its annual nuclear safeguards budget, with still no possibility of detecting the diversion of significant quantities of plutonium.

[30] Germany, Belgium, Switzerland, Spain, Sweden, Italy, and the Netherlands have all shipped spent fuel to either or both reprocessing plants in the UK and France over the past 30 years.

[31] For more analysis on what a future multilateral role for Rokkasho would look like, see Greenpeace International report to the seminar on nuclear proliferation in North-east Asia, presented to at the National Assembly, Seoul, South Korea, April 2005.

growing pressure to scale-back its plutonium program, especially as its stockpile of plutonium reaches towards 100 metric tons. **Rokkasho will be the only such facility operating in a non-nuclear weapon state.** Japanese officials remain wary of South Korea obtaining plutonium for the very same reason that their counterparts in Seoul remain concerned by Japan's plutonium program – the potential for it to be used for nuclear weapons.[32] Fresh MOX fuel provides any state with the means to extract the plutonium for military use. In addition, opposition in Japan to having nuclear waste from Korea dumped on its territory is likely to be considerable.

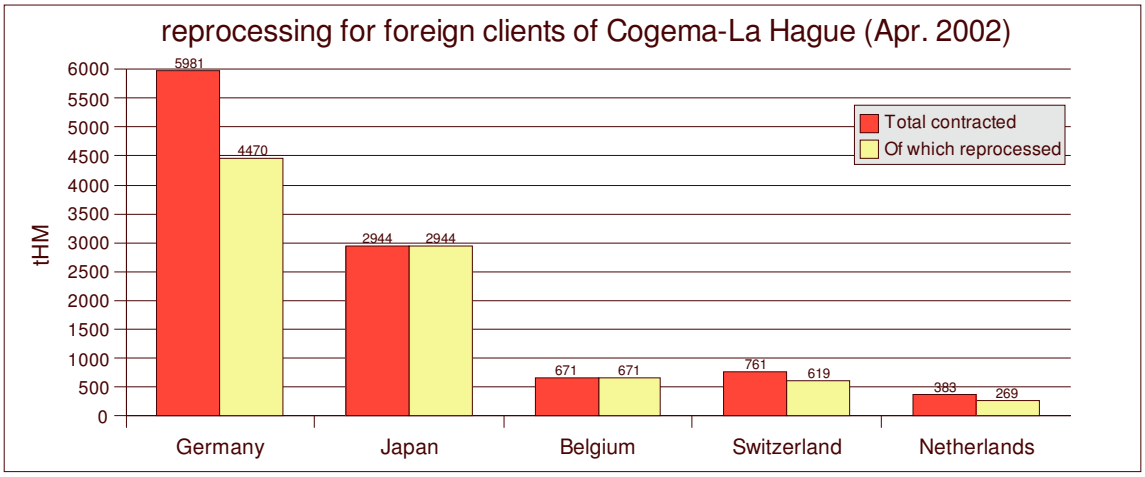
Thus, the IAEA plan to provide reprocessing and plutonium fuel services to South Korea will not reduce either the risk of nuclear proliferation nor the suspicions in the region and beyond that they are serving a 'peaceful' role but with the potential to be used for the manufacture of nuclear weapons.

It is this nuclear conundrum that commercial plutonium is a direct use nuclear weapons material that the IAEA multilateral plan will not be to resolve. Any expansion of reprocessing and plutonium fuel services to other countries will only increase the flow of bomb material increasing the security and proliferation risks. Rather than seeking ways to expand the threat, the international community needs to negotiate an end to all reprocessing and plutonium use through a comprehensive fissile material treaty.[33]

3.3. Accumulation of radioactive waste in La Hague (France)

a) Overview of contracts with foreign clients

Cogema-La Hague is the world's largest reprocessing plant. The two units (UP2 and UP3) each have a capacity of 800 tHM/year. At its peak, reprocessing for the French client EdF and the foreign clients combined, peaked at 1600 tHM/year between 1996-98. After that, reprocessing sharply declined, because key foreign clients either terminated their contracts (e.g. Belgian client Synatom) or did not renew their contracts as the liberalisation of the electricity market in Europe



forces utilities to cut highly expensive reprocessing.

