Financing Disaster

How the G8 fund the Global Proliferation of Nuclear Technology

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Executive Summary

During 2001 the guidelines for Export Credit Agencies (ECAs) from industrialised countries for developing environmental assessments when granting financial cover will be finally adopted. At present only a few agencies have to apply binding guidelines to assess the environmental impacts of the operations they financially support. These negotiations are being carried out both by the Organization for Economic Co-operation and Development (OECD) and by the G8. The 1999 G8 Cologne Summit Communiqué stated that the heads of States undertook to *"work within the OECD towards common environmental guidelines for export credit agencies... by the 2001 G8 Summit".* This was reaffirmed in the 2000 Okinawa Summit Final Communiqué.

This review is long overdue, in particular in its relationship to the proliferation of nuclear technology, as the secrecy and unaccountability of ECAs is fundamental to the survival of the global nuclear power industry. In each of the G8 countries ECAs have been used to facilitate the proliferation of nuclear technology abroad, even as nuclear power has lost favour at home. This is particularly remarkable in the case of Italy, where nuclear power has been phased out for political and environmental reasons.

This report summarises the financial assistance given by ECAs and International Financial Institutions (IFIs) to the spread of nuclear technology and highlights the concentration of investment in two global regions. Firstly and most prominently China is the key country for the construction of new reactors, with over one quarter of the world's total. All of these reactors receive financial support from at least one ECA of a G8 country. The second region of importance is Eastern Europe, where part built reactors and additions to the original designs offer work to Western contractors.

The development of the use of nuclear power to generate electricity began in G8 countries. From the 1950-70s nuclear power was seen as a new technology that offered cheap and clean electricity. However, major accidents such as Three Mile Island and Chernobyl, collapsing orders and poor economics have resulted in a global slump in nuclear power. This collapse has been most visible in the G8 which, although still operating 313 of the world's reactors, only has 6 under construction.

The nuclear manufacturers see the collapse in orders as a temporary situation and envisage a period of further growth about ten years hence, especially if they can financially benefit from concerns over climate change. However, nuclear power plants are large technically complex constructions. Although some of the parts needed to construct a nuclear power plant are also used in conventional power stations, considerable specialized manufacturing equipment is needed to build a nuclear power plant. Without new orders the nuclear infrastructure will collapse. One visible sign of this is the decreasing number of nuclear construction firms due to mergers and acquisitions.

The industry is also active in overseas sales. By creating new markets and continuing to expand in already established foreign markets, the nuclear industry is trying to maintain its manufacturing base. The ECAs are fundamental to this strategy as they offer financial assistance for construction. This assistance is free of environmental and public accountability requirements and is often at favourable bank rates. The table lists the current nuclear projects that have ECA financial support.

There are currently 25 reactors under construction throughout the world.[1] Of these, fourteen are part funded by an ECA from the G8 and six are under construction in a G8 country. The influence of the G8 on the global nuclear industry is therefore indisputable.

Recent Nuclear Projects with ECA Support

(currency conversions based on 2001 exchange rates.)

Exporting Country	Recipient Country	Project	Amount Million US$
Canada	China Romania	Quinshan III Cernavoda I Cernavoda II	1,350 840 250 *
France	China Ukraine	Ling Ao 1 and 2 Khmelnitsky 2 and Rovno 4	2,000 136*
Germany	Argentina China Lithuania	Atucha II Lianyungang Ignalina	9 128 6
Italy	Romania	Cernavoda II	Unclear*
Japan	China Mexico North Korea	Quinshan II and III Laguna Verdi KEDO	36 1 923
Russia	China India Iran	Lianyungang Kudankulam Busher	1,500 ** 2,500 ** 1,000 **
UK	China Ukraine	Quinshan II Ling Ao Khmelnitsky 2 and Rovno 4	157 822 28 *
US	Bulgaria China Czech Republic Lithuania Ukraine	Kozloduy 5 and 6 Quinshan II and III Temelin 1 and 2 Ignalina Khmelnitsky 2 and Rovno 4	77 356 317 20 131 *

* Decision pending

** Total value of contract, amount of ECA guarantee unclear

China has eight reactors under construction, more than any other country in the world – and in the next year at least two new reactors are expected to be ordered. Foreign contractors dominate these projects, in part because of the ease of obtaining foreign credits as funding. The construction of overseas-designed reactors is being explicitly linked by officials to the need to obtain foreign export credits.

In Central and Eastern Europe (CEE) and the Newly Independent States (NIS-former Soviet Union), ECAs are also prevalent. Following the political changes in Eastern Europe in 1989 many reactors remained partially built. This opened up a new area of business for Western nuclear constructors. Further work is also envisaged in extending the operating life of and upgrading the Soviet designed

reactors. ECAs have already part funded the completion of four reactors, Temelin 1 (Czech Republic), Mochovce 1 and 2 (Slovakia) and Cernavoda 1 (Romania). In addition there are three projects still underway, Temelin 2, the completion of Khmelnitsky 2 and Rovno 4 (K2R4) in Ukraine and the upgrade and life extension of Kozloduy 5 and 6 in Bulgaria. Loans are also being considered for the completion of Cernavoda 2 in Romania.

The K2R4 project was a classic example of ECAs being used for a political purpose. Five ECAs from the Czech Republic, France, Switzerland, UK, and US have all provisionally agreed funding. This is despite Ukraine being off-limits for ECA funding for some of these countries and no companies actually approaching the ECAs for cover. Rather, a political agreement was reached to fund the project no matter what corporation might undertake the work. Safety concerns are also emerging with reactors being completed to lower than original design specifications using different technologies and methodologies. The most notorious example is the completion of the Temelin nuclear power plant which was five years late and around US$1 billion over budget.

ECAs are not the only source of financial assistance open to the industry for contracts in Eastern Europe. The European Commission extended the scope of the Euratom Loan facility in 1994 to enable it to fund projects in CEE and NIS. This resulted in the approval of two projects in 2000 – Kozloduy 5 and 6 and K2R4. As a result of these projects the Loan facility is now largely spent and the European Commission is preparing a proposal to extend the loan ceiling. This proposal requires the unanimous support of Member States which, given the current lack of support for nuclear power within the Union, is extremely unlikely. A freeze on the Euratom Loans programme could increase the pressure on some European ECAs to fund nuclear projects.

The funding of K2R4 in Ukraine was also significant as it involved the first ever loan by an International Financial Institution (IFI) for a nuclear power project. The loan, by the European Bank for Reconstruction and Development (EBRD), was granted despite its own independent panel of experts concluding that the project was not economic and should not be funded. However, once again, political pressure took precedence over fact or reason. However, the approval by the EBRD is only provisional and the dispersal of funds to undertake the work is still a long way off.

Political pressure from some EU and G8 countries is also clear in the Russia Mox project scheduled for discussion at the G8 Summit in Genoa in July 2001. The proposal for funding the construction of facilities in Russia to make and use Mixed Oxide Fuels (Mox) or plutonium fuels has been building since the 1996 Nuclear Safety Summit. However, the project is plagued by political and economic problems and underscored with technical and proliferation concerns. In recent months, lack of funding for the first phase of the US$2 billion project has also become apparent. Additional obstacles remain in liability concerns and a body to host the multilateral fund. Despite continual denials by EBRD staff that they want to host it, they appear to be the only body with the experience or infrastructure to deal with such a project.

The chances of the Genoa Summit achieving its objective to *"develop an international financing plan for plutonium management and disposition based on a detailed project plan, and a multilateral framework to co-ordinate this co-operation"* are now slim. The US review of its financial assistance to Russian proliferation is likely to be sufficient to justify further delays. The current single-track approach of Mox utilisation as opposed to plutonium immobilisation is much to blame. Fewer countries are likely to give financial assistance to a project that is technically risky and will increase the overall production of plutonium.

In the rest of the world the era of blind faith in the promises of the nuclear industry has passed. Nuclear power now has to compete in the global marketplace like other technologies. The result of this competition is clear, as there are fewer reactors under construction. To counter this, the nuclear industry has used its political influence to develop large, unnecessary and dangerous projects, like that for Russian Mox, to enable multilateral funds to be put together to subsidize the use of plutonium fuels. The industry also relies on Government credits and financial assistance to export reactors around the world.

The Genoa Summit is a key opportunity for the G8 to renounce nuclear technology and regain some environmental and social credibility. A rethink of the current Mox project must be undertaken and a real reform programme for ECAs put forward. Such a programme should exclude lending for nuclear power, which for over forty years has been shown to be dirty, dangerous and expensive.

Introduction

Export Credit Agencies (ECAs) are designed to support the domestic industry of a country, by assisting the awarding of foreign contracts. As Government bodies, they also reflect national foreign policies to a degree. ECAs have played a particularly important role in the development of the Western nuclear power industry. With the decline of nuclear power in the West, they are now aiding its survival by financing foreign projects.

When companies from different countries bid for contracts they are measured on the economics of the bid, their technical competence and their suitability to undertake the contract. One deciding factor is the financial package that each company can offer. The availability of financial assistance with Government backing is a clear advantage and often mandatory for international tenders. Further advantage can be gained by having fewer conditions attached to funds, less public scrutiny and looser environmental requirements. In this way, the lack of transparency within ECAs can be a significant advantage for a company when competing for foreign contracts.

ECAs are in the process of being reformed within the framework of the Organisation for Economic Co-operation and Development (OECD) and the G8. For the majority of ECAs, this process will be the first time that they have considered binding guidelines relating to environmental protection. While improvements in environmental standards have been seen in most Multilateral Development Banks (MDBs), the same developments have not been seen in ECAs. In the past, projects with lower environmental standards, or even those rejected by MDBs, have been taken up by ECAs. There is therefore a strong lobby against this reform process.

Against this background, this report presents details of ECA lending for nuclear power projects around the world. The report was prepared by NGOs and consultants from the G8 countries and reflects both the current state of financing for nuclear power exports and the unwillingness of the appropriate institutions to be open to non-government organisations and the public.

In researching this report the true extent of the lack of public accountability and reluctance of the ECAs to release information became apparent. In over half the countries included here, no official list of nuclear projects funded by ECAs has been published. In these cases, either the information will not be released or researchers have been told that it will be available at some point in the future. Such information cannot be deemed commercially confidential, as it is routinely released by other international agencies such as the World Bank. Authors have therefore combined publicly available information with that gleaned through personal contacts. Consequently, this report should be seen as the start of an ongoing process to increase the public accountability of ECAs, especially in relation to their nuclear lending.

Nuclear Technology and the G8

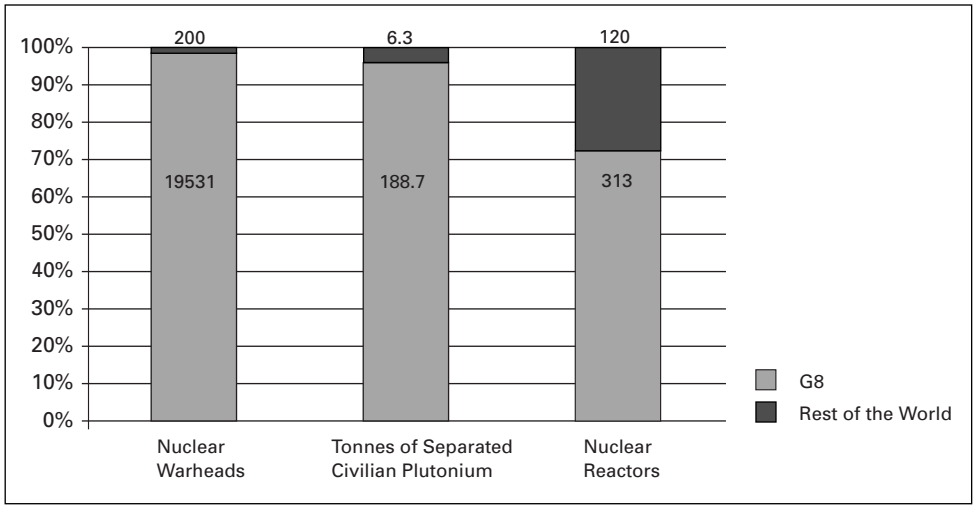
Nuclear power was born out of the development of nuclear weapons, in particular in the "original" nuclear weapons states – France, Russia, the UK and the United States. The link between military supremacy and civilian nuclear development is still apparent today – these 4 countries remain distinctive from their G8 counterparts.

Nuclearisation of G8

	Number of Warheads[2]	Tonnes of Separated Plutonium (civilian)[3]	Number of Reactors currently operating[4]
USA	8,876	4.5	103
France	470	40.3	59
Japan	0	29.3	53
UK	185	59.8	35
Russia	10,000	30.3	29
Germany	0	24	19
Canada	0	0	14
Italy	0	0.5	0

Today, the G8 countries continue to dominate the military and civilian nuclear programmes, with the figure below showing their stranglehold on the world inventory for nuclear technology. The G8 countries own and operate the majority of this technology, particularly in the military sector.

G8's Interest in Nuclear Technology



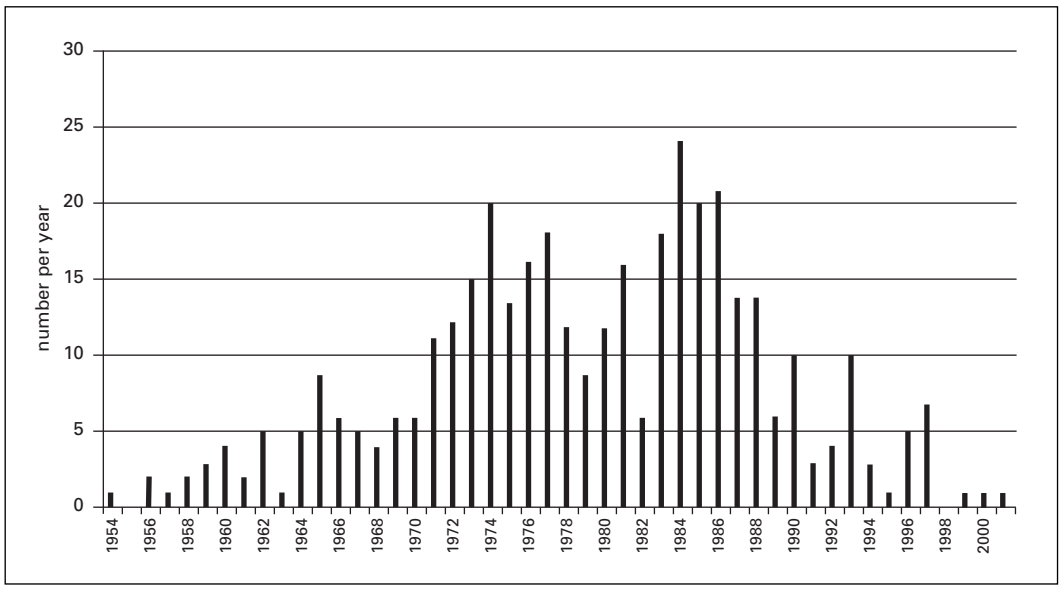
Source: Bulletin of Atomic Scientists; IAEA; ISIS-online

This hegemony is based on historic desires to dominate the global nuclear market. The failure of nuclear power and its related plutonium economy have led to a collapse in orders for nuclear power and the abandonment of the plutonium fast breeder reactors. Consequently, the G8 is now faced with two key problems – what to do with the tonnes of unwanted plutonium and how to support their near redundant nuclear power industry.

Nuclear Power in G8 Countries

As in virtually all parts of the world, nuclear power in G8 countries is on the decline, especially in North America and Western Europe. The graph below shows the historical development of nuclear power in G8 countries in terms of the number of reactors commencing operation. This was high from the 1970s and peaked in the mid-1980s, but since then has largely declined. There are currently only 6 reactors actively under construction in any of the G8 countries, a historical low.

Start-up of Reactors in G8 Countries



Source: Nuclear Engineering International Handbook, 2000

In **Canada**, the Candu reactors continue to be plagued by their "mid life crisis". Age related problems have forced the closure of some reactors and extended maintenance programmes for others. Out of 22 reactors, 8 are no longer operating due to technical and management problems and it is unclear when they will return to operation.

In **France**, often regarded as a fundamental supporter of nuclear power, the country's last reactor will be completed in 2000 and there are no new reactors on order. The Superphenix reactor, the pride of the nuclear industry, is scheduled for closure over the next few years, signalling the abandonment of Europe's only Fast Breeder programme. Plans to develop the next generation of reactors, the European Pressurised Water Reactor, have also been postponed.

The **German** Government reached an agreement with the industry in 2000 to limit the operating life of their existing reactors. Furthermore, the liberalisation of the electricity market has forced the early closure of two reactors in 2000.

Although the **Japanese** Government remains formally committed to nuclear power it is clear that support for the technology is fading. In recent years the industry has been rocked by major accidents at its Fast Breeder Reactors, reprocessing plant and fuel fabrication facilities. Revelations about the quality of fuel manufactured at the UK's Sellafield reprocessing plant have further damaged the credibility of the industry.

In **Russia**, the industry continues to suffer from lack of finance, due to low levels of cash collection for the electricity sold. This has resulted in delayed or no payment for workers, and no funds for maintenance and waste management. However, in 2001 the Rostov nuclear power plant was completed, the first new reactor since 1993.

In the **UK**, a time-schedule has been developed for the closure of the first generation of reactors, the Magnox power stations. With no new reactors planned this is seen as the beginning of the phase out of nuclear power in the UK.

In the **United States** it is over 20 years since a reactor has been ordered and subsequently completed. Although the US has the largest number of operating nuclear reactors (103), it also has also a large number of reactors cancelled or abandoned (around 115), shutdown (20) or awaiting decommissioning (10). The closure of US reactors has begun in earnest with six closing in the last five years. The George W Bush administration has recently signaled its support for nuclear power, however, how this will be manifested is still unclear.

G8 Summits and Nuclear Power

Due to the transboundary impact of the technology and the influence of the industry on the Governments concerned, nuclear technology has found a way into most G8 and G7 summits. In April 1996 there was a specially convened Summit on Nuclear Matters. The main topics that have been consistently discussed are:

- nuclear safety in Eastern Europe and the former Soviet Union, with emphasis on supporting the Nuclear Safety Account (NSA);
- the closure of the Chernobyl nuclear power plant in Ukraine; and
- most recently, the initiative to reduce the stockpile of excess military plutonium in Russia and the United States.

Extracts of the most recent statements on these issues are included in Annex I.

Genoa Summit June 2001

In June 2001, there will be a specific summit on nuclear matters in Genoa. Two main issues will be addressed, namely:

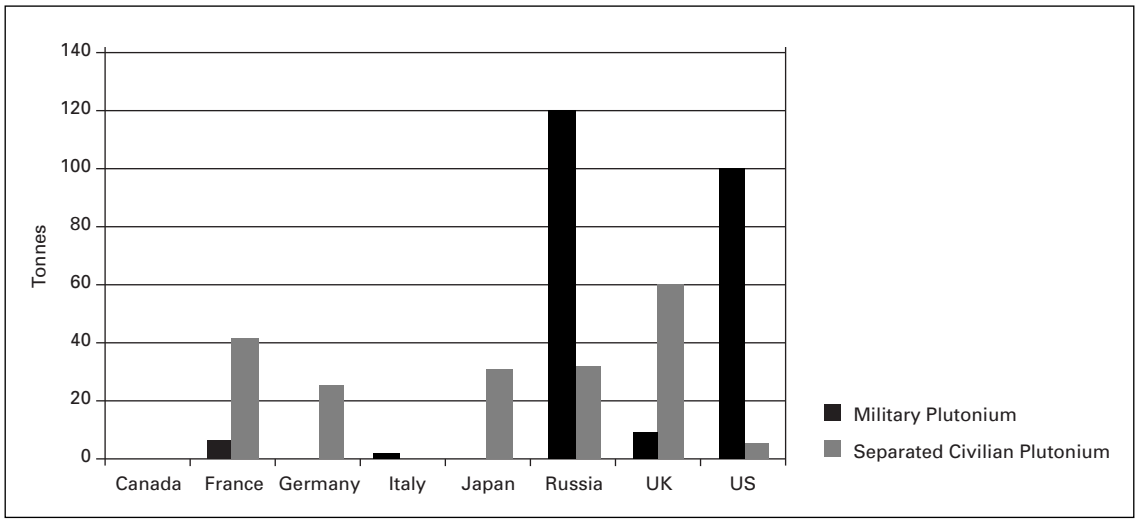
- Plutonium Immobilization.
- Export Credit Agency (ECA) Reforms.

The G8's Plutonium Disposition Programme

Once again commercial interests and military power have come together to create a very expensive and dangerous situation. Officials from G8 countries are working hard to put together a US$2,000 million proposal to allow old and unlicensed equipment from Germany to be dismantled and shipped to Russia for the production of plutonium fuels. If the fuel fabrication plant is reassembled in Russia, the plutonium fuels —or Mixed Oxide Fuels (Mox)— will be loaded into substandard Russian reactors and possibly shipped around Europe. The process is already expected to take decades to complete and even then will only affect around a quarter of Russia's military plutonium.

The G8 currently have an estimated 430 tonnes of plutonium which has been separated and is ready for use – 242 tonnes of military plutonium and 188 tonnes of civilian plutonium. In addition they have produced an estimated 800 tonnes of plutonium which remains in used or spent fuel.[5] The G8's stockpiles of separated plutonium —excluding that still in spent fuel— in G8 are shown in the figure below. Russia and America hold the largest stocks from military sources, while the UK and France hold the most separated civilian plutonium.

Plutonium Stockpiles of G8



Source: ISIS-online.org

However, what this graph does not show is the current trends. The production of military plutonium has virtually stopped. However the production of separated civilian plutonium continues and is increasing to such a degree that it outstrips demand. It has been estimated that by 2015 an additional 65 tonnes of surplus civilian plutonium will have been separated, almost canceling out the benefits of the whole of the US/Russian disposition proposal. Furthermore, with only a limited number of reactors in Europe operating with Mox fuel, the additional Russian Mox may only displace that produced by EU Member States and increase their plutonium surplus.

The Proposal

At a specially organised Summit on Nuclear Safety in April 1996 the G8 developed a political framework for the development of a plan to dispose of 'excess' plutonium from Russia and the USA. This plan has taken five years to develop and it is now hoped that a concrete proposal, with attached financing plan, will be approved at the G8 Summit in 2001. In September 2000 the US Vice-President Al Gore signed the US part of an agreement which would see the disposal of 34 tonnes of plutonium from both the US and Russian military stockpiles. The agreement allows the plutonium to be disposed of in Mox fuel or to be immobilised through vitrification (embedding in glass). The Russian side of the proposal does not envisage any vitrification while the US assumes that around 7 tonnes would be subject to this method.

The schedule assumes that by the end of 2007 Mox production or immobilisation facilities will be constructed that will enable at least 2 tonnes per year to be disposed of by each country. It is then envisaged that a second stage will be developed to allow up to 5 tonnes per year to be disposed of.

The Problems

The vast majority of politicians and the public believe that there is an unacceptably large stockpile of plutonium which needs to be reduced. Furthermore, the current over-production of 'civilian' plutonium is adding to the global plutonium stockpile.

a) Rate of Disposal

The bilateral agreement between Russia and the USA calls for the disposal of a minimum of 4 tonnes of Plutonium per year by 2007. Given this time-table it will take approximately twenty years to carry out the agreement. Although it is assumed that a second phase will be introduced to at least double the annual rate of production of Mox, this is dependent not only on the availability of production facilities but also on the availability of reactors to utilise the Mox fuel. Due to the decay of plutonium, Mox fuel cannot be stored indefinitely before use. Therefore, the production rate of Mox fuel must be linked to its use. There are only a limited number of Russian reactors, the VVER 1000s, which will be modified to use Mox fuel and therefore either additional reactors need to be constructed or the Mox fuel exported. The US-Russian bilateral agreement requires US agreement for any export of Mox fuel from Russia. However, the Western European Mox manufacturers are extremely worried that this would significantly impact on their market and prices.