Source: [Wise-Paris, 2002]

Foreign clients have reportedly contracted a total of 10,740 tHM of spent fuel for reprocessing, of

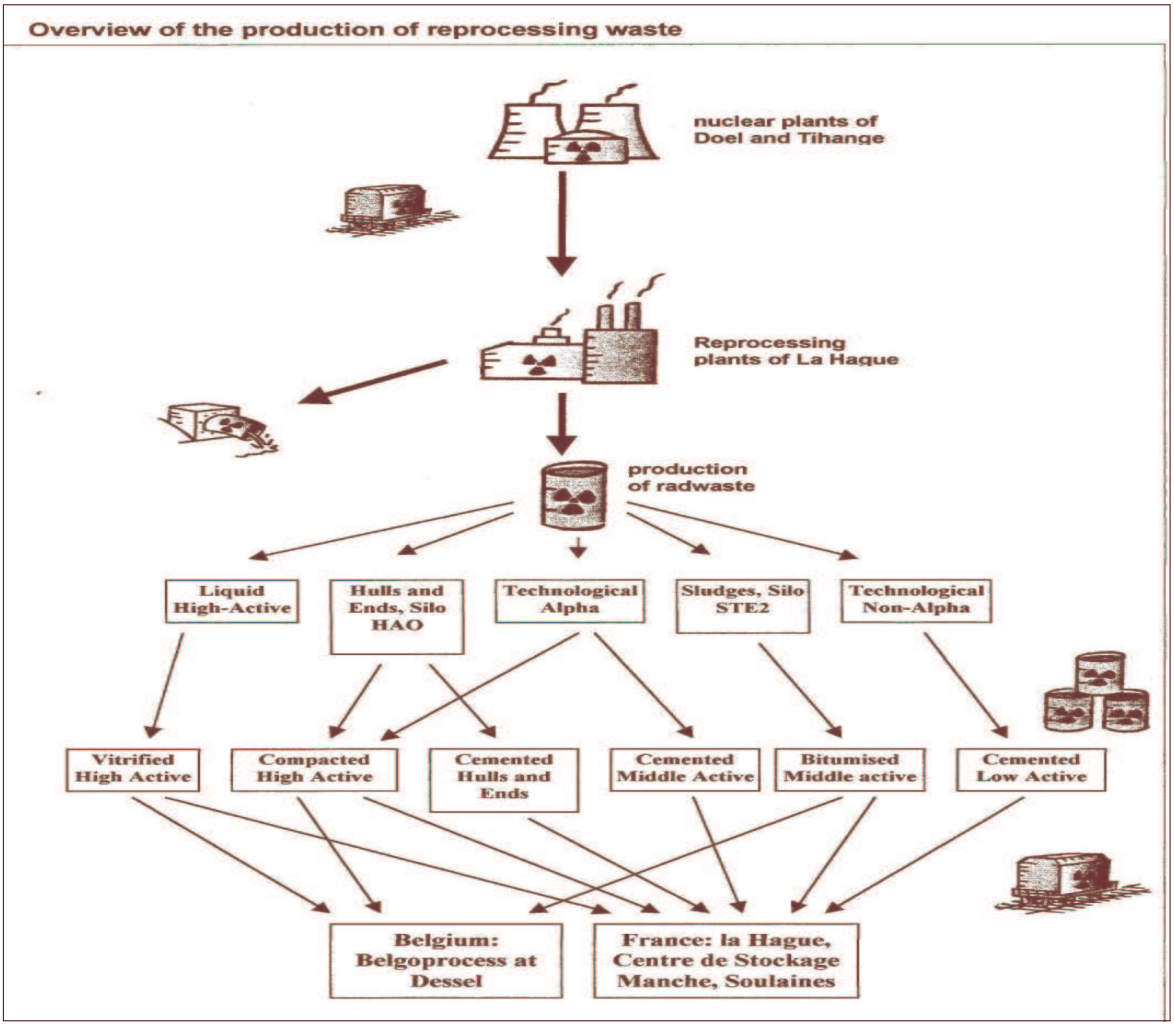
[32] For example, "If the Republic of Korea wanted to import plutonium technology, it would be a borderline case between legitimate need and proliferation concern." Ambassador Ryuchi Imai of Japan, as cited by U.S. Ambassador Armacost to Sec. of State Christopher, March 1993, p50.

[33] See, Greenpeace International draft Comprehensive Fissile Material Treaty, presented to delegates to the NPT Preparatory Meeting, April 2004.

which 84% was reprocessed by April 2002.[34]

The contracts for foreign clients can be grouped in 4 categories:

- **early contracts, prior to 1977** for reprocessing in UP2, with no return close for the reprocessing wastes, including the separated plutonium which was dedicated to the Superphenix breeder reactor;
- **contracts signed in 1977 for reprocessing** in UP2, with a return close for the reprocessing wastes
- **'baseload' contracts, signed in 1977-1978 with a return cl**ause. With these contracts, the foreign clients committed to finance the construction of the UP3 plant on a 'cost-plus-fee' basis.
- **'post-baseload' contracts for reprocessing after the year 2000** (also called post-2000 contracts). The contracts typically have 2 parts: an initial amount + options to be lifted 5 years in advance of actual reprocessing. The Netherlands (EPZ) recently decided to lift such option, although it has no use for the separated plutonium.



[Greenpeace, 2002]

[34] Source: Wise-Paris, 2002.

Overview of types of reprocessing contracts of foreign clients with Cogema					
Type contract	**Execution contract**	**Dates of contract signature**	**Dates of reprocessing**	**Radwaste**	**plutonium**
fixed price	Executed	prior to 1977	1979 – 1980	stays in France	stays in France
fixed price	Executed	1978	1982 – 1988	return	return
baseload Cost-plus-fee	Executed	1978	1992 – 2000	return	return
post – 2000	cancelled, executed or in execution	1990	2000 – 2015	return	return or stays in France

[Greenpeace, 2002]

b) The Cogema 'swap-shop'

From 1977 onwards, reprocessing contracts with foreign clients typically included a return clause for the reprocessing waste. However, in practice, the vast majority of the volumes would stay indefinitely in France. In a reprocessing plant, a large number of waste categories are produced and over the years, waste conditioning has generated different types of wastes.

The following tables gives an overview of waste production, conditioning and allocation for foreign clients.[35]

The principal categories of reprocessing waste:

- **Vitrified High Level Waste**: after chemical extraction of uranium and plutonium from the spent fuel in solution ('le jus'), there remains a **high-active liquid** waste which contains the majority of the radioactivity (fission products and trans-uranics). This liquid is further calcinided and mixed with liquid borosilicate glass which is poured into containers
- **Structural waste** (hulls and ends): the metallic surrounding of the fuel pellets (made of zircalloy) which is sheared during reprocessing, together with the top and bottom ends of the fuel elements. This high-active waste was previously cemented. Currently a compaction installation is under construction at la Hague which will condition the compacted hulls and ends into 'inox' containers
- **Sludges**: during reprocessing sludges are produced inside the plant. A small part if this is **bitumised**
- **Technological** waste: this includes equipment and solid materials that are used at the reprocessing plant and thereby become radioactive contaminated (such as clothing, gloves, instruments). This includes medium-active (alpha-contaminated) and low-level (non-alpha contaminated) technological waste. Most of this waste is **cemented** into different kinds of containers.

In order to accommodate its clients, Cogema agreed to take ownership over the vast majority of the reprocessing wastes volumes by a so-called 'curie swap'. By sending back an equivalent amount of radioactivity (in Becquerel or curies) in the form of high-level waste, very large volumes of medium or low level waste would remain in France. It should be noted that such swap is clearly illegal under French legislation. The 'Bataille' law of 1991 clearly states that[36]

[35] Some categories, like vitrified high-level waste, are both allocated to be returned and to be dumped in France, depending on the date of the contract and whether it did include a return clause or not. Other categories, like low-level waste, are remaining entirely in France, and have been dumped either in the Centre de Stockage de la Manche or – more recently – in the Centre de Stockage de l'Aube (Soulaines).

[36] LAW no 91-1381 of December 30th 1991

Art. 3. - The storage in France of imported radioactive wastes, even if their reprocessing has taken place on the national territory, is forbidden beyond the technical delays imposed by reprocessing.[37]

In 1994, Greenpeace commissioned a legal opinion from Mme C. Lepage (later to become French Environment Minister) on the 'avenant' (amendment) of the 1990 reprocessing contract between Cogema and German utility Preussenelectra. In this amendment the options for long-term storage of spent fuel in France and swaps between waste categories is agreed. Lepage concluded that these two options were illegal under French legislation:

- spent fuel is regarded as radioactive waste, even if it contains reusable materials. Therefore, long-term storage is illegal under the law Bataille.