Within the bilateral agreement it is currently proposed that only around 10% of the plutonium is directly immobilised. The Russian side have refused to include any immobilisation plans, saying that plutonium is a fuel and thus cannot be wasted. However, increasing the percentage of immobilisation would remove the obstacle of insufficient reactors to burn the Mox fuel and thus could accelerate the rate of plutonium disposition.

b) Project Costs

French (Cogema) and German (Siemens) nuclear fuel companies have been negotiating with their Russian counterparts for joint ventures in the Mox field for about a decade. Their further

involvement has been limited by lack of financing. However, the current proposal would see taxpayers from the G7 and EU countries footing the bill. The current expected cost is thought to be around US$1.8 billion for the Russian side and around US$4 billion for the US. In order to start construction in Russia a minimum of US$830 million will be required.[6] This is for the construction of the facilities to dismantle the warheads and then produce the Mox fuel. So far the following funds have been pledged directly for the construction:

- US: US$200 million
- UK: US$105 million
- France: US$120 million

In addition Japan have pledged US$33 million for bilateral assistance of the Russian FBR programme and
the German Government have pledged US$100 million for plutonium immobilisation. It is also reported that the EU might offer up to US$100 million. However, problems are emerging in the United States, the main driving force of the initiative. The US press has reported that President Bush has cut the budget for Russian disarmament initiatives by around US$ 400 million, including a reduction in the Plutonium Disposition Programme of nearly US$200 million.[7] Current estimates suggest that $17 million in additional funds may be available rather than the US$200 million envisaged under the Clinton administration.

c) Mox Use

The bilateral agreement envisages that the majority of the Russian plutonium will be used in Mox fuels. During the fabrication process the military plutonium will be mixed with reactor grade plutonium, increasing the total volume of plutonium to be made into Mox from 34 tonnes to 37.

The US Mox will be burned in four PWRs in the U.S. – two at the McGuire nuclear station in the state of North Carolina and two at the Catawba nuclear station in the state of South Carolina. Russia plans to use its seven VVER-1000 reactors and the BN-600 fast neutron reactor at Beloyarsk. Some of the Russian Mox may also be used in reactors outside Russia. However, this has raised concerns over its transport and impact on the Western European Mox market.

According to the Washington-based Nuclear Control Institute (NCI), the use of Mox fuels will increase the actual and potential impact of the nuclear power plants in which they are used[8] as:

1. The probabilities of certain severe accidents may increase as the introduction of Mox fuel into LWRs reduces the effectiveness of the materials used to absorb neutrons in the core. This makes it more difficult to control the nuclear reactions in the core and reduces the margin available to shut down the reactor safely if problems arise.

2. The consequences (as measured in latent cancer fatalities and early fatalities from acute radiation exposure) of a severe accident involving containment failure or containment bypass (i.e. a steam generator tube rupture) will be greater if Mox fuel is in the core. This is because Mox cores have higher concentrations of actinides, including isotopes of plutonium, americium and curium. Most of these are alpha-particle emitters with large radiotoxicities if inhaled or ingested.

NCI also investigated the potential impact of burning Mox fuel in the Russian VVER 1000 reactors and concluded that, *"the most severe consequences of an accident at a Mox-fueled VVER-1000 would result from a failure or bypass of the containment, unresolved issues associated with VVER-*

1000 containment and steam generator integrity will become even more urgent if Mox fuel is used". Given that Mox has never been used in VVER 1000 reactors before, NCI called for further research before proceeding with the current plans.

d) Project Management

One key question remaining is who will manage the funds for the Russian disposition. The institution widely mentioned is the European Bank for Reconstruction and Development (EBRD), the London-based financial institution that currently hosts the Nuclear Safety Account, the Decommissioning Fund for Accession countries and the International Shelter Fund for Chernobyl. Clearly, the EBRD does have experience in dealing with multi-source nuclear funds, but not disarmament issues, which are deemed as more complex politically. EBRD staff responsible for the nuclear programmes do not wish to host the plutonium fund, but accept that it will be the decision of the G8. The reasons they give for not wanting to host the project are:

- The EBRD already hosts a number of nuclear projects and they does not wish to become even more dominated by nuclear issues.
- G8 countries are not unanimously in favour of the current programme.
- The project is likely to have two elements, one for construction of the facility —paid for by grants— and the other for the operation of the facility, through a commercial venture. This creates additional complications and would require further exploration of how it would work.

e) United States Programme

Although it was originally envisaged that the US would undertake a 'dual track' approach, whereby around 20% of the US plutonium would be disposed of by immobilisation, it appears that this approach may now have been delayed or even abandoned. In mid March the Bush administration announced that plans for a US$1.2 billion immobilisation plant at Savannah River had been withdrawn from the 2002 budget, with proposals for Mox use remaining unchanged.[9]

Reform of Export Credit Agencies and Nuclear Technology

During 2001 the guidelines for developing environmental assessments when granting financial cover by ECAs from industrialised countries should finally be adopted. These negotiations are being carried out both by the Organization for Economic Co-operation and Development (OECD) and by the G8. At present only a few agencies have meaningful guidelines when assessing the environmental impacts of operations they financially support.

For the majority of ECAs, this will be the first time that they face the possibility of binding guidelines relating to environmental protection. While improvements in environmental standards have been seen in most Multilateral Development Banks (MDBs), the same cannot be said for ECAs. Therefore, projects with lower environmental standards or even those rejected by MDBs have been taken up by the ECAs.

OECD

The Members of the Working Party on Export Credits and Credit Guarantees (WP ECG) have agreed in February 2001 that ECAs should take the following actions:

1. Continue to develop, within the national systems of official export credit support, procedures and methodologies for identifying and assessing the environmental impact of projects.

2. Continue to monitor and evaluate, over time, their own experiences with these procedures and methodologies, as well as their own experiences related to mitigating the environmental impact of individual projects, and share these experiences with the other Members.

3. Agree on further refinements to the Environmental Information Exchange for Larger Projects.

4. Based on ECAs' experiences (e.g. with Environmental Information Exchanges), explore ways to synthesise common elements and best practices related to environmental review and impact assessment in order to strengthen a framework of common approaches amongst export credit agencies.

5. Exchange views on an informal basis with appropriate stakeholders.

6. Agree on a work-plan, including Special Sessions of the WP ECG dedicated to the environment issue, in order to facilitate this work and the fulfillment of the OECD Ministerial Mandate. The results of this work, which the Working Party aims to complete before the end of 2001, without precluding interim results by the 2001 OECD Ministerial Meeting, will be publicly disseminated.

In April 2001 the WP ECG decided that these tasks would be undertaken in three sections.

i) Member Governments would develop procedures for assessing the Environmental Impact of Projects. This was to be undertaken by November 2000.

ii) Members would evaluate these environmental impacts and share them with other Members. This was also to be undertaken by November 2000

iii) The development of common themes and practises. A final report by November 2001, including a progress report to OECD Ministers in the second quarter of 2001.

Within the WP ECG delegations are currently negotiating a draft agreement based on what they

define as 'benchmarking' approach, as originally proposed by the Canadian delegation. Although negotiations are at a late stage, the scope of the agreement is still under discussion. It should include officially supported export credits, with the exception of non-capital goods and short term operations (24 months). Such a proposal, which includes goods and project-related equipment supplies, still faces strong resistance from some WP ECG members. It is still unclear what is the minimum operation amount above which the environmental screening will be mandatorily carried out.

According to the proposal which might be finalised in the next meeting in June 2001 before the G8 Summit in July, each agency is obliged to carry out an environmental screening of the proposed operation/project in order to identify the main categories of impacts and further environmental studies needed. ECAs should scrutinise projects/operations, for which financial support has been requested, into three categories on the basis exclusively of preliminary information submitted to them by project proponents through environmental questionnaires. A list of environmental sensitive areas and high-impacts sectors should be annexed to the ECG agreement in order to harmonise screening procedures among different ECAs. No exclusion list has been considered yet until now under the agreement.

Proper EIAs should be mandatory only for projects falling into category A for high environmental impact operations. ECAs should then evaluate environmental studies, which have been further requested from project proponents, comparing proposed project standards against a specific standard chosen case by case in a fully discretionary way from a set of internationally recognised standards – which might include IFC, EBRD and EU standards. As a minimum ECAs are obliged to meet only with host country standards, a provision which is in any case already mandatory under international law. Variances from the standard chosen as a reference in each specific case should be allowed only if project proponents are able to give proof of evidence for them. Furthermore, in cases projects have already met MDB standards, no environmental screening at all is requested.

No specific provision on transparency, access to environmental information and public participation of all stakeholders, in particular affected local communities, prior to project approval is included in the agreement. Furthermore, monitoring procedures include only the provision of a specific questionnaire to be periodically filled in by project sponsors without any possibility of field visit by ECA staff or independent evaluation of project implementation and performance.

The current OECD Guidelines for Officially supported Export Credit for Nuclear Technology are in Annex I. Note these relate to economic and financial issues, rather than environment or nuclear safety.

G8

The 1999 Cologne Summit Communiqué stated that the heads of States undertook to *"work within the OECD towards common environmental guidelines for export credit agencies. We hope to complete this work by the 2001 G8 Summit".* This was reaffirmed in the 2000 Okinawa Summit Final Communiqué which promised, *"to develop common environmental guidelines, drawing on relevant MDB experience, for export credit agencies by the 2001 G8 Summit. We will co-operate to reinvigorate and intensify our work to fulfil the Cologne [undertakings]".*

Environment Ministers of the G8 also discussed the issue at Trieste in March 2001, and noted:

34. *Export Credit Agencies (ECAs), given their important function in supporting export trade and facilitating investment in economic development and infrastructure projects, can play a key leadership role in fostering sustainable development. ECAs should therefore take necessary actions to ensure that environmentally negative impacts, both local and global, arising from the projects benefiting from their support are mitigated and minimized.*

35. *The potential of ECAs to contribute to sustainable development needs to be fostered through a strong and effective commitment of the international community to quickly develop and implement common binding environmental guidelines for ECAs for encouraging strengthened integration of environmental consideration in investment decisions. These common guidelines should be based on the practices of other internationally recognized, publicly supported multilateral finance agencies such as the European Bank for Reconstruction and Development and the International Finance Corporation of the World Bank. ECAs should also adopt common measures to increase the transparency of their decision making process, including public access to environmental information, public consultation and consideration of relevant elements of the recommendations of the World Commission on Dams (WCD).*

36. *We therefore welcome and urge special effort to meet the commitment taken by the G8 Heads of State and Government in Cologne and Okinawa to develop common environmental guidelines for ECAs by the July, 2001 G8 Summit. We welcome the work carried out so far within the OECD towards common approaches on the environment and on officially supported export credits, look forward to the report on progress of the OECD Export Credit Group (ECG) to the OECD Ministerial Council 2001, and call for increased and urgent attention to this issue to ensure its successful and rapid completion.*

Following up on the Trieste language and previous commitments, ECA environmental reform is already in the agenda of the next G8 Heads of State Summit to be held in Genoa, Italy, from 20th to 22nd of July. Because of severe delays and grave gaps within negotiations at the OECD WP ECG, G8 leaders are expected to urge WP ECG to reach a high-level agreement on environmental guidelines based on common, binding, predictable, independently verified standards, including access to environmental information and public consultation standards, to be adopted by OECD ECAs by the end of 2001.

Nuclear Technology and Export Credit Agencies

Nuclear power has been used as a source of electricity for over forty years. During this time hundreds of reactors have been built with thousands of years of experience of operating the reactors. This is not a new technology deserving of special treatment, but one which should be able to stand on its own two feet. However, nuclear power continues to receive significant political and economic support from governments. Despite a general reduction in government subsidies for research and development, nuclear power also continues to receive significant funds. This is especially necessary at the present time, with the global trend of energy market liberalisation. This has forced many nuclear companies to increase their transparency and accountability in some areas, and this increased cost transparency has resulted in fewer reactors being built in domestic markets. To try and combat this, nuclear power plant constructors and utilities are desperately trying to

access markets in other countries, particularly where there is less market transparency and where overseas financing can offer another form of subsidy.

ECAs should only support projects that are beneficial to the societies of both the vendor and recipient country. However, the forty-year history of civilian nuclear power has shown that it is not a technology suitable for modern power systems, particularly not those in developing countries.

ECAs should only fund energy projects that are environmentally sustainable. In this respect, nuclear power fails in a number of key areas. For this and other reasons, outlined below, ECAs must exclude nuclear technology from further financial support.

Environmental Impact: The actual and potential environmental impact of nuclear power plants and their associated activities are unsustainable from an environmental perspective.

If complete environmental assessments were made, this would be easy to prove. Some companies exporting nuclear reactors have shown how desperate they are to avoid making an adequate environmental impact assessment. In Canada, the Government are fighting the Sierra Club of Canada in the courts against having to ensure that an Environmental Assessment is prepared to the same standards for exports as for domestic projects.

The industry is also keen to avoid assessing the environmental impact of the whole fuel cycle – from mining of uranium fuel through to waste management and decommissioning of power plants. Attempts have also been made to limit the scope of assessments of the normal operation of the power plants. However, any meaningful assessment of plants must include the environmental impact of the operation and potential impact of the nuclear facility, especially given the impacts of the Chernobyl nuclear power plant and comparisons with non-nuclear alternatives. This would include an environmental assessment of beyond design-based accidents, as occurred at the Chernobyl nuclear power plant in 1986.

Nuclear vendors are keen to minimise any environmental screening, as they have been partially responsible for their demise in domestic markets. All environmental assessments must, at least, meet the requirements of those for similar projects taking place in the exporting country.

Finally, according to internationally recognised standards all environmental assessments should include an in-depth and comprehensive analysis of all alternatives to nuclear projects. In many cases where alternatives were not properly taken into full account in EIAs regarding ECA-backed projects, a market distortion took place since nuclear industry benefited from ECA support without any consideration of cheaper, more effective and suitable energy options. If EIAs had been carried out with the participation of local affected communities and NGOs before the final decision on the ECA support had been taken, and EIAs made public for comments prior to project approval —as clearly recommended under the Aahrus Declaration of UNECE Environment Ministers in 1998— many nuclear projects would have not found ECAs' support.

Safety Standards: Nuclear power plants have been shown to cause massive damage to the environment and human health. Consequently, nuclear power cannot be seen as an acceptably safe technology. Despite its history, there is no internationally enforced nuclear safety standard that would reassure the public and politicians of the safety of nuclear facilities.

The United Nations has established the International Atomic Energy Agency (IAEA) to oversee developments in nuclear power, but its regulatory mandate is weak. It also has a dual and contradictory function to promote nuclear technology. Although it has developed safety standards

for nuclear power plants, it has no mandate to force governments to require higher safety standards in their facilities. The Nuclear Safety Convention, established following the Chernobyl disaster, only requires signatories to open their facilities for peer review, and contains no enforceable or binding safety standards. The OECD and G8 need to develop international nuclear safety standards that can clearly demonstrate the risks associated with the technology. ECAs must also adhere to these standards.

Economics: Nuclear Power has been shown to be uneconomic. It cannot compete with energy efficiency or conventional energy sources (such as natural gas) and is increasingly expensive compared to renewable energies. If a full economic analysis were to be undertaken, nuclear power would be rejected.

When nuclear reactors are sold abroad, economics are still important. The EBRD —the only International Financial Institution to fund the construction of nuclear power plants— requires projects to be part of a least cost plan. To date the EBRD has tried to fund two nuclear projects and in both cases the economic assessment has proved highly problematic. In the first, the completion of Mochovce in Slovakia, the former team Leader of the Project admitted that the Bank manipulated the economic analysis. In the second, the completion of Khmelntisky 2 and Rovno 4 in Ukraine, the Bank has admitted to methodological errors in the economic analysis.

The economic aspect is of particular importance when international financing is involved as there are ceilings on both the amounts that can be guaranteed by recipient countries, or lent by ECAs. Consequently, large nuclear projects may use up funds and have the effect of crowding out a number of smaller, and more appropriate, energy projects.

Nuclear Waste: No satisfactory method of long-term storage of nuclear waste has been found, even after forty years of operation. Nuclear waste can contain radioactive elements that need to be isolated from the environment for hundreds of thousands of years. The production of nuclear waste must stop.

The problems of nuclear waste are highlighted by the export of reactors. Nuclear power is not just the production of electricity, but requires the development of a whole support infrastructure to manage the waste and eventually to decommission the facility.

Proliferation: Plutonium, the raw material for nuclear bombs, is produced in nuclear reactors during their operation. This can be and is routinely separated. The global stockpiles of so called civilian plutonium are now equal to that of military plutonium stockpiles accumulated during the Cold War.

Despite an international inspection regime, technology designated for peaceful purposes has been successfully used for military means. Furthermore, the threat of military diversion of nuclear technology will only increase with the spread of nuclear technology and growth in plutonium stockpiles.

Euratom

In 2001 the Euratom Treaty and the pro-nuclear factions within the European Union face a key test of their political support. The European Commission is currently preparing a proposal for the further extension of the Euratom Loan facility, which awards loans to enable the construction of nuclear facilities, inside and outside the EU. The final decision on extending the facility, by an estimated ¤ 2 billion, rests with the Council of Ministers and requires the unanimous support of Member States. Given current hostility by the Austrian Government to the Temelin and other nuclear power plants in Eastern Europe, it is initially expected to vote against such a deal, but is unlikely to resist pressure from all other Member States. Therefore, despite requiring unanimity, approval for the facility will depend on how many of the less vocal non-nuclear countries in the Union come behind the Austrian position.

In March 1977 the Council of the European Communities agreed on *"empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations"*[10]. Initially, this was restricted to nuclear facilities inside the Union with an initial credit ceiling of 500 million European units, later raised to ECU 4 000 million. In 2001 the European Commission will discuss and possibly recommend to the Council of Ministers a proposal to increase the lending ability of Euratom.

The Euratom Treaty is one of the cornerstones of the current EU. The Euratom Treaty, first signed in 1957, was established to promote nuclear technology as it was believed to *"represent an essential resource for the development and invigoration of industry".* However, despite significant political support and subsequent unparalleled subsidies nuclear power has declined from a peak two decades ago. Today within the EU-15 there are no new reactors being built or even on order. Seven countries do not possess nuclear power plants, while in others phase out plans are in place. A significant majority of the countries in EU will, in the relatively near term, be nuclear free, and therefore the technology can no longer be seen as essential.

Despite this, nuclear power continues to receive significant political and economic support from the EU. Indicative figures for the 6th Framework Programme for Research and Development Budgets (2002-2006) suggest that nuclear technology will receive a ¤ 1.2 billion subsidy. Euratom Loans are yet another subsidy, as these loans can only be used for nuclear technology. Non-nuclear energy technologies do not have similar financial support mechanisms, in particular energy efficiency and renewable energy which are widely accepted as fundamental for the long-term future of the Union. The importance of these technologies was noted in the recent Green Paper on security of supply.[11]

"This policy of demand management is all the more necessary in that it is the only way of meeting the challenge of climate change."[12]

"Nonetheless, the European Union will only reduce its external energy dependency through a determined policy of demand management."[13]

"With regard to supply, priority must be given to the fight against global warming. The development of new and renewable energies (including biofuels) is the key to change."[14]

Nuclear Power is not Supported by the Majority of Member States in the Union

In the EU there are no new reactors under construction, the most recently completed being connected to the grid in early 2000. Seven Member States —Austria, Denmark, Greece, Ireland, Italy, Luxembourg and Portugal— do not have nuclear power. In Belgium, Germany, Netherlands, Spain and Sweden, political agreements have been reached to limit the life of the existing reactors. In the UK, a closure schedule has been drawn up for half of the country's reactors, while in France the lack of future construction plans halt any long term future for the industry. Only in Finland is there any sort of plan to construct a new reactor, but, given the Parliament's rejection of previous applications, its future is far from certain. In CEE there are only two reactors currently under construction — Temelin 2 in Czech Republic and Cernavoda 2 in Romania.

The demise of the nuclear construction programs in the EU has resulted in the collapse and merger of the Union's nuclear power plant constructors. Currently there are only two major nuclear construction EU construction firms, Framatome Advanced Nuclear Power (Framatome-Siemens) and BNFL-Westinghouse-ABB. The recent Euratom Loans have all been awarded to projects involving Framatome ANP. **Therefore the loans are not benefiting the Union as a whole, but assisting, at most, a handful of companies.**

As the Commission makes decisions about individual Euratom projects, Member States are not required to vote and their opinions about projects are not recorded. However, projects with European Bank for Reconstruction and Development (EBRD) involvement, do require individual Member States to give their approval. In the case of the Khmelnitsky 2 and Rovno 4 project in Ukraine the position of Member States was as follows:[15]

In Favour: Finland, France, Greece, Luxembourg, Portugal and UK
Against: Austria, the Netherlands
Abstained: Belgium, Denmark, Germany, Ireland, Italy, Spain and Sweden

Only six countries supported the project. Clearly, the majority of Member States do not support this type of project, but despite this the project was provisionally approved in EBRD, due to its voting system.

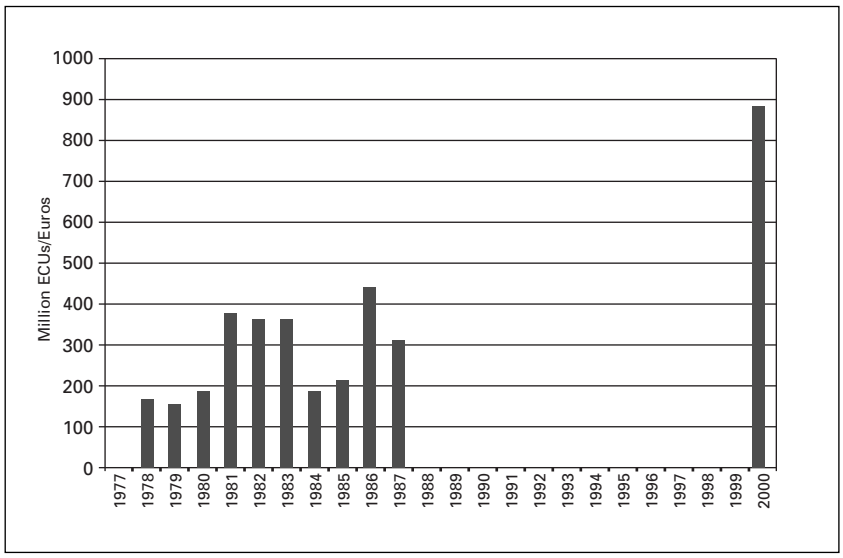
Loan Ceiling

In March 1977 the Council of the European Communities agreed on *"empowering the Commission to issue Euratom loans for the purpose of contributing to the financing of nuclear power stations".*[16] Initially, this was restricted to nuclear facilities inside the Union with an initial credit ceiling of 500 million European units. As funds were used the ceiling was raised and currently stands at ECU 4,000 million. When agreeing to the latest increase in the ceiling, the Council stated:[17]

"When the total value of the transactions effected reaches ECU 3,800 million, the Commission shall inform the Council, which, acting unanimously on a proposal from the Commission, shall decide on the fixing of a new amount as soon as possible."