- the notion of 'waste' cannot be interpreted as the radioactivity only. The Law of July 15th 1975 on waste in general defines waste as a product. Returning an *equivalent* quantity of radioactivity is therefore illegal. Even if the reprocessing waste does not *physically* contain the same materials as in the spent fuel (the same atoms), the volumes and specifications of the waste to be returned can be *technically* defined (no and types of packages).[38]

c) Return of Reprocessing Wastes in Slow Motion

Whereas reprocessing for Cogema's foreign clients started in the seventies, the first transport of vitrified high-level waste took place in 1995. For several utilities, especially in Germany, sending their spent fuel abroad was an 'out of sight out of mind' option. Confronted with limitations on the storage capacity for spent fuel at the German reactor sites, the reprocessing contracts became a de-facto storage option, offering relief. In the Dutch case, the utility EPZ continued to export its spent fuel without having any option for returning the vitrified high-level waste. Only in 2003, the HABOG storage facility was inaugurated. Furthermore, EPZ has no option for returning the plutonium, and it has stated that it is transferring its plutonium to other companies[39].

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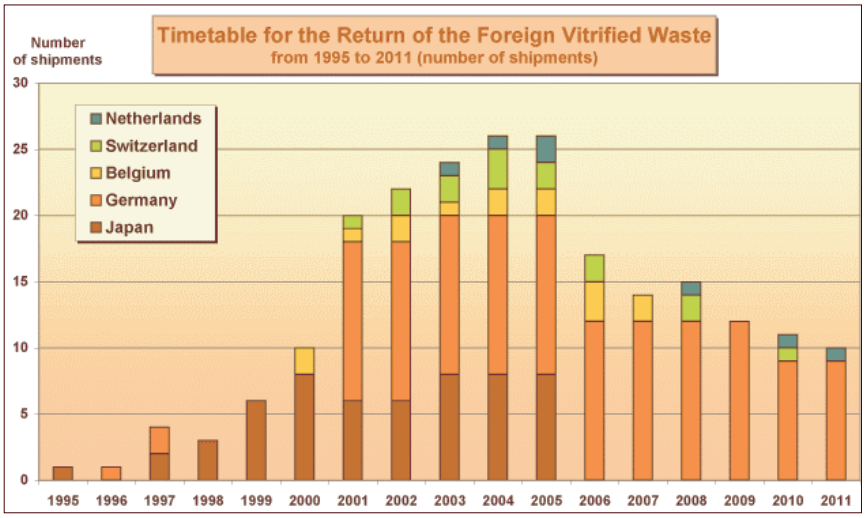
[37] Original text: *"Le stockage en France de déchets radioactifs importés, même si leur retraitement a été effectué sur le territoire national, est interdit au-delà des délais techniques imposés par le retraitement*."

[38] There are two important comments to be made on which confirm the illegality of these swaps:

- although the original contracts which were signed before the 1991 Bataille law, they only offer a framework for swaps. The contracts stipulate that a complementary contract 'agreement' is needed to make this operational. These agreements between Cogema and their clients were clearly signed after the law Bataille of 1991, probably in the timeframe of 1994-1998.
- this framework for exchange between waste and/or residues does not allow any kind of swap. The contracts state that exchange criteria have to take into account the radioactivity (Bq or curie), the radiotoxicity, heat generation, half lives, and volumes. This is far more complex than a simple 'curie-swap', which is clearly not allowed under the contracts.

[39] Letter of EPZ of November 12th 2003



[*Source: Cogema website, graph: Wise-Paris]*

3.4. Sellafield: Radioactive Discharges Already Pollute the Irish Sea

Reprocessing extracts plutonium from used nuclear fuel, and in the process, greatly increases the volume of waste. Since 1994, the expansion of reprocessing activities in Sellafield has led to mounting radioactive discharges in the Irish Sea which wash around Ireland's coastline.[40] Technetium-99 (Tc-99) discharges in particular to the Irish Sea increased, despite the UK having agreed to the 1992 OSPAR Ministerial Declaration that "recognised the need to reduce radioactive discharges from nuclear installations to the marine environment."[41] TC-99 discharges stem from the reprocessing of spent Magnox nuclear fuel[42] and have been found in marine life, including brown seaweeds and crustaceans such as lobsters.[43] TC-99 has a half life of over 200,000 years. Concentrations have been found in focus vesiculosus, a brown seaweed, at Balbriggan, 20 miles north of Dublin and Greenore, 10 miles east of Dundalk, by the Radiological Protection Institute of Ireland (RPII).[44]

The British announcement of reductions of TC-99 discharges into the Irish Sea in April 2004 of a 90% reduction in the discharge was too little, too late. The fact that there were discharges at all illustrates the dangers of reprocessing to the environments of regions.

Terrorist threats on the Sellafield plant are also of considerable concern. Possibilities include a direct attack or an attack on shipments of MOX fuel, or a threat from individuals working inside the facility. In 2001, a report by Oxford Research Group states that it would be quite easy for terrorists

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[40] See Greenpeace report, "Radioactive contamination in Ireland from BNFL's Sellafield Reprocessing Plant," June 1998, at http://a520.g.akamai.net/7/520/1533/5731712d49e39a/www.greenpeace.org/~nuclear/reprocess/irish.pdf

[41] Final Declaration of the 1992 Ministerial Meeting of the OSPAR Commission, Section III *"Priorities and Objectives for Future Work"*.

[42] Cumulative Tc-99 discharges from 1993 to 1997 amounted to 506 Terabecquerels (TBq) and arise from the commissioning of the Enhanced Actinide Removal Plant (EARP), in 1994 in conjunction with the THORP reprocessing plant. EARP reduces plutonium, ceasium-137 and strontium-90 from discharges but not Tc-99. EARP treats the radioactive waste stream produced from Sellafield's Magnox reprocessing operations, the Medium Active Concentrate (MAC).

See Greenpeace Ireland Report, 2.

[43] Ireland report, 2.

[44] Ireland report, 2.

to make bombs out of stolen MOX.[45] Terrorists could relatively easily chemically remove the plutonium oxide from MOX chemically and use it to fabricate nuclear devices. The report found that even if a crude nuclear device using plutonium, when detonated, did not produce a significant nuclear explosion, the explosion of the chemical high explosives would disperse the plutonium widely. If an incendiary material, such as an aluminium-iron oxide (thermite), were mixed with the high explosives, the explosion would be accompanied by a fierce fire. The dispersal of plutonium would make a large part of a city uninhabitable until decontaminated, a procedure which could take many months or years.

A report by the Oxford Research Group on liability for civil nuclear damage[46] cited costs from a nuclear accident at hundreds of billions of US dollars, even excluding many items including personal compensation for cancer and environmental, evacuation and cleanup costs[47] and a report produced by Prognos AG for the federal German government estimated the worst case accident scenario for the Biblis-BPWFR power station at US$ 6.8 trillion.[48]

[45] Dr Frank Barnaby, "Waiting for Terror: How Realistic is the Biological, Chemical and Nuclear Threat?, " October 2001. Summary at http://www.oxfordresearchgroup.org.uk/publications/briefings/terror.htm.

[46] James Woolley, "Report on the Legal Liabilities for Civil Plutonium Incidents," June 2000, at http://www.oxfordresearchgroup.org.uk/nuclear/plutonium/legaliabilities.pdf.

[47] Woolley report, 15, citing Report of the US Armed Services Panel on Nuclear Weaopns Safety, (1975 Rasmussen Report), 56.

[48] Woolley report 17, citing Greenpeace International, Review of Estimates of the Costs of Major Nuclear Accidents, prepared for the 9th Session of the IAEA Standing Committee on Nuclear Committee, 1994.

4. Discussion of key Recommendations

Member States should agree to an immediate moratorium on and a timetable for the complete phase-out of uranium enrichment and nuclear reprocessing for civil and military purposes.

In addition to large amounts of military plutonium due to enter the commercial fuel cycle over the coming decades, the amounts of separated weapons-usable plutonium in civilian stocks now rival the amount of plutonium being held in military programs. Civilian reprocessing and MOX fuel fabrication and use presents a growing proliferation risk that must be addressed.

There are believed to be more than 215 metric tons of weapons-usable plutonium being held by countries involved in reprocessing. As it would take as little as 5 kilograms of this commercial plutonium for a state or terrorist organisation to build a nuclear bomb, the threat posed by the mere existence of plutonium must be addressed by the global community. The recent Carnegie Endowment for International Peace report found that enough civil and military weapons-usable materials exist globally to produce over 100,000 nuclear weapons[49] and called both the continued processing of HEU and the separation of plutonium a global anomaly: "acutely dangerous, expensive, and wholly unnecessary."