The graph below shows the history of Euratom loans. During 2000, Euratom loans have been awarded once again after a gap of over a decade, for the upgrading and life extension of two VVER 1000 reactors at Kozloduy and for the completion of two VVER 1000 reactors in Ukraine, Khmelnitsky 2 and Rovno 4. These combined projects cost ¤ 893 million.[18]

Eurotrom Loans Awarded 1977-2000



Source: Euratom Annual Reports.

Including the two loans signed in 2000, Euratom has now awarded ¤ 3,696 million, which is very close to the trigger for a revised request. For more loans to be awarded additional funds will be required. It is anticipated that a further ¤ 2.0 billion will be sought.

The Commission is expected to discuss the extension of the loan ceiling before the end of March 2001. The lead DG for this issue is Economic and Financial Affairs, but any proposal is likely to be presented jointly with the DGs for External Affairs, Budget, Transport and Environment and Enlargement. The final recommendation on increasing the loan ceiling must be approved by the Commission as a whole.

The proposal will then be submitted to the Council, probably ECOFIN, where unanimous approval is necessary, that is each Member State must approve the proposal. Approval from national Parliaments or the European Parliament is not required.

Project Eligibility

Western Contracts

To guarantee that Western firms would benefit from Euratom loans, Euratom can only fund projects where *"a major proportion of the capital goods item or service which is to be financed"* is provided by a Community enterprise.

Technical and Economic Viability

The eligibility criteria for projects are very broad requiring only that the projects have *"received a favourable opinion from the Commission in technical and economic terms, necessitating Commission reviews on both these aspects".*

The technical (Safety) analysis is undertaken by PHARE/TACIS – PHARE the Commissions assistance programmes for Central Europe and the CIS (TACIS) Nuclear Safety Expert Group (NSEG). This body is composed of representatives of Member States, who give a consensus opinion on the project. The Economic analysis is undertaken by the Commission who assess projects taking into account recommendations from the European Investment Bank (EIB) on the economic and financial aspects.

Euratom Loans Outside Member States

In March 1994 the remit of the fund was changed *"to authorise the Commission to contract Euratom borrowings in order to contribute to the financing required for improving the degree of safety and efficiency of nuclear power stations in certain non-member states"*.[19] The Council was quite clear about one reason for this change:

Whereas, following the slowdown in the nuclear energy sector and the changes in nuclear energy policy by some Member States, there will not be a strong demand for the remaining finance from nuclear energy projects in the Community over the next few years.

This strategy has been successful in using Euratom loans – only projects in Eastern Europe have been funded in the last decade.

Mochovce: In 1994 Euratom proposed to fund 25% of a 1,451DM million project for the completion of two VVER 440 reactors at Mochovce, Slovakia. The other financiers were the EBRD (412.5DM million), the French export credit agency (ECA) COFACE (188DM million) and the German ECA Hermes
(93.5DM million), together with industrial financing. However, the Slovakian Government withdrew the project from consideration by the EBRD and consequently Euratom in the spring of 1995. The two reactors were eventually completed by Slovak, Czech, Russia, French and German companies, using financing from banks and ECAs in these countries.

Kozloduy 5 and 6: In April 2000, the Commission approved its first Euratom Loan in over a decade for the upgrade and life extension of units 5 and 6 at Kozloduy nuclear power plant in Bulgaria. The total cost of the project is expected to be ¤ 540 million, with Euratom covering ¤ 212.5 million. The Western European contractors are Siemens and Framatome. The project does not involve any Western European ECA financing.

Khmelnitisky 2 and Rovno 4 (K2R4): On December 13th 2000, the Commission approved its largest ever Euratom loan, a ¤ 680.5 million for the completion of two VVER 1000 reactors in Ukraine, Khmelnitsky 2 and Rovno 4 (K2R4). The total value of the project is US$1.48 million. Despite taking five years to prepare, there are still a number of barriers to the completion of the project, including the reform of the electricity market and the reactivation of the IMF Extended Fund Facility – which requires general financial reform in Ukraine. Although preliminary approval has been given, no funds have been dispersed and given the current situation it is unlikely that they will be awarded at all.

There are a number of projects said to be under consideration by the Commission at present. These proposals are far from defined and do not have a clear time-table. They include:

Kalinin (Russia): At the time of the loan application in December 1995, the total cost of completion of Kalinin 3 was ECU 670 million. Euratom's share was ECU 335 million. According to the Court of

Auditors[20] in February 1998 consideration for the project was delayed due to the failure of the Russian authorities to supply all the financial information necessary for project evaluation. Despite this, the Kalinin project is still officially under development.

Cernavoda (Romania): The Commission is said to be considering a loan of around ¤ 250 million as part of a ¤ 780 million project to complete the second CANDU reactor at Cernavoda. This reactor, designed by Atomic Energy of Canada Limited (AECL) is expected to get financial assistance from the Canadian and Italian ECAs. The Italian firm Ansaldo participated in the completion of unit 1 and is expected to become a partner in the second reactor completion project. Given the potential support of the Canadian and Italian ECAs it is unclear whether the Euratom Loans are necessary or will be taken up – the first reactor was completed without Euratom Funding.

Proposed Euratom Loans outside Member States have resulted in the manipulation of data and procedural irregularities during the loan approval process. When proposed Euratom Loans involve co-financing with the EBRD they are required to undergo public scrutiny and consultation. This process has uncovered serious methodological flaws and manipulation in the economic analysis used to justify such projects.

During the due diligence process in the Mochovce project, data used to justify the economic case for the project were manipulated. This was revealed by the former head of the project within the EBRD who stated:

"The first phase of the independent Least-Cost Study was completed by Putnam Hayes in early August 1994, accepted and paid for by the Bank. This showed that the nuclear and conventional options, namely combined cycle gas, were in the balance… Unbelievably, the consultants were then instructed to rewrite the Least-Cost Study according to assumptions given by this residual Project Team, resulting in the nuclear option being seen in a more favourable light."[21]

Approval for K2R4 was given despite the conclusions of an independent —funded in part by the European Commission— panel of experts that it was not economic. Furthermore, the subsequent economic analysis commissioned to discredit the independent panel contained methodological errors that skewed the final conclusions in favour of the nuclear option. One analysis undertaken by the German Consultancy FITCHNER concluded that there were serious *"discrepancies and unresolved questions"* in the revised least cost assessment.[22] A further economic analysis was undertaken, which only compounded many of the errors noted by FITCHNER, thus invalidating the final economic conclusion on which the EBRD and Euratom based their decisions.[23]

In addition to these manipulations and procedural errors, the European Court of Auditors (COA) criticized the Euratom Loans in their 1998 report on the Commission's nuclear programmes in Eastern Europe.[24] At that time the COA noted that the loan preparations were rather lengthy. Subsequent negotiations further prolonged these projects.
This is illustrated in the following projects:

- Kozloduy 5 and 6: Loan Applied for in August 1995 – approval given in April 2000.
- K2R4: Loan applied for in July 1995 – provisional approval given in November 2000.
- Kalinin 3: Loan applied for in December 1995 – project still under consideration.

Widening the Scope of Euratom

In parallel with the imminent discussions on increasing the loan ceiling, later this year the Commission is to discuss a broadening of Euratom's scope, in the type of projects which loans could be used for.

Plutonium Fuels in Russia: The G7 and EU are currently preparing a project involving the dismantling of a Mixed Oxide Fuel (Mox) facility in Germany (Hanau), and its rebuilding in Russia. The German facility was plagued by technical, environmental and legal problems. Under the banner of disarmament, it is proposed that plutonium from dismantled warheads is burned in reactors, although others favour the immobilization of plutonium in glass blocks to ensure its non-use. The G7 summit in Italy in June 2001 is expected to develop the proposals further. Euratom Loans may be proposed as one source of funding.

Non-Nuclear Projects: Some critics of the loan facility believe that nuclear power and technology receive a unfair advantage by having their own loan facility. One is possibility would be to transform the facility into one assisting the development of a range of energy sources. Another idea put forward is to create a separate renewable energy and energy efficiency fund.

Discussions about the scope of Euratom have already begun in the Commission —the subject was raised when the Commission approved the K2R4 loan in December 2000. If the Commission wish to propose a broadening of the remit to Euratom, a similar process to extending the loan ceiling must be undertaken, with the additional approval of the European Parliament.

No Unified Safety Standard

One of the supposed advantages of Euratom involvement in projects is that it will lead to an improvement in nuclear safety standards. However, this is hard to quantify and impossible to enforce. Even within the EU there are no common nuclear reactor safety standards or objectives, giving no single safety standard to which nuclear reactors receiving funds from Euratom could comply. The decision to allow nuclear standards to be nationally decided is enshrined in the Euratom Treaty of 1957 which signally fails to mention specific targets. The 1995 White Paper on Energy Policy produced by the Commission gives further clarification on this issue:

"The European institutions have responsibilities under the Euratom Treaty, which permit the development of nuclear energy in ***conformity with the rules and policies at a national level."***[25] (emphasis added).

At the present time, the European Union cannot set safety standards for nuclear power plants and other nuclear facilities within its own Member States, let alone Accession countries or countries in Eastern Europe, which may receive Euratom loans.

The lack of adequate scrutiny of safety has been compounded in the past by rushing through safety approval, prior to the completion of key documentation. The safety requirement is that projects receive a favourable opinion from the Commission in technical terms. In the case of K2R4 the NSEG gave their technical approval for the completion of K2R4 on the 2nd December 1996, based only on partial information. At the time of the decision, no detailed information was available on the status and quality of past construction. The report which analysed this was not completed

until 1997, with further analysis undertaken in 1998, 1999 and 2000. Despite this additional data no further safety review of the K2R4 project was made and no other formal discussions within the NSEG took place.

Conclusion

The Euratom Loan facility is an outdated throwback to the 1950s. It was set up to assist the development of nuclear power within the Union, but is now being used to justify the development of nuclear power outside Member States. The continual decline of nuclear power in the EU has resulted in desperation by Western nuclear construction firms for new business, thus Eastern Europe remains a key market. However, EU funds should not be earmarked to support these companies – if viable the private sector can fund them.

International Financial Institutions

European Bank for Reconstruction and Development

The London based European Bank for Reconstruction and Development (EBRD) was established in 1991. The Bank's primary objective is to foster the transition towards open market-oriented economies and to promote private and entrepreneurial initiative in the countries of central and eastern Europe and the Commonwealth of Independent States (CIS) committed to and applying the principles of multiparty democracy, pluralism and market economics.

The Bank's stated policy is to apply sound banking and investment principles in all of its operations. In addition the Bank has included in its founding agreement a requirement to *"promote in the full range of its activities environmentally sound and sustainable development"*. As such the Bank requires that all its investment and technical co-operation activities undergo environmental appraisal as part of the overall financial, economic, legal and technical due diligence.

Despite its clear mandate to promote environmental protection in its activities, the Bank has come under significant scrutiny and criticism from environmental pressure groups, the public and some Governments for its policy on nuclear power. The Bank was one of the first regional development Banks to allow lending for nuclear power plants or nuclear facilities.

Its Energy policy states that: *"In the context of such strategies, and in addition to ordinary non-nuclear resources projects suitable for EBRD financing, the Bank may also assist from its ordinary resources projects to complete or upgrade modern nuclear stations (of the VVER 213 and 1000 types), provided that they are directly linked with the closure of high-risk reactors operating in the country concerned (such linkages would be enshrined in the relevant legal agreements)."*[26]

In order to try and ensure high standards and to reduce criticism the Bank insisted upon a significant number of conditions for each nuclear loan, including:

- Same least cost criteria as non-nuclear projects (including a review of supply and demand side energy alternatives). The economic (and financial) analysis must include the long-term cost, if appropriate, of reprocessing, long term disposal of wastes and decommissioning.
- Financially Viable.
- The Procurement Policies and Rules must apply.
- The same standards of environmental due diligence as other projects must apply.
- The standards applied for the construction, management and operation of the plant would have to be fully in line with the fundamental principles set out by the International Atomic Energy Agency.
- The reactors must be acceptable under Western-type licensing practises.
- The projects must have received the approval of the relevant nuclear safety authorities.
- The countries concerned should become parties to the Nuclear Safety Convention and the Vienna Nuclear Liability Convention

The EBRD's involvement in the proposed funding of nuclear facilities has to date been restricted to two projects. Firstly, in 1995/6 the Bank was proposed to be co-lending for the completion of two nuclear reactors at the Mochovce nuclear power plant in Slovakia. Secondly, two projects are under consideration for the completion of two reactors in Ukraine, Khmelnitsky 2 and Rovno 4 (K2R4).

Mochovce: Following the public participation process, in which over 1.2 million citizens from Eastern and Western Europe (mainly from Austria) registered their opposition to the project, the project was withdrawn by the Slovakian Government and never presented to the Bank's Board of Directors for consideration. The project would have been the largest loan at that time for the EBRD and without doubt its most controversial, with allegations in the press from former EBRD staff of manipulation of the data for the least cost assessments.

Khmelnitsky 2 and Rovno 4: In December 2000, the EBRD Board of Directors gave its conditional approval for a US$215 million Loan, as part of a US$1.5 billion project. This was the first time that an International Financial Institution had given a loan for nuclear power. In order to comply with the EBRD's energy policy an assessment was needed which would clearly show the project to be least cost. In 1996 the EBRD appointed an independent panel to undertake this assessment. The Panel's recommendation was that, **"We conclude that K2R4 are not economic. Completing these reactors would not represent the most productive use of US$1bn or more of EBRD/EU funds at this time."** Despite this, the EBRD commissioned Stone and Webster to undertake further analysis in 1998, 1999 and 2000. Despite significant methodological errors in these, the Stone and Webster reports were used as economic justification for the project.

Although the project has been given provisional approval by the Board of Directors, it is far from certain that it will ever go ahead. Before the release of any funds significant changes in the electricity industry need to take place, including an increase in cash collection rates, an increase in the tariff for electricity, an increase in funds for the nuclear regulator and an overall improvement in the economic situation in Ukraine.

World Bank

The World Bank has no specific nuclear energy policy. However, it refers to nuclear power both on its web site in the section on questions and answers (see separate box) and in its Environment Assessment Sourcebook[27] which lays out the options available to Task Managers when confronted by decisions concerning nuclear power. The main conclusions of the Sourcebook are:

- The Bank takes the position that, as the financier of last resort, it is unnecessary for its funds to be used for this purpose.
- Given the limited number of suppliers, procurement on the basis of International Competitive Bidding is not possible.
- Costs of nuclear projects typically come in at two to three times the original estimates, delays have been substantial, and production problems have resulted in output well below capacity.
- It is a technology, which if used safely, requires vigorous standards of construction, maintenance and operation – areas with which developing countries have serious problems.
- The economic case is clear: under present cost structures, the Bank would not finance new plants because they are uneconomic. In the unlikely event that nuclear plants become economic, the Bank would not finance them because there are other sources of funds available and, as financier of last resort, Bank funds are not required.

Questions and Answers on the World Bank[28]

Q. Will the Bank fund nuclear energy and, if not, why not?

A. The Bank has never financed a nuclear power station. Nuclear power produces no particulates, sulphur, or greenhouse gas emissions and thus appears to offer a clean, non-fossil-fuel alternative for power generation. However, world experiences with high investment costs, time-consuming and costly approval processes, lack of sustainable waste disposal options, risks of major accidents-together with the Chernobyl disaster-have raised grave doubts about the future viability of nuclear power. Private investors shy away from such risky high-cost investments.

Financing for nuclear development is usually available from suppliers' credits and export financing agencies.

Q. Given its work on shadow prices of carbon, at what price does the Bank believe that nuclear energy is warranted in the fight against global warming?

A. The issues surrounding nuclear power go beyond economic costs alone. Nuclear energy is not acceptable in many parts of the world because of concerns over reactor safety, disposition of nuclear wastes and proliferation of fissile materials. The trade-offs are thus complex and cannot be boiled down to a single carbon shadow value.

Consequently, the World Bank has not lent for any nuclear power plant.

Canada

CANDU: What is it?

CANDU is a registered trademark of Atomic Energy of Canada Limited (AECL) which stands for Canadian Deuterium Uranium reactor. Its generic name is Pressurized Heavy Water Reactor (PHWR). In Candu reactors, heavy water is used as a coolant and moderator, and fuel bundles are inserted in horizontal tubes (instead of in one large pressure vessel, as in light water reactors).

The use of heavy water makes CANDU reactors more expensive than other reactor designs. After ten to twenty years, the CANDU design faces an increasing risk of a major Loss of Coolant Accident (LOCA) due to tube failure. This occurred in 1983 at the Pickering station in Ontario, when an accident forced the shutdown and retubing of all four reactors at Pickering A over a period of ten years. A decline in performance is typical for CANDU reactors after 12 to 13 years of operation.

Early History

In 1942, European and British scientists came secretly to Montreal to conduct research aimed at nuclear weapons production. By April 1944, The 'Combined Policy Committee' (consisting of representatives from the United States, Britain and Canada) agreed that the Montreal group should build a large-scale heavy water reactor prototype – the NRX reactor at Chalk River Nuclear Laboratories, 130 km northwest of Ottawa.[29] The first reactor to be constructed at Chalk River was the Zero Energy Experimental Pile (ZEEP), which started up on September 5th 1945. It was a US$200,000 pilot heavy water reactor which produced design data for the NRX, and the first reactor to be designed and operated outside of the United States.[30]

The NRX reactor started in July 1947, and produced plutonium and uranium-233 for American nuclear weapons. The NRX used water directly from the Ottawa River for cooling, resulting in significant releases of radioactive contamination over the years until it was closed in 1993. The NRX had a devastating accident on December 12th 1952 that needed 14 months and 1,200 personnel for the clean-up and rebuilding of the reactor.[31] Shortly before this accident, on April 1st 1952, the government created the Crown Corporation, Atomic Energy of Canada Limited (AECL), replacing the National Research Council in charge of Chalk River.

The 200 MW national research universal (NRU) reactor began operation in 1957, primarily to produce plutonium for nuclear weapons. The NRU is scheduled to close in 2005, and two 10 MW MAPLE reactors are under construction to take over production of medical isotopes. Another reactor, the 40 MW Canadian Neutron Facility (CNF), is planned for materials and reactor research.

Four major prototype reactors were built in the 1960s:

1. The nuclear power demonstration (NPD) at Rolphton, Ontario, was the first prototype CANDU.

2. The 220 MW Douglas Point Reactor at the Bruce site in Ontario was a larger CANDU design, intended as a commercial plant. Like the NPD, it was a technical and financial disaster.

3. The Whiteshell Reactor-1 (WR-1) was a prototype organic-cooled reactor built at the Whiteshell

laboratories near Winnipeg Manitoba. The design was not pursued.

4. The 250 Mw Gentilly-1 Reactor In Quebec was a Boiling Light Water (CANDU-BLW) design. It was another complete failure.

Commercial Power Reactors

Canadian Power Reactors (Chronological by date of Commercial Operation)

Reactor	MW(e) net	Cons. Start	Comm. Op.	Laid Up	Shut Down
NPD (Rolphton)	22	1958	Oct 1962	—	Aug 1987
Douglas Point	220	Feb 1960	Sep 1968	—	May 1984
Pickering-1	515	Jun 1966	Jul 1971	Dec 1997	—
Pickering-2	515	Sep 1966	Dec 1971	Dec 1997	—
Gentilly-1	250	1966	May 1972	—	Jun 1977
Pickering-3	515	Dec 1967	Jun 1972	Dec 1997	—
Pickering-4	515	May 1968	Jun 1973	Dec 1997	—
Bruce-2	848	Dec 1970	Sep 1977	Oct 1995	?
Bruce-1	848	Jun 1971	Sep 1977	Mar 1998	?
Bruce-3	848	Jul 1972	Feb 1978	Mar 1998	—
Bruce-4	848	Sep 1972	Jan 1979	Mar 1998	—
Point Lepreau	635	May 1975	Feb 1983	—	—
Pickering-5	516	Nov 1974	May 1983	—	—
Gentilly-2	635	Apr 1974	Oct 1983	—	—
Pickering-6	516	Oct 1975	Feb 1984	—	—
Bruce-6	860	Jan 1978	Sep 1984	—	—
Pickering-7	516	Mar 1976	Jan 1985	—	—
Bruce-5	860	Jul 1978	Mar 1985	—	—
Pickering-8	516	Sep 1976	Feb 1986	—	—
Bruce-7	860	May 1979	Apr 1986	—	—
Bruce-8	860	Aug 1979	May 1987	—	—
Darlington-2	881	Sep 1981	Oct 1990	—	—
Darlington-1	881	Apr 1982	Nov 1992	—	—
Darlington-3	881	Sep 1984	Feb 1993	—	—
Darlington-4	881	Jul 1985	Jun 1993	—	—

Source: IAEA

Pickering Nuclear Stations

In August 1964, AECL and Ontario Hydro reached an agreement to build two 500 MW CANDU reactors at Pickering, Ontario, just east of Metropolitan Toronto on Lake Ontario.[32] The federal and provincial governments provided most of the financing for Pickering reactors 1 and 2, the total cost

being reported at US$393 to US$420 million (dollars of the year).[33] The release estimate for all four reactors in 1965 was US$508 million (dollars of the year)[34], while the total cost for all four Pickering A units was US$716 million (dollars of the year).[35]

The four Pickering A reactors maintained reasonable performance until August 1983, when a disastrous pressure tube rupture occurred in Pickering Reactor 2, and all four reactors were shut down in succession to have their pressure tubes replaced. The retubing of the four reactors cost about US$1 billion (dollars of the year)[36] – more than their original capital cost.

In 1974, construction started on the four Pickering B reactors immediately beside Pickering A. All eight reactors share common safety systems, resulting in a significantly higher risk of accidents than at other facilities. The 1974 release estimate for the four Pickering B reactors was US$1.585 billion, and the final cost in 1986 was US$3.846 billion.[37]

Bruce Nuclear Stations

The 1969 release estimate when Ontario Hydro began construction on the four Bruce A reactors was US$930 million (dollars of the year)[38] and the final cost was US$1.8 billion (dollars of the year).[39] Performance was reasonable until the late 1980s but by 1993, Bruce A performance had decayed to an abysmal load factor of less than 40%.[40]

The initial release estimate for Bruce B in 1976 was US$3.929 billion and the final cost was US$5.994 billion (dollars of the year).[41] In July 2000, Bruce A and B were leased (subject to regulatory approval) to the Bruce Power Partnership, 80% owned by British Energy PLC.

Gentilly 2 Nuclear Station

Hydro Québec undertook an agreement in 1973 with the federal government to build Gentilly-2 – a standard AECL-designed 645 MW(e) CANDU-6. The federal government agreed to finance 50% of the estimated US$302 million capital cost of Gentilly-2 at a special low interest rate.[42] However, with the relatively successful initial operation of Pickering Units 1 and 2 in Ontario, the federal government was less willing to accept the financial burden and risk of subsequent projects. Thus Hydro Québec was solely responsible for the billion dollar cost overrun which saw the capital cost soar to US$1.36 billion by the time the plant achieved first criticality in September 1982, a quadrupling of the original estimate.