While these plutonium programs are a threat to global peace and security, they are driven by a relatively small number of advanced industrialised states, specifically, France, the UK, Japan and Russia, along with client countries in Europe. Given the scale of the threat posed by fissile materials, it is even more appropriate therefore that these nations and their industrial/commercial should be challenged over their misguided nuclear policies.

Greenpeace believes one of the most effective ways to address nuclear proliferation is to stop the further reprocessing of plutonium, and to treat existing stocks as nuclear waste.

A moratorium on reprocessing is a necessary, not a utopian, goal. It would, as the Carnegie Endowment observed, require the United Kingdom, France, Russia, and Japan, to cease their reprocessing operations, but "the accumulation of plutonium constitutes such a large global threat in today's circumstances that the security imperative should override other considerations and be vigorously pursued."[50]

The UN Secretary General's High Level Panel on Threats, Challenges and Change panel warned recently that "there is a real danger that we could see a cascade of nuclear proliferation in the near future" and called for a moratorium on the construction of further enrichment or reprocessing facilities.[51] However the Panel conditioned the call on a guarantee of the supply of fissile material by current suppliers.[52] It is hard to reconcile that with the importance of negotiating a fissile material cut-off treaty. The Panel stated that "These suggestions, if implemented swiftly and firmly, offer us a real chance to reduce the risk of a nuclear attack, whether by States or non-State actors."[53]

The Carnegie Report[54] called for a ban on the production of HEU and decades-long moratorium on the separation of additional weapons usable plutonium, and the IAEA's Dr ElBaradei has also

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[49] Carnegie Endowment for Peace, Universal Compliance: A Strategy for Nuclear Security, March 2005, at http://www.carnegieendowment.org/publications/index.cfm?fa=view&id=16593 , page 91.

[50] Carnegie Report, 98.

[51] High Level Panel Report, Para 131, page 44, and page 102.

[52] High Level Panel Report, Para 131, page 44.

[53] High Level Panel Report, Page ix.

[54] Carnegie Report, 91.

proposed a five-year moratorium on constructing uranium enrichment and nuclear reprocessing facilities,[55] since we have enough capacity in the world for enrichment or reprocessing.

As the Union of Concerned Scientists have stated, "It's time to acknowledge that weapon-usable material in commerce cannot be made 'essentially immune to surprise seizure.' The only way to increase assurance that weapon-usable material will be kept out of terrorist hands is to ban its production and use altogether."[56]

Greenpeace is therefore calling for a moratorium on all reprocessing and uranium enrichment pending finalization and entry into force of a fissile material convention. Only this way can the cascade of proliferation feared by the High Level Panel be averted.

Member States should support the immediate commencement of negotiations on a comprehensive and verifiable fissile material treaty at the Conference on Disarmament

Greenpeace believes that to effectively address nuclear proliferation it is essential to stop the further reprocessing of plutonium and to treat existing stocks as nuclear waste.

The High Level Panel report called for the CD to "move without delay to negotiate a verifiable fissile material cut-off treaty that, on a designated schedule, ends the production of highly enriched uranium for non-weapon as well as weapon purposes."[57]

Too much time has been lost, firstly due to China's insistence on simultaneous negotiations on a treaty on the militarization of outer space, and, after China modified that demand, due to the United States' insistence on negotiation of a non-verifiable treaty.

No more time can be lost in starting negotiations for a comprehensive, verifiable fissile material treaty (CFMT). The state of paralysis in the international nuclear non-proliferation and disarmament regime cannot continue, nor can the world stand by while the nuclear States encourage proliferation by defining the non-proliferation agenda in ways that avoid their own Article VI obligations and avoid addressing their own fissile materials.

In addition to large amounts of military plutonium due to enter the commercial fuel cycle over the coming decades, the amounts of separated weapons-usable plutonium in civilian stocks now rival the amount of plutonium being held in military programs. Civilian reprocessing and MOX fuel fabrication and use presents a growing proliferation risk that must be addressed.

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[55] "IAEA chief urges 5-year nuke hold", Yukio Aoki, The Asahi Shimbun, 7 January 2005, at http://www.asahi.com/english/world/TKY200501070152.html

[56] UCS Statement on the 50th Anniversary of Eisenhower's "Atoms For Peace" Speech, December 8, 2003, at http://www.ucsusa.org/global_security/nuclear_terrorism/page.cfm?pageID=1296. The USC explained that "Most nuclear power reactors worldwide use fuel made from low-enriched uranium. The spent fuel can either be disposed of directly (known as a "once-through" fuel cycle) or reprocessed to extract the plutonium in the spent fuel. This plutonium can be used to fuel reactors but, like HEU, can also be used to make nuclear weapons. In a "closed" fuel cycle, the spent fuel is reprocessed and the extracted plutonium is used to make fresh reactor fuel. Thus, the closed fuel cycle requires the production, transportation, and storage of weapon-usable materials."

[57] High Level Panel Report, para 138, page 46 and page 102.

Member States should agree on a moratorium on all shipments of plutonium including MOX fuel by sea or land, and a moratorium on all shipments by sea of nuclear waste, until a regime is in place which ensures the protection of the marine environment and the environment, economy and population of coastal States, including prior notification and consultation, environmental impact assessments, a satisfactory liability regime and protection from terrorism attacks.

Already the G8 States adopted an Action Plan on Nonproliferation at their Sea Island meeting in June 2004.[58] The Action Plan adopted a moratorium on new transfers of enrichment and reprocessing equipment and technology to additional States, for one year, while working to implement permanent controls before the 2005 G8 Summit to keep this equipment from terrorists or States seeking to use it to manufacture nuclear weapons.[59]

A moratorium on the shipment of all fissile material, including plutonium and MOX fuel, would be consistent with this call.

It has been noted above that the MNA will multiply transports of nuclear fuel and highly radioactive waste, by sea and by land. This much is obvious: fewer, bigger reprocessing sites will require the transport of nuclear material and waste between different centers. [60] Waste will have to be transported from nuclear power stations to repositories, to reprocessing centers, and then again as nuclear fuel. Low and high level waste resulting from the reprocessing will itself have to be transported. This is at a time when the World Summit Outcome document of the MDG+5 Summit noted that, " *that cessation of transport of radioactive materials through small island developing States regions is an ultimate desired goal of small island developing States and some other countries."*[61] This wording reflected the decision reached by Small Island States in the Mauritius Strategy[62] to implement the Barbados Programme of Action[63] for their sustainable development. The SIDS, including the Caribbean, the Pacific, and the AIMS (Atlantic, Indian Ocean, and Mediterranean and South China Seas) regions, were united in their opposition to the transport of radioactive material through their regions. It has now been endorsed by the world at large.

These over forty coastal States cannot be expected to sit while shipments of nuclear waste and

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[58] http://www.g8usa.gov/d_060904d.htm.

[59] See G8 Action Plan on Nonproliferation, White House Fact Sheet, June 9, 2004, at http://www.uspolicy.be/mobile/europe/16.htm.

[60] Citing a 1977 IAEA study, the Regional Nuclear Fuel Cycle centers study (REGIONAL NUCLEAR FUEL CYCLE centers, Vol. 1, Summary, 1977 Report of the IAEA Study Project, IAEA, Vienna (1977)), the Pellaud report stated on page 62 that "There was recognition that fewer, bigger sites would probably mean more shipping and transporting of nuclear material and, other things being equal, more transport would mean more chances for accidents. However, these risks were judged to have been outweighed by the risk reduction attributable to having fewer sites." It also noted that **"**The additional establishment of regional arrangements could reduce the transportation risk for separated fissile material and enhance security, in comparison to intercontinental shipments, but could increase the transportation risk in comparison to national facilities." (page 65.) Almost all scenarios suggested increased transportation requirements (see pages 68, 69, 79, 81, 89, 90.) It acknowledged that "Regional facilities would involve transportation of spent fuel over long distance with its associated obstacles." The Pellaud Report went on to state that "therefore, in the views of some States, it is desirable to co-locate nuclear power plants, reprocessing plants, MOX fuel (or mixed metal fuel) fabrication plants and fast reactors to use the MOX fuel. Transportation of spent fuel, if any, should be over short distances." (page 92.)

[61] 2005 World Summit Outcome, UN Doc A/60/L.1, At http://www.un.org/summit2005/documents.html or http://daccess-ods.un.org/access.nsf/Get?OpenAgent&DS=A/60/L.1&Lang=E

[62] The Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island States (Port Louis, 13 January 2005), at found at http://www.un.org/smallislands2005/pdf/sids_strategy.pdf.