Point Lepreau Nuclear Station

AECL and New Brunswick Electric Power Commission signed an agreement in January 1976 to build a 635 MW(e) CANDU-6, like Gentilly-2, at Point Lepreau on the Bay of Fundy, in New Brunswick. The federal government, through AECL, agreed to finance half of the estimated construction cost including interest, up to a maximum of US$350 million.[43] The Point Lepreau release estimate was US$400 million,[44] and the final cost was US$1.215 billion.[45]

While Point Lepreau achieved good performance in its early years, it encountered performance difficulties in the mid-1990s. It is now estimated that the reactor will have to be shut down or retubed between 2008 and 2010. In February 2000, the NB Power Board of Directors approved the expenditure of $40 million (Cdn) for an engineering and business case study of retubing the reactor.[46]

Darlington Nuclear Station

The four reactor Darlington nuclear station is located in the municipality of Clarington, east of Oshawa in the province of Ontario. Work began on Darlington in 1978, and was followed promptly by the Three Mile Island accident in 1979. For the first time in Ontario, construction of a nuclear station prompted large opposition demonstrations and it remained highly controversial during its construction in the 1980s and 1990s. An early cost estimate for Darlington in 1973 was US$2.5 billion,[47] and the initial release estimate in 1978 was US$3.950 billion.[48] The final cost in 1993 escalated to a staggering $14.4 billion (Cdn) (dollars of the year).

Darlington experienced serious technical problems in its early years, causing delays in start-up and operation, and which required modification of all four reactors.[49]

1997 Ontario Hydro Reactor Shutdown

On August 13th 1997, Ontario Hydro announced that over the next 6 months it would temporarily shut down the Pickering and Bruce reactors.[50] (One Bruce reactor had already been closed in 1995.) It was the largest single shutdown in the international history of nuclear power – over 5,000 MW of nuclear capacity. Ontario Hydro called for the 'phased recovery' of its nuclear reactors, including 'extensive upgrades' to the operating stations Pickering B, Bruce B, and Darlington, before bringing all the Pickering and Bruce reactors back into operation.

A controversial environmental assessment on the restart of the four Pickering A reactors was approved by the Canadian Nuclear Safety Commission in February 2001. It excluded any review of severe accidents with widespread radioactive fallout, as well as any review of alternatives. The Pickering A restart requires a licence amendment scheduled for mid-2001. Actual restart would occur over the following two years.

In April 2001, Bruce Power (owned by British Energy PLC) announced its intention to restart reactors 3 and 4 of the Bruce A station by the summer of 2003.

EDC Support for Canadian Nuclear Exports

Canadian Reactor Exports (Chronological by date of Commercial Operation)

Reactor/Country	MW(e) net	Cons. Start	Comm.Op.	EDC* Corp $M (Cdn)	EDC** Can $M (Cdn)	Gov't Aid US$M
CIRUS/India	40 (t)	Dec 1955	Jul 1960	—	—	9.5^{+}
KANUPP/Pakistan	125	Aug 1966	Oct 1972	$25.5	—	25.5^{++}
RAPP-1/India	207	Aug 1965	Dec 1973	$37	—	—
RAPP-2/India	207	Apr 1968	Apr 1981	$38.5	—	—
Wolsong-1/Korea	629	Oct 1977	Apr 1983	$50 (US$112.5)	$250	—
Embalse/Argentina	600	Apr 1974	Jan 1984	(US$60)	$124	—
Cernavoda/Romania	633	Jan 1980	Dec 1996	(US$820) (US$19.4)§	(US$300)	—
Wolsong-2/Korea	665	Oct 1991	Jul 1997	—	—	—
Wolsong-3/Korea	665	Nov 1993	Jul 1998	—	—	—
Wolsong-4/Korea	665	May 1994	Sep 1999	—	—	—
Qinshan-1/China	678	Feb 1997	UC	—	$1,500	—
Qinshan-2/China	678	Feb 1997	UC	—	(US$350)	—

* Export Development Corporation, Corporate Account (Cdn $million) (dollars of the year).

** Export Development Corporation, Canada Account (Cdn $million) (dollars of the year).

+ Columbo Plan.

++ External Aid Organization (later Canadian International Development Agency).

§ US$820 loan date 1978, US$19.4 loan date 1992

Sources: IAEA, AECL, see text for finance references.

India: CIRUS

In 1956, Canada agreed to provide India with a reactor modeled on the NRX at Chalk River, which became known as 'CIRUS'. The deal included complete design information, all reactor components and construction.[51] CIRUS was not financed by export credits, but was given to India as direct aid, with payments from the Colombo Plan for Canadian purchases of US$9.5 million out of a total cost of US$17 million.[52] CIRUS was controversial because the Canadian government did not require a guarantee that it would not be used for plutonium production for nuclear weapons. Motivated by the opportunity to establish a commercial nuclear beach-head in the developing world, Canada chose to ignore the nuclear proliferation risk.

India: RAPP-1 and RAPP-2

Canada's first sale of a power reactor was to India in 1963. The Rajasthan Atomic Power Plant-1 (RAPP-1) was a 200 MW(e) CANDU built at Rawatbata, in Rajasthan, modelled on the Douglas Point

reactor. AECL reported that finance was provided by the Export Credit Insurance Corporation (ECIC – predecessor of the Export Development Corporation) *"for the purchase of services, material and equipment from Canada up to a value of US$37 million out of the total estimated cost of US$76 million for the station".*[53] Another estimate of the total cost put it at US$79 million, of which US$35 million was to be spent in and financed by Canada.[54] The plant's first criticality was in August 1972.

A second deal between AECL and the Indian Department of Atomic Energy (DAE) provided free exchange of information on heavy water reactors for a period of eight years. It gave to India the design and specifications of the Douglas Point reactor, allowing its full commercial use. This information was valued at US$5 million by India, but was provided freely by Canada as part of an aid programme.[55] The Douglas Point reactor design would subsequently become the basis of most of India's nuclear capacity. These so-called 'CANDU clones' would not be subject to IAEA safeguards, as RAPP-1 and RAPP-2 were.

In 1966, another agreement was signed by Canada and India for construction of a second 200 MW reactor (RAPP-2) with some improvements at the same site as RAPP-1. AECL suggested that ECIC would provide US$38.5 million financing for the project's Canadian services and equipment.[56] It has also been suggested that the Canadian government financed half of the US$140 million cost of RAPP-1 and RAPP-2 payable over fifteen years at 6% interest with about six years' grace.[57] The DAE was involved with the construction and commissioning of the two RAPP reactors, and also fabricated some fuel. Indian content in RAPP-1 was 55% and 75% in RAPP-2.[58]

In 1974 India exploded a nuclear bomb fueled with plutonium made in the CIRUS reactor, and Canadian personnel stopped work on RAPP-2. Canada's nuclear non-proliferation safeguards were subsequently strengthened, and after the failure of negotiations, Canada ended nuclear assistance to India, delaying commercial operation of RAPP-2 until 1981.

Pakistan: KANUPP

In 1964 an agreement was made between Canadian General Electric and Pakistan to build a 137 MWe CANDU reactor near Karachi. The reactor, known as the KANUPP (Karachi Nuclear Power Project) cost US$63 million, US$51 million of which was financed by Canada. Half came as external aid at 3/4% interest over 40 years, with 10 years' grace; the other half at 6% over 15 years with 5 years' grace.[59] The ECIC provided the 6% financing, and the concessional financing came from the External Aid Organization (EAO). Wallace described the terms of the EAO loan somewhat differently: *"Between 1966 and 1978 a total of US$12.4 million was provided in export credits, and US$29.4 million was loaned through the EAO/CIDA account.... Its terms included a 10-year period of grace followed by a 50-year repayment schedule with no interest charges."*[60]

The EDC took over the accounts of the ECIC in 1969, and the EAO's account was taken over the Canadian International Development Agency (CIDA).[61]

Canada ended nuclear cooperation with Pakistan on January 1st 1977, shortly after its December 1976 decision that nuclear trading partners with Canada must sign the Non Proliferation Treaty. Loan payments continued despite the end of nuclear cooperation between Canada and Pakistan.

Argentina – Embalse

In 1972, AECL submitted a bid to Argentina's Comision Nacional de Energia Atomica (CNEA), in partnership with the Italian company Italimpianti (Societa Italiana Impianti), to build a 600 MW turnkey CANDU in Argentina, now known as Embalse. Italimpianti was to handle marketing and the plant's conventional equipment, and AECL was responsible for the nuclear side.

The total estimated cost was US$420 million, of which about US$150 million went to AECL.[62] The EDC initially provided a loan of $124.05 million (Cdn) in April 1974.[63] The loan was payable over 25 years, with repayment starting only when the reactor entered service. This was a 'Canada Account' loan was, made on the grounds that it was 'in the national interest'.[64]

The original contract was for a 25 year period, and had a 25% ceiling on inflation.[65] With the 1973 OPEC oil embargo and a period of high inflation, by 1975 AECL was heading for a substantial loss.[66] Subsequent attempts to renegotiate the contract were interrupted in March 1976 by a bloody military coup. The contract was subsequently amended in February 1977, but in that same year AECL made provision for a loss of US$130 million on the deal.[67] In other words, the possible loss was as much as the original contract. After further renegotiations, AECL claimed that there was no loss on the sale.[68]

The Embalse deal was not just complicated by inflation and underpricing – defective boilers costing US$15 million were also supplied by Babcock & Wilcox Canada.[69] Repairs delayed the project for over a year. The Embalse sale was also controversial because bribes in the form of 'agent fees' were paid to secure the contract.[70] An Argentinean investigation in 1985 revealed that José Ber Galbard, then Argentine Minister of Economic Affairs received US$2.4 million, plus another US$1.1 million in May 1974, and an additional US$300,000 two years later.[71]

South Korea: Wolsong-1

In January 1975, AECL and the Korean Electric Power Company (KEPCO) signed a deal for a 600 MW CANDU.[72] The total cost of the reactor was US$576.5 million, of which US$430 million was arranged by the EDC. This initially included a $250 million (Cdn) loan under the Canada Account and $50 million (Cdn) under the Corporate Account. A further loan of US$112.5 million was made under the EDC Corporate Account in May 1979.[73] The loans were to be repaid in 30 semi-annual repayments over 15 years, starting no later than six months after the commissioning of the reactor, which took place in November 1982. The interest rate on the loans has never been revealed.[74]

The Wolsong-1 deal was odd in two ways: first, Korea had not issued a call for international bidding, and second, it was a dramatic shift in nuclear technology for Korea. Their first nuclear power reactor had been a 560 MW Westinghouse Pressurized Water Reactor (Kori-1) ordered in 1970.[75] The reason for the surprising decision is that AECL influenced the decision through bribery. AECL President Lorne Gray had agreed to pay an 'agent' (Shaul Eisenberg of Tel Aviv) a fee of US$17 million plus another US$3 million at a rate of US$500,000 a year for six years.[76] Despite the public outcry over this blatant corruption, Eisenberg's 'commission' was only reduced to US$18.5 million, and AECL retained him to negotiate the sale of a second reactor.

Romania: Cernavoda-1

In November 1977, a licensing agreement was initialled between AECL and Romanergo, the state trading company, which gave the design of the CANDU-6 (a 600 MW reactor) to Romania. The licensing fee was to be US$5 million per reactor for Romania's first four reactors, decreasing to US$2 million per reactor thereafter up to a total of 16 reactors that were anticipated.[77] On this first reactor, the Canadian content was estimated at US$100 million of the total US$800 million cost, or 12.5%.

In April 1979, a financing agreement of up to US$1 billion was announced by EDC. EDC loaned US$680 million and a consortium of banks loaned US$320 million,[78] US$140 million of which was guaranteed by EDC for a total commitment of US$820 million by the EDC under its Corporate Account.[79] The repayment period was 30 years. It was the largest long-term loan in Canadian history for a single export sale. AECL has stated that about US$600 million of this loan was actually drawn down and repaid.[80] The financing agreement was for four reactors, but detailed agreements were only signed for one reactor. It has been suggested that a US$1 billion line of credit was easier to justify for four reactors than to admit that the loan was really for one reactor with an estimated Canadian content of only 12.5%.[81]

In March 1982 EDC froze loan payments after Romania stopped payment on international loans.[82] EDC was joined by the US Export-Import Bank in the freeze.[83] In August 1983, the freeze was lifted after intense lobbying by AECL and its private sector allies.[84] A unique concession was that Romania would be allowed to negotiate directly with the private sector suppliers on a barter or 'countertrade' basis. Although companies refused to disclose the nature of their trade deals, reports stated that reactors would be traded for a variety of goods, including strawberries, wine, tractors, clothing, and shoes, even though the Canadian Energy Minister at the time, Jean Chretien, was famously quoted as saying *"We are not bartering CANDUs against strawberries".*[85] It was reported that while AECL was paid in cash, a number of Canadian manufacturers took 100% countertrade on their sales to Romania.[86]

Throughout the 1980s, 15 to 30 AECL personnel remained at Cernavoda in an advisory capacity, while construction floundered because of poor management and lack of quality control. Construction was interrupted by the 1989 revolt in which Ceausescu was deposed and executed. At that time, all of the Canadian personnel and many Romanians abandoned the project.

In September 1991, the Canadian government announced a new agreement to form the AECL/Ansaldo Consortium (AAC) to salvage the initial reactor. As originally announced, the salvage package included: a loan of US$315 million through the EDC; takeover of project management by AECL and Nuclear Construction Managers; and provision of services and components from other Canadian companies.[87] EDC has since reported that the actual loans were US$300 million from the EDC Canada Account and US$19.4 million from the Corporate Account this totalled about US$320 million, or approximatly $370 million (Cdn).[88]

It has been reported that the financial package of foreign funding to complete Cernavoda-1 was US$419 million, implying that about US$135 million for Ansaldo's participation came from the Italian Medio Credito Centrale.[89] The Romanians had only confirmed funding five years later in an undisclosed amount of *"something less than US$100 million"*.[90] By April 1995, US$222 million of the 1991 EDC loan was still outstanding on the Cernavoda reactor, and costs had mounted to

US$2.2 billion.[91] The Cernavoda-1 reactor finally achieved first criticality on April 16th 1996 – more than a decade after the initial target start-up date of December 1985.[92]

The Campaign to Finance Cernavoda-2

Despite the nightmarish history of Cernavoda-1, AECL has been lobbying intensively to arrange Canadian financing for a second reactor at Cernavoda. Much of the equipment for Cernavoda-2 was supplied earlier, but many components were borrowed for use on the first reactor. Work on Cernavoda-2 had stopped *"with 80% of the civil work and 5% of the mechanical work completed"*.[93] The target date for completion of Cernavoda-2 is December 2006.[94] AECL remains in a consortium with the Italian state-owned nuclear company Ansaldo, and both companies have been trying to arrange financing from the export credit agencies in their respective countries.[95] In April 1995, the parties apparently initialed, but did not sign an agreement to do some work on the second reactor.[96]

On April 27th 1998, AECL announced an interim programme, providing about US$142 million (about $200 million Cdn), with the EDC providing an unconfirmed percentage. The AECL news release stated that the *"Canadian scope of the project [is] worth $80 million..."*.[97] During his May 1998 visit to Canada, former President Constantinescu asked Prime Minister Chretien for a further US$1 billion loan,[98] with a lower guarantee, a longer payback period and a delay before repayments started.[99] This related not only to the interim US$200 million financing but to the total completion package for Cernavoda-2, which will cost (according to the former utility RENEL) an additional US$750 million or over US$1.1 billion Canadian.[100] AECL has stated that Canada would finance only one-third of that (US$250 million, or $375 million Cdn).[101] In March 2000, the Chairman of EDC Board of Directors stated that *"EDC is presently participating in interdepartmental meetings to determine whether Canada Account funds would be available in support of AECL's contract and, if so, under what conditions such support would be extended"*.[102]

Ansaldo has approached Mediocredito Central and SACE, the Italian export credit agency for financing.[103] Romania has also applied to Euratom for a US$350 million loan,[104] leaving a balance of US$150 million, which may be financed by other European export credit agencies for goods and services from European nuclear companies. In May 2001, a commercial contract was signed between Nuclearelectrica and AECL and Ansaldo Energia. Once the contact becomes effective, it is expected that the completion of unit 2 will take 54 months. The total completion is expected to cost US$689 million.

There is strong opposition in Canada to further Canadian financing for Cernavoda-2. In March 1999, 164 members of parliament —a majority of MPs including one third of the governing Liberal Party— came out publicly against federal government financial support for Cernavoda-2.[105] A petition from the Romanian environmental group Mama Terra (For Mother Earth) opposed the second reactor at Cernavoda, and was endorsed by more than 50 Canadian environmental groups, and over 80 organizations in 40 countries.[106]

The proposal to proceed with Cernavoda-2 is absurd given the fact that Romania has a huge three-fold surplus of generating capacity. In 1999, total installed capacity was 19,676 MW,[107] and peak demand in 1998 was only 6,000 MW.[108] Construction of the nuclear plant will cause dislocation of the existing system, and ultimately depends on electricity exports which are still unconfirmed and dubious at best.

South Korea: Wolsong – 2, 3 & 4

In December 1990, AECL signed a contract with South Korea for a 680 MW CANDU (Wolsong-2). Of the total plant cost of US$1.2 billion, the AECL contract reportedly accounted for about US$600 million, of which about US$200 million went to Korean sub-contractors, US$200 million to Canadian manufacturers and about US$200 million to Nuclear Project Managers Canada Inc., Canatom and AECL-CANDU.[109] The deal did not require financing from EDC.

In September 1992, AECL announced another sale to South Korea, this time for two CANDUs, Wolsong-3 and -4. AECL contracts amounted to US$950 million, of which US$450 million went to Korean subcontractors, with about US$500 million coming to AECL and Canadian suppliers.[110] As with Wolsong-2, this deal did not require financing from EDC, but the percentage of Canadian content (in dollar terms) was about 40% less. The dollar amount of contracts going to the private sector may have been about US$300 million. In order to achieve a short-term sales objective, AECL gave South Korea the knowledge and skills to build its own CANDU reactors. It has been reported that Korean content in Wolsong-3 and -4 was 'close to 75%.[111]

AECL has tried to sell two 900 MWe CANDU reactors to South Korea, but in February 2001, officials in the Korean government finally disclosed that Wolsong-5 and -6 would be built as 1000 MW PWRs.[112] This decision closed the door on AECL's last best hope for more reactor sales in the foreseeable future.

Qinshan Phase III

On November 8th 1994, AECL signed a Memorandum of Understanding (MOU) with the China National Nuclear Corporation (CNNC) to begin negotiations on the sale of two CANDU-6 (i.e. 700 MW) reactors. Former Chinese Premier Li Peng and Canadian Prime Minister Jean Chrétien had just previously signed a Nuclear Cooperation Agreement (a bilateral agreement on nuclear weapons proliferation). A second phase of the CANDU deal was signed a year later in Ottawa. Former AECL President Morden stated that *"the Chinese terms are onerous"* and that price and financing *"are the key issues and we have not crossed these hurdles yet"*.[113] By that time, the Canadian government had already committed to a US$1.5 billion credit guarantee through the EDC.

The Chinese clearly drove a hard bargain. Canadian CANDU subcontractors were asked to cut their bids by a further 15%.[114] Nuclear industry insiders speculated that AECL was willing to sell the CANDUs at cost in order to secure the contract.[115] The Canadian government of Jean Chrétien pulled out all the stops to save the CANDU deal. On July 12, 1996, a "Project Award Agreement" was signed which *"finalise[d] the price and commercial terms for Qinshan Phase III CANDU nuclear power project as well as the fees, the financing scope and conditions from the Export Development Corporation and other export credit agencies"*.[116]

Because Canada Account support through the EDC was limited to $1.5 billion (Cdn), AECL had to seek foreign partners with their own financing for the remainder of the $4 billion (Cdn) project. The successful consortium, Hitachi-Bechtel (Japan-USA), brought financing from the Japan Export Import Bank (JEXIM), and the United States Export Import Bank. [117]

AECL reportedly retained Korea Heavy Industries and Construction Company (Hanjung) for heavy components worth more than US$120 million.[118] As Korea's first major nuclear export order,

inclusion of the Korean Company may have been an added enticement in AECL's attempt to sell more reactors to Korea.

The signing of the July 12th 1996 agreement was prompted by an impending change in the Consensus interest rate of the Organization for Economic Cooperation and Development (OECD). After July 12th, it rose above 7.49%.[119]

On November 26th 1996, the final contract was announced for the sale of two CANDU-6 reactors, valued by AECL at $4 billion (Cdn). It was originally announced that the EDC provided $1.5 billion (Cdn)[120], for goods and services within Canada.[121] The EDC has since confirmed that the actual loan agreement signed in January 1997 included a loan of $1.47 billion (Cdn) and US$350 million or approximatly $1.94 billion (Cdn).[122]

In January 1997, the Export-Import Bank of the United States approved a US$323 million loan for Qinshan's balance of plant equipment and services by Bechtel Power Corporation, Gaithersburg[123] (the amount having been reduced from an initially approved amount of US$383 million). This was provided at 7.49%, with a 15 year term, with repayment starting 6 months from final acceptance of goods, and not later than April 15th 2004 (in other words after the commercial operation of the nuclear station).[124]

In January 1997, the Export-Import Bank of Japan (JEXIM) announced that a US$280 million loan was being provided for Qinshan III. The loan was co-financed with Industrial Bank of Japan and Bank of Tokyo, with JEXIM providing 60% or US$168 million of the total.[125] The loan was for the purchase of turbines, generators and other equipment from ITOCHU and Hitachi. It also noted that the US Exlm Bank was providing funding for Bechtel Corporation to supply the transformer facility for the station.

All of the loan agreements were signed with the State Development Bank of China, 100% owned by the Chinese government. The site of the two CANDU reactors is known as Qinshan Phase III.

Qinshan Concessions

The $1.5 billion (Cdn) government guarantee and loan for the Qinshan reactors was the largest loan in Canadian history, and as an EDC Canada Account transaction, it will be a liability on the government's account. The loan was far too large and risky for either private sector banks or the EDC to handle on their own. However, few details about the deal have been revealed. They are at pains to note that the $1.5 billion EDC loan for Qinshan was not 'concessional', with the contract allegedly meeting the terms of the OECD Consensus Agreement, including an interest rate reportedly of 7.49%[126] – a lower rate than any normal commercial deal. Although AECL originally claimed that the deal was worth $4 billion (Cdn), it has since stated that it was $3 billion (Cdn).[127] There have clearly been other concessions.

During the visit of former Minister of Natural Resources Anne McLellan to China in May 1996, CNNC President Jiang Xinxiong identified four areas where they were seeking concessions: *"economics, financing, heavy water lease, and the training and simulator".* On the question of price, the CNNC President argued that CANDUs were more expensive than the PWRs at Daya Bay Phase 2, and he stated *"There was still a big gap, roughly 10 per cent or $300 million [presumably US$]. So each side should take a step".* McClellan responded by saying it was impossible for AECL to cut

US$150 million.[128] On the financial question Minister McLellan responded by saying that "there could be further discussion on financing fees. Movement is possible".[129]

On the question of heavy water supply, it seems likely that by leasing the heavy water, Canada made a significant concession to avoid the impact of an outright sale of the expensive commodity. The Qinshan reactors require about 1,000 tonnes, at a purchase cost of over US$200 (Cdn) per kilogram.

When Liberal politico Roy MacLaren visited China in April 1996, his mission at least in part was apparently to offer a concession in the form of a CANDU training package, including a computerized CANDU simulator. CAE Electronics Ltd. of Montreal stated that value of the simulator it would supply for Qinshan was $20 million (Cdn).[130]

Finally, it is no coincidence that on the same day as the CANDU agreement, former Canadian Minister of International Trade Art Eggleton announced that the EDC would grant a concessional line of credit to China for up to US$75 million, noting at the same time that the EDC was providing commercial lines of credit for business in China of up to US$430 million. This was a barely concealed flouting of the OECD consensus agreement.

Other EDC Nuclear Support

The EDC has provided financial support for other smaller nuclear exports as well. It can be seen that often these smaller projects were financed as an incentive for possible CANDU reactor sales. The projects have been noted below.

Czechoslovakia

In 1983, EDC provided US$1.5 million under a line of credit agreement with Cekoslovenska Obchodni Banka , A.S., of the former Czechoslovakia. It was for the sale of nuclear valves by Velan Inc. of Montreal to Intersigma, the Czechoslovakian foreign trade organization.[131]

Hungary

Canada has had a longstanding interest in nuclear trade with Hungary. In 1984, EDC provided US$1.26 million under a line of credit agreement with Magyar Nemzeti Bank of Hungary for *"a sale of nuclear valves by Velan Inc. of Montreal to Eromu Berahazasi Vallalat, a Hungarian foreign trade organization".*[132]

In 1988, AECL signed a Memorandum of Understanding with three Hungarian companies to study the marketing and construction of Slowpoke reactors in Eastern Europe.[133] In 1989, AECL and New Business Ventures (a subsidiary of the former Ontario Hydro) signed an agreement with the Hungarian state utility to study the feasibility of building a CANDU reactor in Hungary dedicated to the export of electricity to western Europe.[134] In 1991, AECL reported that

"A market feasibility review and analysis for Czechoslovakia and Hungary has been completed and presented to marketing management. The purpose of the review is to confirm preliminary assessments of the long-term opportunity for CANDU in those countries."[135]

In 1996, Canada supported a Hungarian radioactive waste programme. In May 1996, it was anounced that the federal government had already given Hungary US$230,000 to *"assist with*

drilling underground tunnels and to develop the disposal research programme". The Canadian International Development Agency (CIDA) was providing another US$500,000 to complete the project. Monies for the funding were committed in the 1996 federal budget.[136]

Indonesia

AECL made a bid on construction of what was to be Indonesia's first nuclear power plant in 1987. AECL was competing against Framatome (the state-owned French company); Mitsubishi Corporation of Japan; and Kraftwerke Union (then a subsidiary of the German company Siemens AG). However, it appears that the nuclear plant was cancelled because of its high cost.

In 1991, BATAN (Indonesia's National Atomic Energy Agency) retained a Japanese consulting firm to do a feasibility study for the nuclear power option in Indonesia, and selected an initial site on the Muria Peninsula, on the northern shore of Central Java. Possible reactor vendors were narrowed down to General Electric, Mitsubishi Heavy Industries/Westinghouse, Nuclear Power International/Siemens & Framatome, and AECL.[137]

That same year, former AECL President Stanley Hatcher and Chairman Robert Ferchat visited Jakarta to promote the CANDU. As an incentive, they established a programme to send Indonesian nuclear personnel to South Korea to gain experience on CANDU reactors operating there.[138] In 1992, AECL announced a programme to send Indonesian nuclear personnel to study at Canadian CANDU stations.[139] That same year, AECL submitted technical information on the CANDU to BATAN.[140]

In November 1994, Prime Minister Jean Chrétien personally promoted a CANDU sale with former Indonesian strongman Suharto in Jakarta. Chrétien announced that the Atomic Energy Control Board (the previous name of Canada's nuclear regulatory agency) would provide another sales sweetener for AECL, by training four Indonesians per year in the management of CANDU technology.[141]

In January 1996, Prime Minister Chrétien again visited Jakarta, heading a trade delegation of politicians and business persons ('Team Canada'), and again promoting a CANDU sale. It was Chrétien's fifth personal meeting with Suharto. Canadian media referred to discussions about CANDU sales, mentioning a 'technical cooperation agreement' between AECL and BATAN, and the possible sale of one or two reactors at US$2 billion each.[142] At some point in the mid to late 1990s, the EDC provided yet another incentive for a CANDU sale, by financing the sale of a nuclear laboratory to Indonesia. EDC and AECL have not disclosed any information about the project.[143] By this time, AECL had been operating an office in Jakarta for a number of years.

In 1996, Djali Ahimsa, Director General of BATAN, stated that Indonesia would proceed with a 1,800 MW nuclear station, with construction starting in 1998 or 1999, and the station entering service between 2004 and 2007. The station would consist of three 600 MW reactors or two 900 MW reactors, to be located on Java's Muria Peninsula.[144] Public opposition focused on the earthquake risk to nuclear power plants, as Indonesia has about one third of the world's active volcanoes.[145] Mount Muria, on the Muria Peninsula where the first nuclear station was planned, is a dormant volcano. NGOs also protested that the Suharto regime repressed and prevented any public debate on nuclear power.[146]

Following the collapse of Suharto's dictatorship in May 1998, Indonesia's proposed nuclear programme was quietly ended. It is likely that austerity programmes imposed by the International

Monetary Fund precluded expensive nuclear plants, and public opposition became possible with the restoration of democracy. During the crisis of Suharto's ouster in 1998, AECL shut down its Jakarta office and moved to Bangkok, Thailand.

Mexico

AECL lost out to General Electric in a 1969 bidding competition for the Laguna Verde reactor in the state of Veracruz. The plant eventually began operation in 1988. Despite massive cost over-runs and delays on that first reactor, Mexico's Instituto Nacional de Energia Nuclear (INEN) issued a call for bids in 1980 for a second reactor at the site. It was to be part of a massive nuclear expansion programme of 20,000 MW by 2000, estimated to cost US$32 billion. The same companies that had bid on the first reactor also put in bids for the second reactor by February 1982.

Canada launched a massive marketing effort, dubbed 'CANDU Diplomacy'. It included a US$2 million study performed by AECL looking at Canadian importation of Mexican oil.[147] As an official 'bribe', in 1980 the Canadian-Mexican Agreement on Industrial and Energy Cooperation was signed under which Ottawa said it would buy Mexican crude oil if Mexico considered buying a CANDU. In 1981, the EDC reported providing a line of credit for US$2,358,781 to the Comision Federal de Electricidad (CFE) of Mexico, ostensibly "to support the sales of a design and development study by Atomic Energy of Canada Limited (AECL) and a computer data acquisition system by Bailey Meter Co. Ltd. Of Burlington, Ont., to CFE."[148] By 1983, a million dollars worth of Mexican crude oil was coming into Montréal every day, despite the fact that Mexico had killed the whole nuclear deal in 1982.[149]

Mexico had pressured Canada to supply generous concessionary financing for 100% of the cost of the package, estimated at as much as US$6 billion for four CANDU-6 reactors. The Canadian government was apparently willing to borrow billions of dollars at commercial rates (then about 16%) to finance the project for Mexico at 7% or 8% – in effect a subsidy for as much as 40% to 60% of the station.[150] It was also suggested that Mexico was pressuring for a 'guaranteed cost agreement' putting the risk of cost overruns onto AECL.[151]

In January 1982, two weeks before the bid deadline, former Canadian Prime Minister Pierre Trudeau visited Mexico for the third time in a year to promote the bid. AECL had established an office in Mexico City, and one source reported that $50 million (Cdn) had been spent on the Canadian bid.[152] However, under the weight of falling oil prices, and its $70 billion debt, the Mexican peso had collapsed in February, 1982. Mexico announced the cancellation of its grandiose nuclear expansion plans in June 1982.[153]

Main Canadian Companies Involved with Reactor Exports

This section looks at some of the main suppliers of goods and services in the nuclear industry in Canada. It is not an exhaustive list and no comprehensive list is available of the companies involved in specific reactor sales, and their role or the value of their contracts. AECL has stated that about 150 Canadian companies (public and private sector) contributed to Qinshan Phase III contracts.[154]

Atomic Energy of Canada Limited (AECL)

Atomic Energy of Canada Limited (AECL) is a publicly owned crown corporation founded in 1952, that is primarily responsible for CANDU design, engineering, research and marketing. Unlike many other major international nuclear vendors, AECL does not have any in-house manufacturing capability. Therefore, in its export reactor projects, it has acted as a marketer and negotiator, a primary contractor, designer and procurer of equipment, and has general responsibility for nuclear projects. AECL's previously large research role in 'pure science' has been largely eliminated in the last decade.

AECL remains highly dependent on government subsidies for its existence, having received US$16.6 million ($2000 Cdn) from 1952 to 2000. Despite government moves to reduce subsidies, AECL received an average of US$162 million per year from 1997 to 2000 inclusive.[155] AECL's future remains very uncertain with the collapse of its hoped-for reactor sales in Indonesia, Turkey, South Korea and China.[156] AECL has 3,500 employees, with 6 Canadian offices and international offices in Argentina, China, Indonesia, Korea, The Netherlands, Romania, Thailand, Turkey and United States.[157]

GEC Alsthom Canada

In 1991, GEC Alsthom NV[158], a Franco-British company that manufactures turbines and generators bought 65% of Mil-Tracy from the MIL Group, becoming GEC Alsthom electromecanique Inc.. The remainder of the company was purchased by a provincial crown corporation, the Societe de Developpement Industrielle du Quebec. This gave GEC Alsthom access to the North American market for power generating equipment, as well as the nuclear business, which Mil-Tracy had been involved with since the 1950s.

In 1990 Mil-Tracy had signed a joint venture with Sulzer of Switzerland in order to bid for the Wolsong-2 reactor in South Korea. As part of that deal, Mil-Tracy accessed new technology applicable to CANDU reactors. Mil-Tracy/GEC Alsthom have manufactured a variety of major nuclear equipment. The company produced £25 million worth of equipment for Qinshan Phase III CANDU reactors.[159]

Babcock & Wilcox

Babcock & Wilcox Canada, of Cambridge Ontario, is owned by McDermott Inc. of New Orleans, a subsidiary of McDermott International Inc. of Panama. B&W Canada specializes in steam generators ('boilers') for both fossil and nuclear plants, and also produces heat exchangers and provides a range of services including steam generator diagnostics, cleaning, and modifications.[160] Babcock & Wilcox has produced 222 of the 226 boilers for commercial CANDUs in Canada and abroad.[161] In the late 1970s, a flaw was discovered in the B&W manufacturing process, which resulted in a massive amount of defective manufacturing, with major defects in boilers at the Pickering A, Pickering B, Gentilly-2, Point Lepreau and Embalse CANDU nuclear stations.[162]

The company currently employs about 1,600 people, half of whom work on nuclear boilers, and the other half on fossil boilers. About 1,000 of the employees are at the Cambridge plant. B&W used its base of experience on CANDU boilers to move into the market for replacement steam generators for Pressurized Water Reactors in the United States, installing 209 boilers in 69 reactors over the last 14

years – about US$1 billion worth of business totaling about 20% of the market.[163] B&W Canada is the only manufacturer of nuclear boilers in North America.

General Electric Canada

GE Canada Inc. is a wholly owned subsidiary of the General Electric Company of Fairfield, Connecticut. GE Canada played a large historic role in the development of the CANDU reactor, including the design and construction of the prototype NPD reactor, as well as the KANUPP reactor exported to Pakistan, and the WR-1 reactor at Whiteshell. It abandoned the attempt to become an independent CANDU vendor in the early 1960s.

Based in Ontario, the company has manufactured a number of major CANDU components. GE Canada is also one of two CANDU fuel manufacturers in Canada.[164] It manufactured the fuelling machines and large electric motors for the Qinshan reactors.

Canatom NPM Inc.

In August 1998, Canatom and NPM Nuclear Project Managers merged to form Canatom NPM Inc..[165] Prior to the merger, the engineering/construction corporations SNC-Lavalin and Monenco-Agra jointly owned Canatom. SNC-Lavalin and Monenco-Agra, along with Foundation Nuclear and AECL also formed the Nuclear Projects Management (NPM) consortium. In addition to the contracts that Canatom obtained on its own, it apparently also did most of the work coming to its parent companies through NPM.[166] Canatom was founded in 1967 to provide nuclear engineering services, and NPM was formed in 1982 for project management, construction management, commissioning assistance and procurement of nuclear equipment. At the time of the merger, Canatom NPM had 250 employees. Since 1998, the ownership of Canatom NPM has changed to to SNC-Lavalin (62%), and BFC Construction (38%). BFC Construction Group Inc. is a subsidiary of Armbro Enterprises Inc., which in turn is is 49% owned by Hochtief AG, a large German construction company.

Canatom has been the traditional contractor for CANDU exports, and it or NPM was involved with all previous CANDU reactors, as well as heavy water plants and research reactors.[167] Canatom NPM is currently involved with the CANDU-6 projects in China, South Korea, and Romania. Canatom NPM now describes itself as the *"largest Canadian private-sector engineering company operating exclusively in the nuclear field".*[168]

Canatom NPM Inc. has its head office in Montreal, Quebec, as well as offices in Oakville, Ontario, and Seoul, Korea. It has four affiliated companies: CS&W Nuclear, Amag, CTECH (radioactive material management with AEA Technology of the UK) and CNUS (nuclear consulting and management services).

As noted above, Canatom in partnership with GEC-Alstom (UK-France) made an unsuccessful bid for work at Qinshan.[169] However, the company reportedly received sub-contracts from Bechtel, and also AECL

The Export Development Corporation

The Export Credits and Insurance Corporation (ECIC), predecessor of the Export Development Corporation (EDC), became Canada's official export credit agency under the Export Credits Insurance Act in 1944. It was assumed that a buyers' market would reassert itself in the post-war years, and

that Canada would need a governmental export credit agency to protect Canadian corporations in foreign markets, and allow them to compete with foreign corporations whose governments had similar agencies.

In the 1960s, several amendments were made to the Act, allowing long-term financing, increased financial ceilings and expanding services.[170] In 1969, the Export Development Act converted the ECIC into the Export Development Corporation and made it a crown corporation. Crown corporations are state-owned corporations that often function on a commercial or partially commercial basis. However, they clearly have a public policy mission and serve as the vehicles of state intervention in the economy. The EDC's basic purpose is to promote Canadian exports, rather than to maximize profit. A notable change made in 1969 was that the EDC could now borrow on the government's credit to fund its activities. Prior to that time, all loans were made on the government account and funded with borrowings from the Consolidated Revenue Fund.

Since 1969, EDC has provided a number of financial services: short term export credit insurance; bonding and surety services; political risk insurance; short term credit guarantees; and medium and long term loans to foreign borrowers and buyers.[171] In 1993, amendments were made to the Act which substantially broadened the EDC's mandate. These new powers included the ability to: provide consulting services; incorporate subsidiaries; make equity investments in Canada and abroad; provide domestic credit insurance; conduct lease agreements where the user is outside of Canada; and enter joint ventures in Canada and abroad.[172] The government requires EDC to be self-sustaining, which means that much of its business must be done on 'commercial', as opposed to concessional terms. The EDC operates a government account on OECD Consensus terms, the 'Canada Account' but also has a 'Corporate Account' on commercial terms. Corporate Account transactions are subject for example to the World Trade Organization's Subsidy and Countervail Measures (SCM) Agreement.[173] There have been bitter charges of unfair competition against the EDC, particularly from domestic credit insurance companies and banks, since the EDC has clear advantages over its private sector competitors,[174] including that it:

- is not subject to income tax;
- does not have to pay dividends;
- can borrow money in capital markets at the low interest rates of the government;
- is subject to a lighter regulation;[175]
- benefits from *"government debt relief provided ex gratia under Paris Club agreements to countries that experience financial distress"*; and
- is compensated above normal market rates for administration of the Canada Account (in 1999, the EDC retained US$25 million from Canada Account transactions).[176]

In addition, the government bails out the EDC for bad debts, having provided about US$750 million over the last ten years.[177]

Since it operates mainly as a direct lender, the EDC is different from most ECAs which act primarily as credit insurers and guarantors. The EDC's volume of business on its corporate account has expanded from US$17.237 billion in 1995 to US$40.055 billion in 1999.[178]

Canada Account vs Corporate account

Under Section 23 of the Export Development Act,[179] if the EDC decides that it will not enter into a transaction under normal 'commercial' terms, and if the Minister of International Trade (with the

concurrence of the Minister of Finance) decides that the transaction is 'in the national interest', the Minister may authorize the EDC to proceed. The monies needed for the transaction are then paid out of the government's Consolidated Revenue Fund (its main operating fund). Any transaction over US$50 million (which has included all Canada Account support for reactor exports) requires the approval of Cabinet.

Transactions taking place under Section 23 of the Act are commonly referred to as 'Canada Account' transactions. Canada Account transactions are by definition large and/or high risk, and would not be accepted by private sector financial institutions or the EDC, even with its higher tolerance for risk. EDC describes Canada Account transactions as those which, *"on the basis of prudent risk management, cannot be supported under the Corporate Account"*.[180] Most, although not all, of AECL's reactor exports have required Canada Account support.

The EDC is required to maintain a separate account for all of its Canada Account transactions. The EDC is responsible for the management and administration of the Canada Account transactions, but the risk ultimately rests with the Canadian government. Under Section 24 of the Act, liabilities under the Canada Account are limited to US$13 billion. In 1999, the outstanding loans and commitments were US$5.133 billion (1998 – US$5.650 billion).[181]

EDC provides five financial services, of which only four are available through the Canada Account: export credit insurance; financing service; performance insurance; and political risk insurance. The Corporate Account also provides equity investment services.[182]

Eligibility considerations for Canada Account transactions are:

- EDC's usual lending criteria (Canadian content, qualifications of the exporter, viability of the project);
- the government's willingness to consider the country in question's risk and the credit worthiness of the borrower(s); and
- national interest considerations, including:
- economic benefits and costs to Canada, including employment generated;
- importance of transaction to the exporter;
- foreign policy implications;
- importance of the market to Canada.[183]

EDC has described Canada Account transactions as typically having *"long lead times and a high degree of uncertainty",*[184] so it is typical for the Minister, or Cabinet, to give approval in principle, before the project is too far advanced.

In 1996 a dispute arose between Brazil and Canada over each other's subsidies to their respective aerospace companies (Canadian Bombardier Inc., and Brazilian Embraer SA) for sales of regional aircraft. The Canada Account had been used in about half of Bombardier's sales since 1992.[185] Brazil charged that the EDC's Canada Account support and another subsidy programme, Technology Partnerships Canada, constituted illegal subsidies. A 1999 WTO ruling found Technology Partnerships illegal, condemned Canada for failing to provide adequate information on its provision of Canada Account subsidies, and found the Canada Account at least partly in contravention of the WTO Subsidies and Countervail Measures Agreement (SCM). The dispute evolved into a major international trade war, with appeals and counter appeals against the original ruling. In March 2001, Brazil served notice that it would again challenge the legality of the EDC's use of the Canada Account at the WTO's dispute resolution meeting.[186] The fate of the Canada Account is vitally

important to the Canadian nuclear industry, since it is the vehicle for most governmental financial support.[187]

EDC Consultation Review

The Gowlings law firm published a review of the Export Development Act in June 1999.[188] The review defended the status quo for EDC's role, while suggesting a few modest reforms. The Gowlings review fed into a legislative review by the Standing Committee on Foreign Affairs and International Trade (SCFAIT), which published a report in December 1999.[189] The recommendations included:

- in disclosure, distinguishing between Canada and Corporate Account transactions;
- creating an Ombudsman at EDC;
- the Auditor General (whose office includes the Commissioner for Environment and Sustainable Development) should review the EDC environmental framework;
- statutory authority should be given to the environmental review process being suggested by EDC within 12 months;
- the Auditor General should be given ongoing oversight of EDC's performance; and
- EDC's environmental framework should be subject to further public consultation[190]

The government responded to the SCFAIT report[191] by endorsing a few largely meaningless changes.

EDC Disclosure and Consultation Policy

EDC provides virtually no detailed information about its transactions. Clients are not even identified by name. By comparison, the Export-Import Bank of the United States routinely provides the following information: name of applicant, name of borrower, buyer, guarantor, exporter, supplier, product, name of project, amount of loan, loan commitment fee, interest rate, number of payments, frequency of payments, repayment starting date, 'not later than' repayment starting date, and finally the board decision (i.e. approved or not). Although the US Exlm Bank is not an ideal model, it reveals that EDC claims about the need for commercial confidentiality are greatly exaggerated.

In 2000, EDC hired the polling firm Environics to conduct consultations with the public on the issue of disclosure.[192] In December 2000, EDC released for comment a 'draft outline' for a disclosure policy.[193] EDC currently plans to release its draft disclosure policy for a 45 day comment period (no meetings, written comment only) in early April.[194]

Canada's EDC Working Group (a coalition of environment, development, social justice, and labour organizations) has recommended that basic information (such as that provided by the US Exlm Bank) should be made available at the proposal stage, along with evaluation reports on completed projects and environmental assessments.[195] The Working Group has also suggested that Canada's Access to Information Act should be applied to EDC. Other crown agencies such as the Canadian International Development Agency (CIDA) are subject to the ATI Act. In addition, both the US Exlm Bank and the United States Overseas Private Investment Corporation (OPIC) are subject to the US Freedom of Information Act.[196]

EDC Environmental Policy

In an attempt to defuse some of the criticism it was receiving for its deplorable environmental record, the EDC has taken several steps. In May 1999, it followed numerous Canadian and international private sector and multi-lateral financial institutions in signing the United Nations Environment Programme Statement by Financial Institutions on the Environment and Sustainable Development.[197]

In April 1999, EDC released its Environmental Review Framework (ERF).[198] The Office of the Auditor General is currently reviewing the ERF and this review is expected to be released in late May 2001. The EDC may invite public comment on this review.[199] The International Campaign for Export Credit Agency Reform has also made a detailed critique of the ERF.[200]

The ERF gives EDC complete discretion about what constitutes environmentally unacceptable projects.[201] Other agencies (for example, US Export Import Bank/ExIm, IFC, US Overseas Private Investment Corporation /OPIC, and other members of the World Bank Group) have specific prohibition or exclusion lists.

The ERF also only requires the EDC to 'consider' international environmental standards and states that *"Environmental covenants, If any, will be developed in consultation with contractual parties. Such covenants will, at a minimum, be consistent with the laws of the host jurisdiction…".* In other words, EDC only requires compliance with host country laws. This undermines attempts by the World Bank Group and others to raise the standard of environmental practice.[202]

The EDC Working Group has recommended that World Bank environmental standards be accepted as the minimum standards for EDC and for export credit agencies internationally.[203] The Working Group has also suggested that the Canadian Environmental Assessment Act should be applied to the EDC, or that the Projects Outside Canada regulations should be amended to include, at a minimum, EDC's Canada Account transactions.[204]

The Environmental Review Framework provides absolutely no guarantee of public consultation or access to information. It absolves EDC of the need to disclose any information to the public without the consent of all parties. By contrast, WB, ExIm and OPIC all publish environmental assessments prior to decisions made on projects.[205] EDC's decision mechanisms remain a black box, with virtually no transparency on the sensitive issue of environmental protection.

On the question of consultation, EDC says that it 'may consider' information on projects from outside sources, making public consultation a totally discretionary practice. By not allowing access to information, this virtually guarantees that meaningful public consultation will not occur.[206] The ERF insures only accountability to the EDC Board of Directors, not to the public or any independent agency. Other financial institutions such as UNEP, IFC and OECD are not so dilatory, and support consultation with concerned groups.