[63] Programme of Action for the Sustainable Development of Small Island Developing States (Bridgetown, 6 May 1994) ('BPOA'), in *Report of the Global Conference on the Sustainable Development of Small Island Developing States (Bridgetown, Barbados, 25 April-6 May 1994)* (A/CONF.167/9, October 1994).

nuclear material by their coastlines are massively increased by the international community. Only this year, at the 2005 Review Conference of the Nuclear Proliferation Treaty (NPT) meeting in May of this year, which resulted in a deadlock, and no substantive resolution, important statements were made on nuclear shipments by a number of States. Chile[64] drew attention "to the potentially disastrous effects that an accident could have on the population, the maritime environment and the economy of coastal States, whose fishing industry is vital to their development. Samoa[65] on behalf of the Forum cited the SIDS Mauritius strategy, and emphasized the need for continuing action, in particular on the further development and strengthening of the international regulatory regimes. They noted that fisheries and tourism would be totally devastated by negative publicity following an incident. The Marshall Islands stated that it remains concerned that the present international arrangements for liability and compensation do not adequately address the risks posed by the shipment of radioactive materials.[66]

We have already seen significant protest at the shipment of fuel between Europe and Japan, and can expect considerably more shipments, both by land and by sea and even by air, if the Pellaud report recommendations are implemented.

A moratorium should also include radioactive spent fuel, since it is both a terrorist target and a threat to the marine environment. Coastal States should call for a moratorium on *all* shipments of nuclear fuel and nuclear waste, until a regime is in place which ensures the protection of the marine environment and the environment, economy and population of coastal States, including prior notification and consultation, environmental impact assessments, a satisfactory liability regime and protection from terrorism attacks.

Member States should seek the provision of alternatives that respect fully the right to sustainable development of all States including sustainable and renewable energy technologies; Member States should recommend the amendment of the IAEA statute to confirm the Agency's role in containing the dangers of radioactive materials.

The foregoing has shown the many insoluble proliferation and environmental consequences of reprocessing, enrichment and of the disposal and transport of radioactive waste. The IAEA is out of date and hamstrung in limiting its discussion to nuclear power, and particularly in its promotion.

States need energy alternatives to achieve their sustainable development including sustainable and renewable energy technologies. This has very recently been explicitly acknowledged in the World Summit in September 2005 in New York. The Outcome Document noted that we face serious and multiple challenges in tackling climate change, promoting clean energy, meeting energy needs and achieving sustainable development, and we will act with resolve and urgency in this regard,"[67] acknowledged various partnerships that are under way to advance action on clean energy and climate change, including bilateral, regional and multilateral initiatives,[68] and declared that States are committed to taking further action through practical international cooperation, to promote innovation, clean energy and energy efficiency and conservation; improve policy, regulatory and financing frameworks; and accelerate the deployment of cleaner technologies, and resolved to

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[64] Statement by H.E. Mr. Alfredo Labbe of Chile to Committee III of the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 23 May 2005.

[65] Statement by H.E Mr Ali'ioaiga Feturi Elisaia, Permanent Representative of Samoa to the United Nations, to the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 4 May 2005.

[66] Statement by N.E. Mr. Alfred Capelle, Permanent Representative at the 2005 Review Conference of the Parties, to the Treaty on the Non-Proliferation of Nuclear Weapons, 5 May 2005.

[67] World Summit Outcome Document, para. 50.

[68] World Summit Outcome Document, para. 54.

accelerate the development and dissemination of affordable and cleaner energy efficiency and energy conservation technologies, as well as the transfer of such technologies, in particular to developing countries, on favorable terms, including on concessional and preferential terms, as mutually agreed, bearing in mind that access to energy facilitates the eradication of poverty.[69] States also committed to promoting and supporting greater efforts to develop renewable sources of energy, such as solar, wind and geothermal .[70]

The IAEA must move to amend its statute to enable it to address non-proliferation without promoting nuclear power with all its inherent proliferation consequences. If the Agency it is to maintain its relevance, it must address all energy needs through renewable and sustainable initiatives.

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[69] World Summit Outcome Document, para. 56(i)
[70] World Summit Outcome Document, para. 60(d).