The ERF was correctly characterized by the Gowlings report as an *"internal EDC process… which stops short of setting objective criteria or benchmarks".*[207] Canada, represented by the EDC, claims to have taken a leadership role in developing environmental standards of ECAs through the Export Credits Group of the Organization for Economic Co-operation and Development (OECD). The EDC claims that *"Trying to impose Canadian standards on all commercial projects in foreign jurisdictions would place our exporters at a competitive disadvantage without ensuring any change in environmental outcomes".*[208] The EDC refuses to lead by example or even match the modest

disclosure and environmental standards of its competitors, thereby contributing to lower international standards.

Sierra Club of Canada Court Case: Environmental Assessment for an EDC Nuclear Deal

On November 6th 1996, the Canadian cabinet amended regulations under the Canadian Environmental Assessment Act that would have required a preliminary screening and a comprehensive study (environmental assessment) to be carried out on the proposal by AECL to build two CANDU reactors for the Chinese government at Qinshan. The revised regulations were given the force of law the next day, without the normal publishing in the Canada Gazette for a 60 day comment period. The revised regulations were only published the day after the CANDU agreement with China was signed. The regulations were triggered by the federal government authorization of the $1.5 billion (Cdn) loan guarantee through the Canada Account of the Export Development Corporation (EDC).[209] This required the approval of Cabinet.

In January 1997, the Sierra Club of Canada filed an Application for Judicial Review with Federal Court of Canada-Trial Division.[210] The government has argued that the EDC loan emanated from the EDC, and not from the government, and refused to release background documents.

In November 1997, minutes of an April 1997 cabinet were leaked to the public. The document was primarily dealing with the financing of the proposed sale of two CANDU reactors to Turkey, but it commented on the Sierra Club court case.

"In the Sierra Club litigation challenging the CANDU China transaction, the government has taken the position that CEAA [Canadian Environmental Assessment Act] does not apply to projects which receive financial assistance from Crown corporations through the Canada Account. However, [the Department of] Justice has advised that its case is not strong and that the Federal Court may well rule in favor of the Sierra Club. If the government loses, Justice expects that the court could issue an order directing the 'responsible authority(s)' (RA), DFAIT [Department of Foreign Affairs and International Trade] and Finance, to conduct an environmental assessment which satisfies the Projects Outside Canada Environmental Assessment Regulations (POC)."[211]

In April 1998, on the eve of cross-examination of government officials by the Sierra Club, AECL filed a motion to become a respondent (full party) in the judicial review. On April 29, 1998, the Federal Court dismissed AECL's motion, although AECL was subsequently allowed to become an intervenor. AECL has subsequently engaged in a lengthy series of delaying tactics, while work has continued on the reactors in China.

The Sierra Club is currently engaged in actions to expedite the progress of the hearing.[212] It is clear that the AECL strategy is to delay the legal proceedings so that the question of environmental assessment will become moot when construction of the two reactors is complete. The projected first criticality for reactor #1 at Qinshan is October 2002, and July 2003 for Reactor #2.[213]

France

Introduction

The purpose of this report is to measure and evaluate the policy of export credit agencies in support of the French nuclear industry's international projects. A highly concentrated sector, the nuclear industry plays an important international role, with the permanent support of the state authorities under whose control it remains. Political support, present right from the start, has certainly resulted in —and still results in— the involvement of export credit agencies, essentially the very powerful *Compagnie française d'assurance pour le commerce extérieur* (COFACE). Unfortunately, this is an area which is difficult to penetrate and we were only able to obtain very fragmented information, making it impossible to provide an overall analysis of the situation. In particular:

- there is very little publicly available information on the details of projects supported by COFACE where nuclear power is concerned, or regarding the company's policy on this sector of activity;
- great difficulties were encountered in obtaining further information by direct contact with managers.

We have nevertheless attempted to provide some elements clarifying the way in which environmental impacts are considered in projects benefiting from COFACE guarantees, especially those relating to the nuclear industry.

Our inquiries were at three different levels:

1) Within COFACE. Here we were only able to obtain two contacts: Mr Ph. Paugam, of the Bureau d'information et d'orientation (office of information and policy orientation) and Mr Ph. Barbier, Environmental Expert. Unfortunately, we obtained very little information about COFACE's general policy on the environment. Nor did any information filter through on the guarantees provided by COFACE for nuclear projects.

2) At COFACE's controlling authorities: the Direction des relations économiques extérieures (DREE – foreign trade division) and, in general, the Ministry for Economy, Finance and Industry. A few people were willing to respond to questions so long as these remained general. As soon as the nuclear industry was mentioned our contacts became evasive and either refused to answer or referred us back to the DREE. The DREE, in spite of our insistence, refused to respond to our calls.

3) Finally, we attempted to obtain information via parliamentary commissions and various departments of the Ministry for Industry, especially regarding the control exercised by COFACE within the framework of public procedures. The Parliamentary Commission on Foreign Affairs, via Mr L. Klein, declined to answer, and the Ministry departments referred us systematically to the DREE. WISE-Paris also made an official request to the Cour des comptes (France's national audit office) to obtain access to the public reports on the management of COFACE. The reply, dated February 26th 2001, was positive.

France's Nuclear Industry

Today, France is a major player on the international nuclear scene, with the highest level of reactors in the world. The French nuclear sector is the worldwide leader in the plutonium industry. Not only is it firmly controlled by state authorities, it is also highly concentrated, both vertically (there are only a few companies operating at different stages of the fuel cycle) and horizontally (each stage is entrusted to one company only).

Nuclear Power in France[214]

France's nuclear programme took off in the early 1950s, initially in the form of military projects and then via the building of reactors for civilian use.

1952: Decision to build the first nuclear reactor to generate electrical power as part of a military project for production of plutonium, based on the gas cooled reactor (GCR). In all, three plutonium production reactors were built at Marcoule (G-1, 2 MW, then G-2 and G-3, each with a capacity of 43 MW).

1955: Setting up of a civilian programme to build nuclear reactors developing on the GCR (Chinon A1, A2 and A3, operated respectively until 1973, 1985 and 1990). The CEA (French atomic commission) then lost its monopoly on nuclear generated electricity, but reactors retained both a military and civilian status.

The 1960s were characterized by diversification of reactor designs, under the impetus of Électricité de France (EDF - France's national utility company), in parallel with maintenance of the CGR option until its abandonment.

1960: Order for a pressurized water reactor (PWR): Chooz A1, 320 MW (shut down in 1991).

1961: Order for a heavy water reactor: EL4-Brennilis, 75 MW (shut down in 1985).

1963-66: Order for three new CGR reactors: Saint-Laurent A-1 and A-2, shut down in 1990 and 1992, and Bugey-1, shut down in 1994).

1966: Order for a fast neutron reactor: Phénix, 250 MW.

1969: The government officially abandoned the CGR option.

In the 1970s, France embarked on a massive nuclear power programme after choosing its reactor design —the pressurized water reactor (PWR)— produced in a highly standardized form. All of the reactors in this series were built by Framatome, under a license agreement from Westinghouse adapted to the French context at the end of the 1970s.

1970: Contract Programme (CP): order placed for building of six light-water reactors (two at Fessenheim and four at Bugey).

1974: acceleration of the nuclear programme decided by the government after the 1973 oil crisis, with an order for sixteen 900 MW reactors (CP1).

1975: first order for 1300 MW PWR reactors (4 units).

1976: new order for twelve additional 900 MW reactors (CP2).

1976: launch of fast breeder programme with an order for Superphénix-1 (1200 MW).

In the 1980s, the PWR programme continued, although several projects were abandoned in the wake of a drop in electricity demand. The problems encountered in the development of fast breeder reactors led the authorities to abandon the launch of Superphénix-2.

1979-1983: decision to build a new series of higher power reactors, with an order for 16 new 1300 MW reactors.

1984: order for two new even more powerful PWRs (series N4, 1450 MW) at Chooz.

In the 1990s, the over-capacity of the installed base of reactors led to a slowing down and then a freeze on the PWR programme. No other series was developed and R&D efforts were concentrated on the European Pressurized Reactor (EPR) project, an improved PWR. In parallel, the government, after various difficulties, decided to abandon its fast neutron reactor programmes.

1991-1993: order for two series N4 reactors, at Civaux.

1998: decision to shut down Superphénix reactor permanently.

At present, all of the 58 PWRs that were built are operated by EDF (although 12 include foreign electricity companies among their minority shareholders). The only other power reactor operated in France is Phénix, the CEA's fast neutron reactor, temporarily shut down since November 1998. Today, France has the second largest installed nuclear base in the world (second to the USA) and EDF is the largest producer of nuclear generated electricity, producing 395 TWh in 2000 (for a net electricity consumption in France of 441 TWh in that same year). This nuclear power over-capacity allows EDF to export electricity massively to its European neighbors (72.7 TWh in 2000).

The Plutonium Industry

France's nuclear industry has induced a very high level of vertical integration in the fuel cycle. Although natural uranium is now no longer extracted in France, all of the other stages in the cycle are carried out on French territory:[215] from conversion to reprocessing and manufacture of plutonium-based fuel. Clearly, France originally developed this option for the later stages of the cycle for its military needs, then for its fast breeder programme. Since that programme was abandoned, a part of the plutonium separated has been re-used in the form of MOX (Mixed Oxides) fuel in PWRs.

France has commissioned the following reprocessing plants, in chronological order:

AT1: 'Atelier 1', La Hague, operated by CEA from 1969 to 1979
APM: 'Atelier Pilote de Marcoule', Marcoule, operated by CEA since 1962
UP1: 'Usine Plutonium 1', Marcoule, operated by CEA from 1965 to 1997
UP2-400, UP2-800, UP3: 'Usines Plutonium' 2 and 3, La Hague, operated by CEA (then COGEMA) since 1966, 1994 and 1989 respectively.

France also operates two MOX fuel manufacturing plants (mixed uranium and plutonium oxides from reprocessing): the ATPu facility at Cadarache and the MELOX facility at Marcoule.

These reprocessing and MOX plants have been, or are still, operated for both French and foreign clients (Australia, Belgium, Germany, Japan, Netherlands, Spain, and Switzerland). France, via COGEMA, now occupies a central position internationally in the increasingly controversial plutonium industry.

Industrial Players

The French nuclear industry is also characterized by a very high level of horizontal integration, as there is only one player in each area of nuclear activity. These players, wholly or mainly controlled by the state, have varied very little since the start of the French nuclear programme, in spite of a series of restructuring exercises.

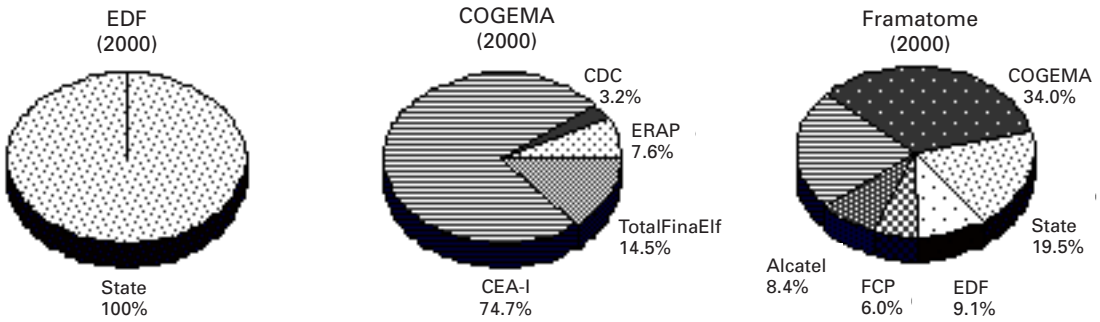
It was the CEA, a public body created at the end of the Second World War, that developed the bases of the French nuclear industry and then carried out the main R&D required to support industrial development. After the 1970s, the CEA's industrial activities were increasingly farmed out to subsidiaries that grew rapidly. January 1976 saw the creation of the *Compagnie générale des matières nucléaires* (COGEMA), a public organization established for industrial and commercial purposes, which absorbed all of the personnel (around 8000 people) and assets of the CEA's production division.

In December 1983, all of the CEA's subsidiaries were grouped in a holding company: CEA-Industrie (CEA-I). This is the major shareholder in COGEMA and has a large holding (with some variations) in Framatome, the manufacturer of nuclear steam supply systems.

France's nuclear industry is based around three poles: EDF, which operates all of its PWRs; Framatome, providing services relating to reactors and manufacture of uranium fuels; and COGEMA, managing all of the other stages of the fuel cycle. All of these companies are, directly or indirectly, under state control:

- EDF is a fully nationalized company, 100% under state control;
- COGEMA is controlled up to 75% by CEA-I, and only 5% of its capital has been opened up to outside investment;
- Framatome is controlled by COGEMA (which has recently acquired 34% of shares), CEA-I, EDF and the State, which together represent 85.7% of the capital.
- the CEA goes far beyond its role as public research body on atomic energy: through its 100% subsidiary CEA-I, it is the most important player of the field, controlling every stage apart from the electric production, taken on by EDF.

Financial Structure of France's Nuclear Industry



Source: COGEMA, Framatome

Further restructuring is in progress. This includes, in particular, the merging of Framatome's nuclear activities (now deriving only half of its revenue from the sector, the other half being in connector technology) with those of the German company Siemens. And the next step is the creation - announced at the end of November 2000 by Mr Laurent Fabius, France's Minister for Economy, Finance and Industry - of a new holding company, provisionally known as Topco, grouping CEA-I, COGEMA and Framatome. Its turnover is assessed at around ¤ 10 billion, of which nuclear activities will represent 75%. In 1999, EDF's turnover reached ¤ 32 billion, increasing by 8% compared to 1998.

The French Nuclear Industry Internationally

Activities of France's Nuclear Industry Abroad

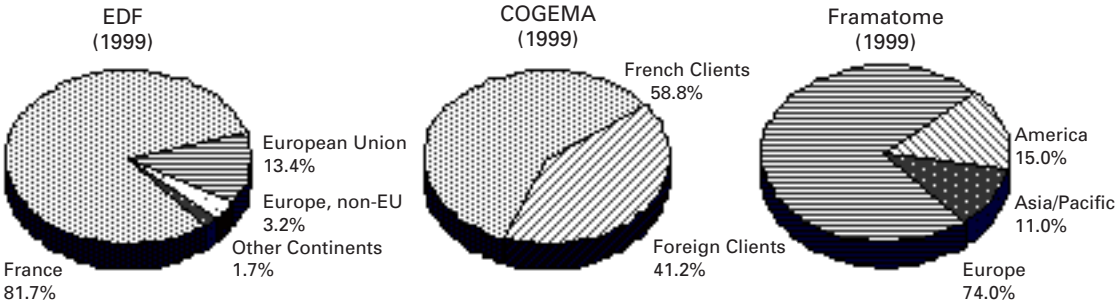
France's nuclear industrial structure was used initially to develop the 'domestic'" market, without, however, ignoring the international possibilities. For example, in the 1970s, it was planned to export around one reactor for each one built in France. This policy was relatively unsuccessful, as Framatome has exported 11 PWRs, in all.

A large part of Framatome's revenue is now generated abroad, mainly from nuclear construction projects, supply of fuels (made in Europe and USA), and nuclear-related services (reactor maintenance, etc.). The COGEMA group, which mainly operates uranium mines abroad and the fuel cycle in France, is present in 30 countries and raises around 40% of its revenue from foreign clients.

EDF, the operator of France's reactors has, for its part, experienced far more 'national' growth. However, the group has recently set itself some very ambitious objectives: the company, which in 1999 raised more than 80% of its revenue from supply of electricity within France, intends to lower this to 50% by 2005 while maintaining revenue at the same level.

In conjunction with this, EDF intends to *"take 10 to 15% of the generating market and 15 to 20% of the distribution market"*[216] in the central and eastern European countries (Czech republic, Hungary, Poland, Ukraine, etc.).

Geographical Breakdown of Turnover Figures of Players in French Nuclear Industry



Source: EDF, COGEMA, Framatome annual reports

Support for export of nuclear projects

Political support has been constant throughout the decades, whether for implementation of the national programme or to promote export of French technology beyond France's borders.

This support for exports has been manifest either in the form of political support during negotiations to close on major projects and/or via credit guarantees provided to the exporter, especially by COFACE.
There is no doubt that COFACE has played an important role in providing guarantees on behalf of the State, initially as a public body and from 1994 as a private structure and manager of the public procedures for credit guarantees. However, we have experienced difficulty in obtaining any information on this subject.

French nuclear projects abroad

The activities of France's nuclear industry where exports are concerned have been rich and varied, including services, processing of nuclear materials and supply of equipment. In particular, Framatome has built 11 reactors based on the French PWR 900 model (two in South Africa, three in Belgium,[217] two in South Korea and four in China).

The non-exhaustive list[218] below gives some of the major projects for generating capacity carried out wholly or partly by French companies and which may have benefited from COFACE guarantees.

Reactor exports: completed projects

South Africa

Koeberg-1 (965 MWe), commissioned in 1984, builder: Framatome.
Koeberg-2 (956 MWe), commissioned in 1985, builder: Framatome.
Total of nuclear-derived electrical power exported to South Africa: 1844 MWe.

China

Daya Bay-1 (900 MWe), commissioned in 1994, builder and service provider: Framatome & EDF.
Daya-Bay-2 (900 MWe), commissioned in 1994, builder and service provider: Framatome & EDF.
The contracts were signed with China's authorities on 23 September 1986.
Total of nuclear-derived electrical power exported to China: 1860 MWe.

South Korea

Uljin-1 (950 MWe), commissioned in 1988, builder: Framatome.
Uljin-2 (950 MWe), commissioned in 1989, builder: Framatome.
Total of nuclear-derived electrical power exported to South Korea: 1860 MWe.

Reactor exports: projects in progress

China

Ling Ao-1 (900 MWe), commissioning: 2002, builder and service provider: Framatome & EDF.
Ling Ao-2 (900 MWe), commissioning: 2003, builder and service provider: Framatome & EDF.

The framework agreement between the authorities was signed on January 15th 1995. An export credit of more than 15 billion FF was accorded to China for the construction of the nuclear power plant, an amount proudly proclaimed by the then Minister for Industry, Mr José Rossi, as being

"more than France's exports to China for 1994". The bank consortium was led by the *Banque Nationale de Paris* (BNP). The contracts for French firms were estimated to be worth around 9-10 billion FF, with around 6 billion FF for Framatome, more than 1 billion FF for EDF and 760 million FF in other contracts for French companies. **The loan was underwritten by COFACE to 95%.**

Replacement of steam generators

Belgium

Tihange-1 (1000 MWe), commissioned in 1975, service provider Framatome.
Doel-4 (1000 MWe), commissioned in 1985, supplier and service provider Framatome.
Tihange-3 (1000 MWe), commissioned in 1985, supplier Framatome.
Framatome built the three reactors.
Total of nuclear-derived electrical power exported to Belgium: 1860 MWe.

Spain

Asco-1 (1000 MWe), commissioned in 1984, supplier and service provider Framatome.
Asco-2 (1000 MWe), commissioned in 1986, supplier and service provider Framatome.

Switerland

Beznau-1 (400 MWe), commissioned in 1969, supplier Framatome.
Beznau-2 (400 MWe), commissioned in 1971, supplier Framatome.

Improving reactor safety

Slovakia

Mochovce-1 and 2 (2x440 MWe), commissioned in 1998 and 1999, service providers: Framatome & EDF.

The value of this contract was estimated at 495 million FF. The French bank Société Générale provided the loan, notably for the French part. EDF obtained an aid agreement for 100 million FF. **COFACE and Hermes (Germany) provided guarantee.**

Bulgaria

Kozloduy-5 (1000 MWe), commissioned in 1987, service provider: Framatome.
Kozloduy-6 (1000 MWe), commissioned in 1989, service provider: Framatome.

Euratom agreed to a ¤ 212.5 million loan —representing 50% of the financing cost— to modernize Bulgaria's reactors. The Commission gave its approval in May 2000

Ukraine

Chernobyl (1000 MWe), commissioned in 1982, service providers: Framatome & EDF.
The aid contract was signed with EDF in April 1998.
Rovno-4 (1000 MWe), commissioning planned in 2006, service providers: Framatome & EDF.
Khmelnitski (1000 MWe), commissioned in 1988, service providers: Framatome & EDF.

For the Rovno-4 and Khmelnitski projects, Euratom and the European Bank for Reconstruction and Development (EBRD) provided a loan of US$585 million and another for US$215 million respectively, after approval by the Commission on 13 December 2000. Total investment was estimated at US$1.48 billion. Export credit agencies from France, UK, Czech Republic, US and Switzerland are all earmarked to provide funds, totalling US$348 million, with COFACE providing US$136 million.[219]

Canceled Reactor Projects

Iran

Ex-Karun-1 (1000 MWe), commissioning planned in 1982: Framatome.
Ex-Karun-2 (1000 MWe), commissioning planned in 1983: Framatome.

COFACE

History

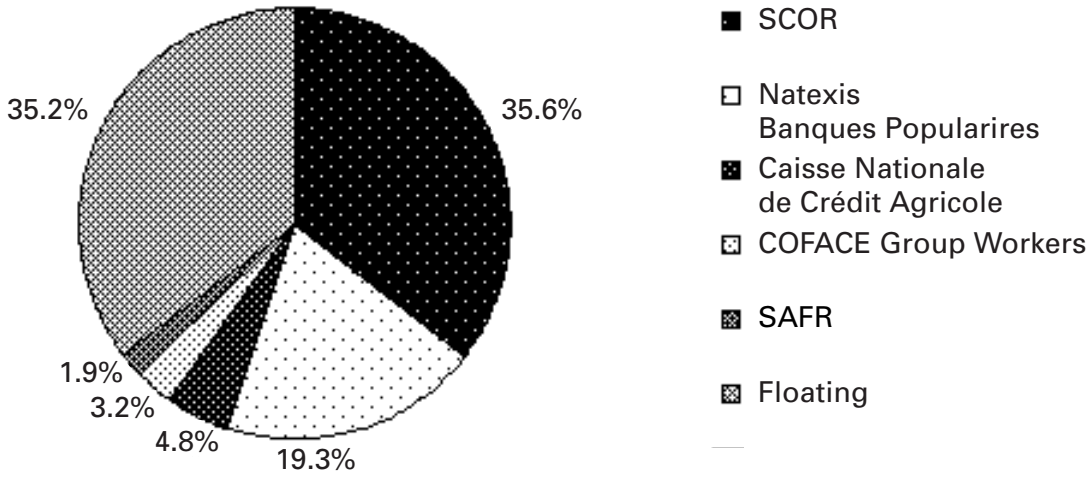
COFACE (the Compagnie française d'assurance pour le commerce extérieur) was created on June 1st 1946. One of its aims was to *"protect French companies from the risks arising from their international investments".*[220]

Ten years later, it spread into the different regions of France where it now has 21 Regional Offices and five Regional Representative Offices.[221]

The 1990s were a very important period in the history of COFACE:

- International development: COFACE entered into partnership agreements with similar organizations. abroad and created two subsidiaries: LBF, in the UK; and Viscontea, in Italy.[222] In 1996, when it became the majority shareholder in the German credit-insurance company, Die Allegemeine Kredit, COFACE became the world leader in export credit insurance with an annual turnover figure of around ¤ 738 billion.
- Entry into the private sector: after the privatization of most of its shareholders in 1994, COFACE moved from the public to the private sector, although it *"retained a special relationship with the State".*[223]
- Flotation on the stock market: on February 2nd 2000, the COFACE Group was introduced on the stock market. Its shareholders as of March 31st 2000[224] were as shown below.

Breakdown of COFACE's Capital: COFACE's Shareholders



Source: COFACE

COFACE's Activities

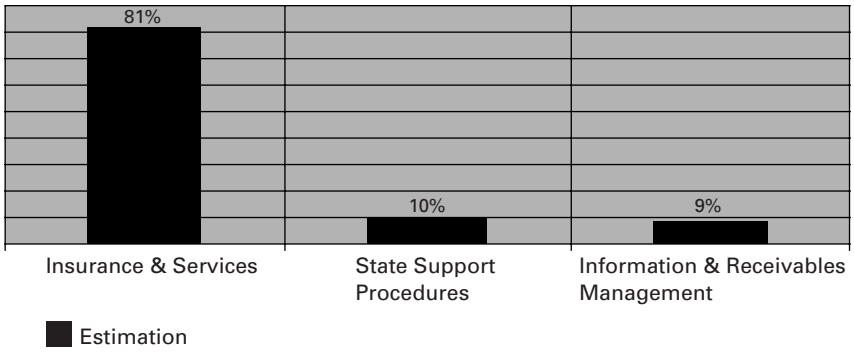
Among COFACE's main activities are:

1. Private market credit insurance, in which it assumes financial liability as an insurance company.

2. Intervention *"on behalf of and with the guarantee of the French state"*, within the framework of its overseas trade support policy, through the management of four forms of state support for exports:
(i) credit insurance (political and commercial risks);
(ii) business development insurance (support for international development of small and medium-sized business);
(iii) exchange risk cover (risks affecting export contracts that arise from exchange rates);
(iv) guarantees against economic risk (guarantees against price fluctuations). The amount of indemnities generated by each of these is shown in the following figure.

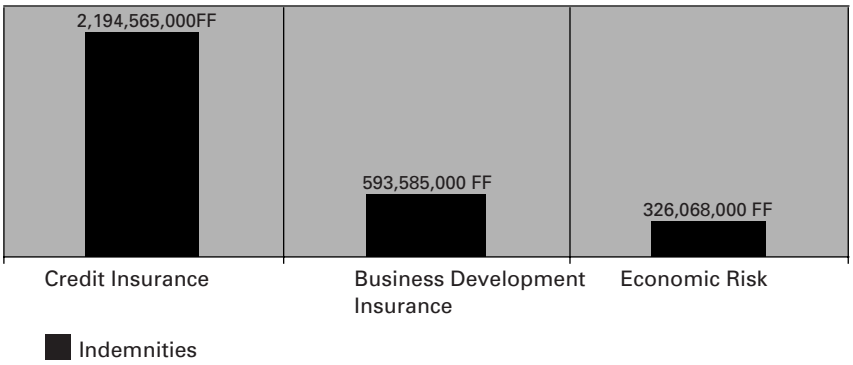
3. Dissemination of commercial information and receivables management.

Breakdown of COFACE's Activities in 2000



Source: COFACE

Indemnities Recorded by COFACE in 1998



Source: Cour des comptes (national audit office report from Commissioner Deloitte Touche Tohmatsu), 1998.

State Support Procedures

There are two instruments for state support for exports: the Natexis bank and COFACE. Support via Natexis consists of the provision of export loans at *"special rates of interest and with proposed exchange risk cover".*[225] Although it has been a private-sector organization since 1996, Natexis, like COFACE, continues to maintain privileged links with the state authorities, especially the *Direction du budget* (budget department) within the Ministry of Finance, responsible for the exchange risk cover procedure.

Support for French industrial exports is mainly in the form of guarantees against economic and political risks, introduced by the State and managed by COFACE. Such guarantees apply, principally, to large-scale projects.

Within COFACE, it is the Medium Term Insurance Department that handles credit insurance operations that have government support.

5.1. Public intervention

COFACE appraises state support operations for companies wishing to invest in 'large-scale'[226] projects in the medium and long term.
For exporters, the purpose of these guarantees is to cover them against the risk of interruptions to contracts or failure to meet contractual obligations. For the banks that finance projects, cover is provided for non-payment of debts or insolvency of debtors.

5.2. Conditions under which guarantees are provided

Where credit insurance is concerned, there are two kinds of operations managed by COFACE:
• Operations financed in the short term, outside of OECD countries, and
• Operations financed in the medium term, anywhere in the world.

The list of countries in question is fixed each year by the controlling authority. On the other hand, the *"classification of countries used by the Medium Term Insurance Department"* —the basis for setting the levels of guarantees— *"is revised quarterly",*[227] taking into account political and/or economic changes which may come about.

"Guarantee is in the form of an individual policy", suited to each contract. The criteria for provision of a guarantee (or refusal) depend on:

• *"the country in question,*
• *the sector of activity, especially in the areas of public civil engineering works and aeronautics, and*
• *the proposed financial arrangements".*

• *"Unpaid debts are covered to:*
– *95% for export customer credit,*
– *90% for supplier credit when risks are political in nature,*
– *85% for supplier credit for commercial risks, rising to 90% if the debt is covered by a bank guarantee."*[228]

Modalities

The *Commission des garanties* (guarantees commission-COFACE) is responsible for receiving and appraising applications for guarantees while contracts are still being negotiated. The Commission

forwards applications to the DREE which will, on behalf of the Ministry for the Economy, decide whether or not to provide the guarantee.

"COFACE draws up an insurance policy and receives a premium in return for this:
• In case of default by the customer, COFACE will 'substitute' *for the customer to the benefit of the policy holder (indemnity);*
• Recovery may be possible later, especially in cases of political risk affecting certain loan agreements signed between France and other countries."[229]

The premiums, which constitute COFACE's remuneration, depend on the risk assessed per country.

The State-COFACE Relationship

COFACE's policy on provision of guarantees for large-scale projects, and consequently for everything relating to the environment within the framework of these operations, stems from the DREE's policy orientation.

Although it entered the private sector in 1994, COFACE has retained a 'special' relationship with the State, through which it continues to support exporting companies. Since the additional Finance Act of 1997, *"the State has an account with COFACE that is protected against seizure".*[230]

COFACE, acting as 'service provider',[231] is responsible for management of guarantees relating to *"export operations that cannot be insured in the private sector. It is the leading agency given the diversity of state guarantees it manages (business development insurance, trade fair cover, medium- and long-term credit guarantees, exchange risk cover, investment guarantees)".*[232]

The Ministry for the Economy, Finance and Industry intervenes —on behalf of the State— in covering the export credits managed by COFACE. This has been the case since the creation of COFACE.

La Direction des Relations Économiques Extérieures (DREE-Foreign Trade Division within MinEFI)

Within the Ministry for the Economy, Finance and Industry (MinEFI), it is the *Direction des relations économiques extérieures* (DREE - foreign trade division) that acts as COFACE's controlling authority. The DREE decides whether or not to provide the state guarantee for major export projects, after opinion from the *Commission des garanties et du crédit du commerce extérieur* (commission for guarantees and foreign trade credit).[233]

The DREE develops and implements *"public policy in the areas of foreign trade relations and international development of companies".*[234]

Present in 118 countries, and with the support of public and private bodies intended to promote foreign trade, it is a powerful means of disseminating economic information for trade coordination, promotion of exports or even for negotiations.

This gives an idea of the importance of economic policy orientations for and political influence on COFACE where public procedures are concerned.

The direct implication of the DREE in major nuclear projects needs no further demonstration. During the negotiations which led to the signing on January 14th 1995 of the contract for the construction of the Daya Bay-2 power plant (China), Mr J-P. Landau, Director of the DREE, and Mr J. Rossi, then

Minister for Industry, met regularly with Mr J. Desponts, Director of the BNP responsible for international finance, to discuss the progress of negotiations.[235]

It should be borne in mind that, when the contract was concluded, China was afforded an export credit amounting to 15 billion FF, the highest amount ever granted by France, according to the BNP representative.[236]

Guarantees for Nuclear Projects

Although COFACE's involvement in certain projects is established, it is very difficult to ascertain the extent of guarantees it has provided for nuclear projects. As this involves state procedures, there is a tendency of the controlling authorities to centralize the decision-making process. Thus the procedures by which COFACE decides to provide guarantees are extremely unclear.

The most probable hypothesis is that major nuclear projects benefit almost automatically from state support, and therefore from COFACE guarantees. These require not only large investments but also political involvement at the highest level. Any attempt to analyse COFACE's commitments in the private sector would be mere speculation. There is a general lack of transparency surrounding the company's general policy, especially in this area, and the information involved in such contracts is highly confidential. According to Mr Paugam of COFACE's *Bureau d'orientation et d'information* (office of information and policy orientation), the agency has a single approach to energy projects. However, the DREE, via Mr Suryanarayanan, stipulates that environmental impact assessments are adapted so as to be appropriate to different types of projects.

The Other Guarantee Agencies

While COFACE guarantees up to 25% of French exports,[237] recent developments in the international market have brought private insurers to take increasing interest in risks extending beyond three years.

This improved credit insurance capacity and extended period of cover have meant that private insurers —in France or elsewhere— are now increasingly being asked by major groups and consortia to guarantee large-scale contracts.

The diversification of sources of financing and/or insurance allows these groups and consortia, among others, to *"avoid the limits imposed by the ceilings placed on risks by the credit insurers and banks for a given country or buyer-borrower".*[238]

The participation of these insurers in the provision of guarantees for French nuclear projects in other countries, even more minor ones, is therefore probable.

Taking Account of Environmental Risks

The COFACE website[239], supposed to present COFACE's policy on environmental impacts *"of the major projects that it guarantees on behalf of the state"*, actually only gives very general information.

A number of questions (italicised) therefore remain unanswered.

How are Environmental Risks Taken into Account?

It appears that COFACE only takes account of environmental impacts for the *"major projects that it*

guarantees on behalf of the state". It should be borne in mind that public procedures represented only 10% of COFACE's activities in 2000.

Does COFACE have a different policy for non-public procedures?

What was the policy before 1999?

COFACE's policy on environmental matters prior to 1999 was described by the agency's office of information and policy orientation as *"implicit".*[240]

Prior to 1999, did COFACE encourage its clients to undertake environmental impact assessments? Was there any obligation or directive from the DREE on the consideration of environmental aspects of projects submitted?

What was the policy after 1999?

After 1999, COFACE officially (and apparently explicitly) integrated *"consideration of environmental risks"* into its decision-making process. Since March 1999, COFACE has been sending an environmental questionnaire to exporters, when:

1. The project under consideration belongs to one of the following sectors:
- *"Mining and extractive industries,*
- *Paper industry,*
- *Chemicals and hydrocarbons,*
- *Dams and hydroelectric plant,*
- *Energy production,*
- *Public civil engineering and infrastructure,*
- *Agriculture."*

It should be noted that the text includes fossil-fuel power plants as examples of energy production, but makes no explicit reference to the nuclear industry (see Annex 1).

2. The contract total (including the local part) is equal to or greater than ¤ 45 million.
However, it is specified that COFACE reserves the right to ask the exporter to respond to a questionnaire in the case of a project that *"could*, a priori, *engender significant risks."*

What are the criteria used to judge such risks?

COFACE designates an environmental expert responsible for project appraisal *"from the environmental point of view".* After an initial appraisal, the Environmental expert classifies projects according to three categories:

Category A: projects *"with significant impacts".* These require an environmental impact statement (EIS). The exporter is responsible for providing COFACE with a copy of the project's environmental impact assessment (EIA), made by the buyer. **There is no apparent indication as to the methodology used for analysis of environmental impacts of projects nor as to which contracting party is responsible for assessment or for causing assessment to be made.**

Category B: projects with *"potential environmental impacts"*: EIA is not required *'*systematically'. For projects in categories A and B, the guarantee is subject to *"meeting of commitments on environmental performance", in other words "mitigating or compensatory measures".*

If, after the EIA and any complementary studies are completed, the improvement measures proposed by the exporter do not satisfy COFACE, is the project refused solely on environmental grounds?

Category C: projects *"with little or no impact on the environment."*
Here again, the text gives no indication as to the criteria that could be applied to determine and assess the extent of environmental impacts (see Annex 1).

Where nuclear projects are concerned, are questions of safety standards considered by COFACE when questionnaires are sent to exporters? Is the safety aspect covered in EIAs?

What is the controlling authority's position?

According to COFACE's office of information and policy orientation, nuclear projects are *"considered in the same way as any other project in the energy sector."*[241] Moreover, the DREE has confirmed that it has no specific and/or favorable policy regarding a particular energy sector in relation to others, but affirms that "impact studies are appropriate to each type of project".[242] However, it has, for several years, been establishing directives in the form of *"internal memos and documents"* calling on COFACE to be *"more attentive"* to environmental issues and to require *"ad hoc surveys"* when necessary.[243]

Are these internal memos and documents prescriptive where COFACE is concerned, or does the agency retain a great degree of freedom?
On what legal basis (international treaties, European directives, laws and/or regulations) are they drafted?

Conclusion

Control of environmental risk assessment by COFACE

COFACE refused to clarify the extent of its control over environmental risk assessment when examining dossiers for projects receiving state support. The question can therefore be posed as to the degree of rigor applied to the procedures for informing the public in the beneficiary countries. While the agency's website does not mention public involvement in decision making (although it does refer to *"exchanges of information between all interested parties"*), it raises the question of *"consultation of local populations affected"*[244] in its questionnaire – as a 'necessity' but not as an 'obligation' (see Annex 1). Nor is there any mention of international debate as required under the Espoo Convention, to which France is a signatory.

The main thrust of COFACE's policy is to avoid financial risk due to temporary or permanent 'insolvency' on the part of debtors, arising eventually from inadequate environmental manangement.[245] This perhaps explains COFACE's choice of defining environmental risk as *"an integral part of the financial risk covered"* rather than as a risk in its own right.

Control of COFACE by the DREE

In the light of the information presented above, there is no doubt that COFACE's policy on the environmental aspects of projects receiving state support, issues mainly from its controlling authority, the DREE:

• The DREE is the controlling authority for all projects receiving state support;
• It establishes general policy regarding public procedures;
• It establishes general policy regarding France's foreign trade;
• Finally, it issues 'internal memos and documents' on the environment to COFACE.

However, the DREE's initial responsibility is to examine projects in terms of purely economic and financial criteria (or in some cases political ones). Nothing indicates that it assumes the right to consider the environmental aspects of projects receiving state support, and even less the methodology used for impact assessments.

The Treasury

The Treasury is responsible solely for the recording of operations carried out by COFACE under public procedures.

State control

Until 1994, the *Cour des comptes* (national audit office) had the power and obligation to monitor COFACE, the latter being a state body (Articles L111-1 and L111-3 of *Code des juridictions financières* (financial jurisdiction code).

Today, monitoring is limited to state procedures and —although certain aspects of COFACE's operations are made public— is only intended to verify income and expenditure as presented in accounts.

Questions nevertheless remain, among both members of parliament and within the audit office, as to the *"lack of transparency surrounding operations carried out by COFACE on behalf of the State".*[246] The audit office has, in fact, regularly denounced certain procedures and especially operations that *"do not appear clearly either in public accounts nor in those of COFACE".*

Furthermore, it outlines the lack of 'correlation' since 1995 between the figures presented by the controlling authorities regarding management of state procedures. In 2000, the audit office undertook *"an inspection of the budgetary funds used for management of financial procedures presently entrusted by the State to this organization".*

The Parliament

Except for a few cases in which the Foreign Affairs Commission has had to *"question some COFACE managers"*, the national parliament exercises no particular control, direct or indirect, over the public procedures.[247]

The Parliament can, however, call on the audit office to clarify certain aspects of management of some state procedures.

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Germany

West Germany

The 'Uranium-project' during World War II can be seen as Germany's first attempt to build a nuclear reactor. With the German surrender in 1945 all nuclear efforts were halted by the Allies. Ten years later West Germany retrieved its nuclear sovereignty from the UN. Shortly after, the West German government established an atomic ministry to set up a national nuclear programme. The aim of this was to catch up quickly with the technical standards of other industrial countries and to develop a strong nuclear sector. Universities, large companies and energy suppliers were encouraged to get involved in the development and promotion of nuclear technology. Government support consisted of:

- Direct investment in fundamental research programmes for universities and special research facilities,
- Strong financial commitment to the construction of prototype reactors,
- Major tax advantages for nuclear energy production as bait for the energy suppliers,
- Low risk insurance costs for plant owners by minimizing necessary liability funds .

At least 8,4DM billion[248] of public money was spent in the first 15 years of the nuclear programme. The oil crisis of the seventies and predictions of a dramatic rise in energy consumption multiplied these government subsidies over the next decades.

Nuclear technology

In the early nuclear days AEG and Siemens were the two main companies in the West German nuclear sector, both favoring the design of the Light Water Reactor (LWR). A long relationship with the American company General Electric (GE) gave AEG a head start: in 1958 the construction of the first research reactor Kahl began, and in 1961 it started operation. The first commercial reactor in West Germany, Gundremmingen was also constructed by AEG and licensed by GE. This Boiling Light Water Reactor (BWR) with a capacity of 250 MW electricity was started up in 1966. In the same year Siemens completed its first research reactor, the MZFR Kahrlsruhe. Siemens developed a different technical concept in co-operation with another American nuclear corporation Westinghouse. Their first commercial reactor Obrigheim was a Pressurised Light Water Reactor (PWR). Commercial operation of Obrigheim started in 1969.

In parallel with the PWR and BWR Light Water reactors, the West German nuclear sector concentrated on the development of two other nuclear prototypes.

The High Temperature Reactor (HTR) was developed at the research facility in Jülich in 1969. The company involved in the construction of the first nuclear power plant of this type was BBC (now ABB) in alliance with Krupp AG. Although this design was supposed to be more efficient and safer than the PWR, the HTR only had a very brief commercial appearance in the nuclear records of West Germany. The Thorium-HTR in Hamm Uentrop operated only between 1985 and 1987. Technical problems and scandals around BBC's partner company Nukem led to the rapid closure of this reactor. Meanwhile the project cost had risen from an initial estimate of 690DM million to more than 4DM billion.[249]

Commercially operating nuclear power plants in Germany[250]

(in order of commercial start date)

AKW	Constructor	Type	Mwe (net)	Commercial Start	Main owner
Obrigheim	Siemens	PWR	340	Mar. 1969	EnBW
Stade	Siemens	PWR	640	May 1972	EON, HEW
Biblis A	KWU	PWR	1146	Feb. 1975	RWE
Biblis B	KWU	PWR	1240	Jan. 1977	RWE
Neckarwestheim 1	KWU	PWR	785	Dec. 1976	DB, EnBW
Brunsbüttel	AEG/ KWU	BWR	71	Feb. 1977	HEW, EON
Isar 1	KWU	BWR	870	Mar. 1979	EON
Unterweser	KWU	PWR	1255	Sept. 1979	EON
Phillipsburg 1	KWU	BWR	864	Feb. 1980	EnBW
Grafenrheinfeld	KWU	PWR	1235	June 1982	EON
Krümmel	KWU	BWR	1260	Mar. 1984	HEW EON,
Gundremmingen B	KWU	BWR	1240	July 1984	RWE, EON
Grohnde	KWU	PWR	1325	Feb. 1985	EON
Gundremmingen C	KWU	BWR	1248	Jan. 1985	RWE, EON
Phillipsburg 2	KWU	PWR	1300	Apr. 1985	EnBW
Brokdorf	KWU	PWR	1326	Dec. 1986	EON, HEW
Isar 2	KWU	PWR	1320	Apr. 1988	EON
Emsland	KWU	PWR	1290	July 1988	RWE, EON
Neckarwestheim 2	KWU	PWR	1269	Apr. 1989	EnBW, DB

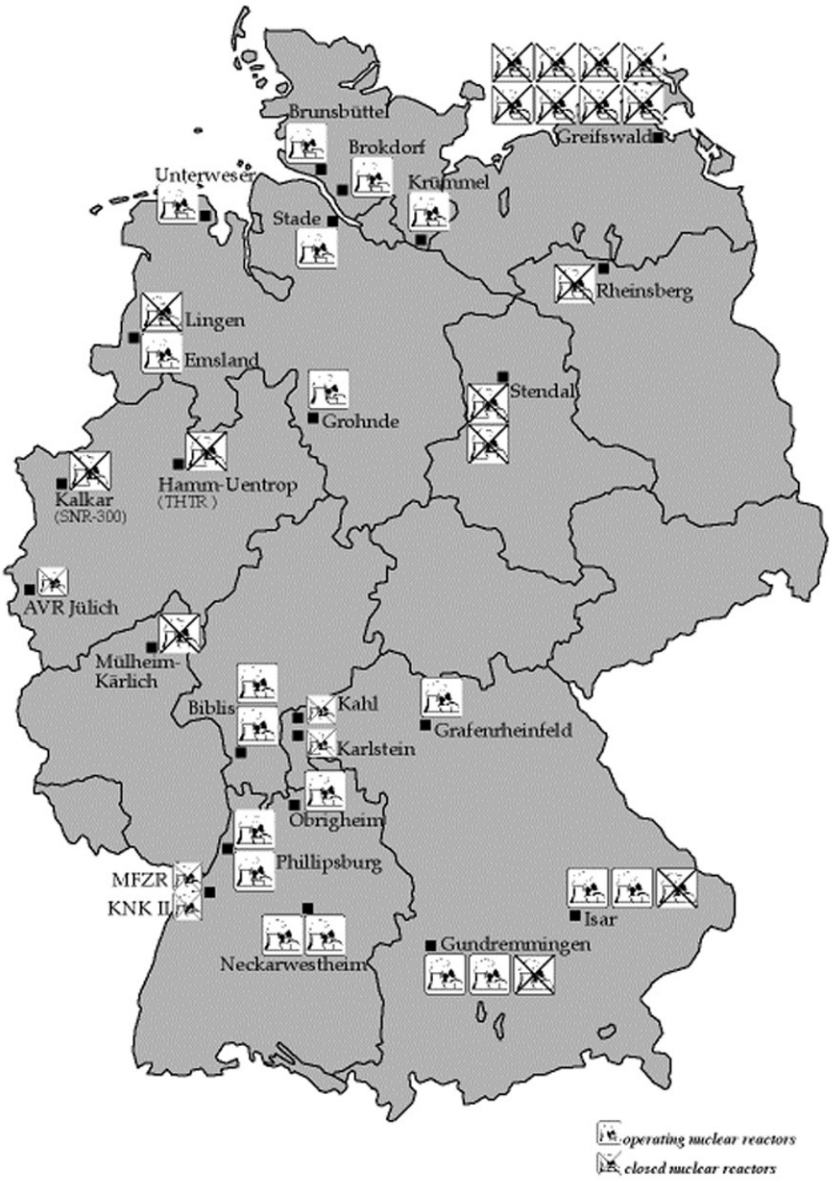
The Fast Breeder was intended as the product of a trilateral cooperation between West Germany, Belgium and the Netherlands. A syndicate of Interatom, Belgonucleaire and Neratom started to built the SNR-300 prototype in Kalkar in the early 70's. Athough almost completed the last license needed for operation was never given for technical, economical and political reasons. On March 21st 1991 the Fast Breeder project was finally terminated. The planned 300DM Million project cost had risen to the astronomical sum of 7DM billion.

The light water reactors emerged as the champion nuclear design. Although many safety questions —including that of waste storage— remain unanswered, 19 light water reactors, 13 PWRs and 6 BWRs, are commercially operated in Germany.

Nuclear industry

Strong competition in the West German power market has resulted in only marginal profits for the nuclear construction companies. For this reason, in 1968, the two competitors AEG and Siemens decided to merge their power construction branches into a joint venture, the Kraftwerksunion (KWU). However, neither was able to bring their nuclear branches into the KWU until 1973 because both were committed to American partner companies through long term license contracts. For AEG the merger came too late. Massive cost overruns of more than 220 DM million at the NPP Würgassen forced AEG out of the nuclear business.[251] It had to sell all its KWU shares to Siemens shortly after completing the KWU-alliance.

Nuclear Reactor Sites in Germany



Another large nuclear company, BBC, was hit by major losses at the THTR project in Hamm Uentrop. Mühlheim Kährlich, the other nuclear power project with BBC involvement, also ended disastrously. This reactor was completed ten years too late and cost 7,8DM billion – 6,3DM billion more than initially estimated. Because of serious misconduct in the licensing process and inadequate architecture (it was built on a fault line), the reactor was shut down after only one year in operation. BBC did not attempt any further projects.

This development gave Siemens a monopoly in the German nuclear power market. It owns 100% of the construction companies KWU and Interatom (a product of a Siemens-AEG merger). All the commercial NPPs currently operating in Germany have been constructed by Siemens/KWU.

Neckarwestheim 2 was the last West German NPP to be completed, coming on line in 1989. No commercial reactors have been licensed since, nor are any under construction or even ordered. Siemens adapted to this shift in the domestic nuclear sector by specialising in nuclear servicing and the manufacturing of nuclear fuel. Last year Siemens merged their nuclear KWU branch with Framatome for a better chance on the global nuclear market. This joint venture is called Nuclear Power International (NPI).

Anti nuclear movement

In the 1970s, a large grassroots movement developed, reflecting a strong and still vivid popular opposition against this technology. Big demonstrations and many direct actions curtailed the high flying dreams of the nuclear sector. Some nuclear projects had to be stopped because of intense protests (Whyl, Wackersdorf). Others were completed only with massive police deployment (Brockdorf, Grohnde). The Harrisburg and Chernobyl catastrophes, as well as the scandals around Nukem, only served to consolidate people's rejection of this technology.

This strong and lasting popular resistance changed the political landscape. The Green party evolved as part of the anti-nuclear movement. The SPD, initially a strong supporter of nuclear energy, performed a remarkable turnaround in 1986 when they made nuclear phase-out one of their political goals.

Closed nuclear power plants in Germany * brutto MWe[252]

Reactor	Type	Constructor	Mwe (net.)	Commercial Start	Closure
VAK Kahl	BWR	AEG, GE	15	1961	Nov. 1985
Multipurpose MZFR	PHWR	Siemens	51	1966	May 1984
Gundremmingen A	BWR	AEG, GE	237	Apr. 1967	Jan. 1980
AVR Jülich	HTR	BBC/Krupp	15*	1966	Dec. 1977
Lingen	BWR	AEG	240	Oct. 1968	May 1979
Karlstein	HSR	AEG/KWU	25*	Oct. 1969	Apr. 1971
Würgassen	BWR	AEG/KWU	640	Nov. 1975	Sept. 1995
Niederraichbach	GCHWR	Siemens	100	Jan. 1973	Aug. 1974
Mühlheim Kärlich	PWR	BBC/BBR	1219	Mar. 1986	Oct. 1987
Kompakt KNK	BNR	Interatom	18	1978	Aug. 1991
Hamm-Üntrop	HTGR	BBC/Nukem	296	June 1987	Oct. 1989
Kalkar	SNR, Fast Breeder	Interatom Belgonuclaire Neratoom	327*	Suspended in 1991	

East Germany

The nuclear era in East Germany began almost at the same time as the West German. In 1966, Technopromexport, the state owned monopolist for nuclear technology, completed the PWR in Rheinsberg. After that, all NPPs constructed were Soviet PWR types – 4 VVER 440/230 reactors, one VVER 440/213 and two VVER 1000 were completed. The only Soviet reactor type never built in East Germany was the Chernobyl type RBMK reactor. The Soviet Union only allowed construction of RBMK reactors on its own territory because of their capability for producing plutonium.

The collapse of the East German regime in 1990 foreshadowed that of the East German nuclear sector. The first government of the reunited Germany announced that it could not competitively upgrade the Soviet-designed NPPs to West German safety standards. All operating units were finally shut down in 1990 and all projects under construction were suspended. Some of the spare parts were sold to countries in Eastern Europe operating similar reactors (e.g. Bulgaria and Hungary).

Nuclear Power Plants on the Territory of Former East Germany[253]

Reaktor	Type	Mwe (netto)	Commercial Start	Closure
Greifswald 1	VVER-440/230	408	July 1974	Dec. 1990
Greifswald 2	VVER-440/230	408	Apr. 1975	Feb. 1990
Greifswald 3	VVER-440/230	408	May 1978	Feb. 1990
Greifswald 4	VVER-440/230	408	Nov.1979	June 1990
Greifswald 5	VVER-440/213	408	1989	1990
Greifswald 6 - 8	VVER-440/213	408 (each)	Cancelled	—
Rheinsberg	PWR	70	Oct. 1966	Oct. 1990
Stendal 1 & 2	VVER-1000	950 (each)	Cancelled	—

In the past decade the Eastern German VVER reactors were keenly researched by the formerly West German nuclear sector. Now Siemens is trying to promote its broader view of Eastern and Western nuclear technology to win work on safety upgrades of NPPs in central and Eastern Europe.

Status Quo in Germany

The current German government, a coalition of the Social Democrats and the Green Party, promised a nuclear phase-out in Germany. It negotiated with the national energy suppliers to shut down all remaining nuclear reactors within 20 years.

This political translation of a strong popular anti-nuclear feeling is rather half hearted. Besides weak benchmarks being defined for the energy suppliers, two main points raise concern in the context of the German nuclear phase-out.

1. Germany still invests money in:
• nuclear research reactor projects. Garching II will be started up this year.
• nuclear fission research
• the joint German-French EPR reactor programme.

2. The government subsidises nuclear exports with tax payers' money. One of the important bilateral instruments for this is the national export credit agency, Hermes.

HERMES – Discreet Subsidies for the Nuclear Industry

Political Motivation

Strong German trade balances arise from high export figures of manufactured goods, services and expertise. High export figures strengthen the German economy and help to maintain a high employment rate. To keep exports at a high level, Germany established, like most other OECD countries, an Export Credit Agency (ECA). This institution safeguards domestic exports against possible commercial and political risks in recipient countries by offering a government guarantee for exporting companies or German Banks involved in projects. In Germany the ECA responsible for managing the official export guarantee scheme is Hermes Kreditversicherungs-AG, referred to hereafter as Hermes.

In 1999, Hermes guaranteed exports accounting for 26,658 DM million which constituted 2.7% of German exports that year (214). In 2000 this sum increased to 38,1DM million which equals 3.3% of the overall exports.[254] Although only a small percentage (2-5%) of German exports are backed by Hermes guarantees, this tool plays an important role in promoting Germany's foreign trade. Most exports to developing countries or to Central & Eastern Europe are guaranteed by Hermes. As the Ministry of Economy has stated, many exports to these countries only become possible because of this government support. With this instrument the German government wants to encourage the exporting industry to reach out into new and unstable markets .

Decision Making Procedure

Hermes is a private insurance company, a 100% subsidiary of the German Allianz Versicherung AG. It administers the export credit guarantees of the German government on a mandatory basis. Many cases are handled by Hermes itself, although certain applications have to be endorsed by a special governmental commission – the Interministerial Committee for Export Guarantees (IMA). The IMA makes decisions on all cases involving sums greater than 5DM million and it decides on fundamental questions e.g. regarding country cover policies. All applications for exports of sensitive goods (e.g. military or nuclear exports) are decided regularly at the political level of the ministries.[255] This committee is composed of representatives from the Ministry of Economy and Technology, the Ministry of Finance, the Ministry for Foreign Affairs and the Ministry for Economic Cooperation and Development. An expert group consisting of delegates from industry and the banking sector acts as an advisory body. Decisions by the IMA are made on a consensus basis, so any of the ministries can block a guarantee. If there is major disagreement within the IMA, the decision will then be discussed by the cabinet. The cabinet decides issues by majority voting.

The only guiding principles for a decision are the economic efficiency and merit of an export. An application is judged as economically efficient if the chances of the buyer being capable of paying for the goods are considerably high. The merit of an export leaves room for political influence on a Hermes decision. Employment effects of an export or the diplomatic relationship with the recipient country are taken into account. An export is deemed not worth covering if it conflicts with

fundamental German interests. Whatsoever, no binding minimum environmental or social standards or exclusion criteria exist at any point of the decision making procedure.

Parliamentary influence on government export credit guarantees is very limited. The annual parliamentary ballot on the general federal budget is the only regular legislative contact with Hermes. In this the German Bundestag votes on the whole budget for the next year – including the Hermes portfolio. Any opposition to Hermes could only take the form of an overall veto of the whole annual budget. In serious cases like K2R4 the Bundestag can express its opposition to a specific Hermes guarantee. By passing a motion prior to the IMA decision the government can be asked to withdraw support from a particular project. Although this motion is not legally binding the government is likely to follow such parliamentary advice. However, this is a harsh form of parliamentary criticism and would only be used by the parliamentary majority as an exceptional tool. The lack of transparency within Hermes also devalues this parliamentary option, because in most cases information is simply not available prior to an IMA decision.

Hermes Reform

In their coalition treaty the SPD and the Greens agreed to reform Hermes by integrating social and environmental standards. A parliamentary group with representatives from both parties has negotiated this with the Ministry of Economy over the past two years. In April 2001 they agreed upon a joint paper. These guidelines fall far short of the initial targets. Furthermore, the new rules do not have a binding character at all, they will only apply for exports larger than €15 million. To regulate the financial support for nuclear exports they used the following phrase:

"Excluded from the export promotion are nuclear technologies for new constructions or for the conversions of nuclear sites. Measures and equipment that is needed for decommissioning or for improvements of safety standards can be supported in individual cases, as long as it is not concerning nuclear technologies."

The whole text is formulated in a very vague manner. No minimum binding safety standards are mentioned. Nor is there any definition of what is meant by 'nuclear technologies' or clarification of the status of exports for partly built reactors. From this text it cannot be foreseen if, or what, exports to nuclear power plants will occur.

Information policy

There is almost no transparency in the German ECA at all. No project specific information is published, either before or after a decision is taken. Hermes' annual report only gives general economic trends and lending figures of the past year on a regional basis. Global annual trends are broken down only to regions and rough sectoral categories. Only the biggest recipient countries are listed in any detail. There is no information on individual guarantees.

The information policy towards the parliament is also rather strict. Since 1977 the budgetary committee of the Bundestag has only been informed about projects of 'fundamental significance' after IMA approval of an application. The Ministry of Finance lists the exported goods, the recipient country, the importing company, the project volume guaranteed for and the current status of the export. No information about the exporter or any banks involved is given.

The only information available on Hermes' decisions before they are made is leaked information. This happened last year when it became public that three nuclear projects were covered by Hermes.

Examples

Hermes' information policy allows only a fragmentary insight into its nuclear lending record and the lending policies of the current government. However, it is possible to speculate about which projects may have received Hermes guarantees. Siemens have only constructed a few reactors outside Germany. Those in Switzerland, in the Netherlands and in Spain, are not obvious candidates for a Hermes guarantee. However, the export of reactors and parts to Argentina (Atucha-1 & -2) and to Brazil (Angra-2 & -3) were much more likely to have needed a Hermes guarantee. It is also plausible that Hermes guaranteed Siemens' involvement in the early phase of the Iranian Busher plant. There has not been a Hermes guarantee for the construction of a new nuclear reactor for over 20 years, although Hermes has still guaranteed shipments of nuclear components in that time.

Busher

On July 4th 1976 Germany and Iran signed a co-operation treaty on the civilian use of nuclear technology. One year later the German Government approved a Hermes guarantee for the Siemens involvement to build a 1300 MW PWR reactor at Busher. The German share of the project was expected to cost 1.43DM billion. In 1979 following the revolution in Iran the Treaty was cancelled and the project has never been completed. Furthermore, during the 1980s in the Iran-Iraq war the construction site was partially damaged.

Since then the US Government has attempted to prevent any further nuclear collaboration with Iran, for non-proliferation reasons. This resulted in the collapse of the Iranian nuclear programme and there wasn't any serious attempt to finish Busher until the late 1990's. In 1998 an agreement between Russia and Iran was signed: Russia agreed to complete the Busher project for US$800 million. In 1999 it was reported that Busher-1 was 40% complete[256] and a proposal was put forward for the reactor to be completed in 2002.

In late 2000 the German-Iranian relations began to normalize. As a result there was a strong demand of the German industry to regain parts of its Persian market and Siemens has mentioned its interests in exporting equipment to Busher. Support from the German Government seems unlikely although co-operation treaties and joint ventures between Siemens/KWU and some of the leading Russian power generating companies (LMZ, Electrosila, KTZ, Nuklearkontrol) could become another route for technology transfer.[257]

Angra, Brazil

On June 27th 1975, the governments of Germany and Brazil signed an ambitious agreement to launch a civilian nuclear development plan for Brazil. Brazil ordered 8 new NPPs, a Uranium enrichment plant and a conversion plant from German companies. The German government promised to support these nuclear technology exports. Despite confirmed suspicions that the Brazilian regime was planning to use this technology for military purposes, Siemens began to build Angra 2 in 1976. Brazils second nuclear reactor started operation in October 2000. 25 years after construction started, about 17 years later than scheduled with estimated project costs of US$10 billion this reactor is the only outcome so far of the German-Brazilian agreement.[258] It has to run at least 40 years to pay for its expenses (at least three times more expensive than planned).

The region of Angra proved to be a poor choice for nuclear reactors because of erosion, the danger of earthquakes and corrosive salt water. Nevertheless, plans for another Siemens reactor, Angra-3, went ahead too. A construction pit was excavated and the first parts delivered when President Franco stopped Angra 3 in 1993. By this time many Hermes guarantees for Angra-2 and -3 had been issued, for an overall sum of 4,150DM billion.[259] Now that Angra-2 is operating, the Brazilian company Electronuclear, has to start repaying the loans.

In the past few years, efforts have been made to complete Angra-3. This would require another investment of at least 3DM billion and take 6 years. Due to the current financial situation of Brazil, this is not likely to happen without new Hermes guarantees. An application for new exports for Angra-3 has already been submitted to the IMA.

The German-Brazilian nuclear co-operation treaty, a typical example of 'How not to do technology transfer',[260] will probably never be fulfilled. The chance to end this outdated treaty slipped by recently: both governments can give notice to terminate the treaty every 6 years, and the last opportunity to do so was in 1999. It is unclear why the current German government did not take advantage of it.

Mochovce, Slovakia

Another unfortunate example of a Hermes guarantee for nuclear technology is Mochovce. The Slovakian government planned in the early 90's to complete the partially built reactors Mochovce 1 and 2. To finance the construction of these VVER 440/213 reactors they applied for an EBRD credit. In addition to the standard EBRD criteria (public participation, environmental impact assesment), three more conditions were laid down by the multilateral bank, to justify its involvement in this nuclear project:

1. The nuclear choice needed to be the least cost option.
2. International safety standards needed to be reached.
3. The NPP Bohunice had to be closed as soon as operation at Mochovce started.

After it became clear that Slovakia would not fulfil these requirements, the EBRD pulled out of the project.[261] Surprisingly, in 1996 Siemens signed a contract for the completion of the nuclear reactors in Mochovce, supported by the German government. An application for the export of instrumentation and master controls for the Mochovce reactors accounting for 153 DM million was approved[262] on March 26th 1996. The German government defeated opposition in the Bundestag against this guarantee by declaring

- that Slovakia promised to keep the safety conditions from the EBRD proposal, and
- that Bohunice would be closed down (according to a decision of the Slovakian parliament in 1994) as soon as the reactors Mochovce 1&2 were completed.[263]

The latter looked very unlikely when Siemens later announced its involvement in upgrading Bohunice.

Mochovce is now operating, as are the high risk reactors in Bohunice. The Slovakian government revised its 1994 decision and negotiated new closure dates with the EU of 2006/2008 for these VVER 440/230 reactors. The safety level at Mochovce also remains in question.

So overall, Germany increased the nuclear risk in CEE. The Hermes guarantee allowed Slovakia to complete a project that Germany would avoid on its own territory for economic and safety reasons. By giving a financial commitment it undermined the EBRD conditions.

In March 1999 Siemens applied for an increase of the Hermes guarantee from 1996. This application has not been decided so far, because of the EU-Enlargement negotiations. The current government could still prove its antinuclear credentials by rejecting this application.

Nuclear Projects in 2000

There was a curious occurrence in early March 2000, when a secret list of 17 sensitive Hermes applications became public. 14 of them were nuclear projects and 3 of these had already received IMA approval. In mid-March, the status of the other eleven projects was also discovered (see table 4). Applications without consent were halted for various reasons.

In the month following the publication of the list, a Hermes application of another 300DM millon export to Lingyungang was approved.[264]

Conclusion

"Because of its high safety risks and the danger of vast damages, the use of nuclear energy is irresponsible."[265] Germany therefore decided to phase out its own nuclear energy, but has not applied this finding to its foreign trade policy. For a credible policy the conclusion needs to be reflected in the decision making process of Hermes. The current case by case procedure is not a proper solution. Minimum standards for the approval procedure of Hermes guarantees need to be defined that exclude nuclear projects.

Status of Projects Leaked in March 2000

Recipient country	Nuclear plant	Amount DM mil.	Company	Purpose	Official status May 2000[266]
Argentina	Attucha 1	20	Siemens	Repair	Guaranteed in 2000
Brazil	Angra 3	ca. 1500	Siemens	New reactor	Decision process halted
Bulgaria	Kosloduj 5&6	ca. 125	?	Master control and modernisation	Applicant halted decision process
China	Lianyungang	286	Siemens	Master controls	Guaranteed in 2000
China	Ling Ao	?	?	Inspection and emergency engines	No decision taken so far
Kazakhstan	Aktau	?	?	Waste disposal	Decision process halted because of country profile of recipient
Lithuania	Ignalina	14	Siemens	Cement facility for liquid waste	Guaranteed in 2000
Russia	Novovrnesh	?	?	Heating instalation	Decision process halted because of country profile of recipient
Russia	Kalinin	?	?	Waste deposit	Decision process halted because of country profile of recipient
Russia	Electrosal (fuel fabrication)	?	?	Dry-converting facility	Decision process halted because of country profile of recipient
Slovakia	Mochovce	20-30	Siemens	Follow up of former upgrade	Applicant halted decision process
Turkey	Akkuyu	?	NPI	New reactor	No official application
Ukraine	Chernobyl	?	?	Melting equipment for radioactive waste	Decision process halted because of country profile of recipient
Ukraine	K2/R4	?	Siemens	Completion of partially built reactors	No approval

Italy

Italy is the only G7 country to have rejected nuclear power plants (NPPs) in a 1987 referendum following the Chernobyl nuclear accident in 1986. However, there are still outstanding problems related to nuclear waste management and the decommissioning of NPPs already built.

Italian NPPs

In the mid-60s Italy had the third highest nuclear power capacity in the world after the United States and the United Kingdom. The Italian government completed its first three nuclear power plants —each equipped with only one reactor— at Latina in 1964, at Garigliano in 1964 and at Trino Vercellese in 1965, giving a total installed capacity of 500 MW. In 1977 plans for 20 more nuclear power plants were considered. In 1978 the fourth Italian NPP located at Caorso was connected to the grid.

NPPs operating in Italy until 1987

Latina NPP was the first Italian nuclear reactor to enter into operation: it was a 210 MW Gas Cooled Reactor (GCR) equipped with British technology – the so-called Magnox type reactor. Because of problems with steel resistance during the first years of functioning, plant power capacity was decreased to 160 MW. After the reactor's activities were stopped in 1986, fuel was de-activated in the plant itself, since GCR technology made this kind of operation possible on the site of the reactor, and spent fuel was sent to the BNFL reprocessing nuclear plant at Sellafield, UK.

Garigliano NPP consisted of one 150 MW Boiling Water Reactor (BWR). Corrosion problems in 1978 saw the reactor converted from a dual to direct system. In 1980, the NPP had unexpected structural problems after a strong earthquake hit Southern Italy. Estimated costs for upgrading the existing safety measures of the plant in relation to earthquakes were high, and ENEL —the then state-owned national power utility— decided to stop producing electricity at Garigliano in 1982. In December 1987 all radioactive fuel was transferred to the nuclear manufacturing ENEA plant 'Avogadro' at Saluggia.[267]

Trino Vercellese NPP consisted of a Pressurised Water Reactor with an installed capacity of 250 MW. It stopped producing electricity in March 1987, when it was shut down for re-powering.

Caorso NPP had a maximum net output of 860 MWe. The plant, consisting of a boiling light water cooled and moderated reactor, worked at design capacity for about 10 years when it was shut down in November 1986 in order to allow a reactor recharge.[268]

In addition, in 1987, when all nuclear operations were stopped, more than 70% of construction was completed at the new Alto Lazio NPP, located at Montalto di Castro. All the main components were already manufactured. This NPP was to have comprised two BWR units with net output 2000 MWe.

In the mid 80s, ENEL had also already commissioned work for the construction of unit 1 of the first 'Italian Standard' NPP (2 x 970 MW) at Trino Vercellese (Trino II NPP) under the so called nuclear 'Unified Programme'. The Unified Programme aimed to bring nuclear power generation centrally into the national power system in the long term, also shaping future interventions in the non-nuclear energy sector. For instance, Italy has more than 7.000 MW of installed capacity in pumping systems,[269] that were originally set up for shifting nuclear energy over-production from low-load time overnight to peak hours during the day.

The Nuclear Phase-out in Italy

The Italian nuclear power programme was suddenly curtailed following the Chernobyl tragedy in 1986. On November 8th 1987 65.5% of the Italian people voted in favour of a referendum promoted by environmental associations over the future of nuclear power in Italy. In the referendum, 80% of the voters supported the closure of Italian NPPs and the ending of public funding of nuclear power.[270] The referendum was able only to call for the restriction and freezing of the nuclear programme, namely a 'nuclear protection'. Soon afterwards the Italian government decided to put a five year moratorium on all nuclear activities, including projects, power plants and research reactors.

Following the results of the referendum, on December 12th 1987 the House of Deputies of the Italian Parliament passed a motion calling for the final shut down of Latina and Garigliano NPPs, a halt of any construction work at Trino II, and a freezing of operations at Trino I and Caorso and construction works at Alto Lazio.

The 1988 national energy planning confirmed Italy's abandonment of the nuclear Unified Programme —and therefore the Trino II plant construction— and development of new passive safety reactors.

In February 1989 the Italian Parliament approved a decision made by the Italian government to convert the Alto Lazio plant into a conventional thermal power plant, to be completed by 1998.

In June 1990 the House of Deputies called for the shut down of Caorso and Trino NPPs. The month before, the Senate had also urged the government to clarify the future of the two plants considering

all potential options.[271] The government responded by deciding definitively to ban nuclear power generation in existing plants in Italy. On July 26th 1990 the Cross-ministerial Committee on Economic Planning (CIPE) decided to shut down Caorso and Trino NPPs. ENEL was to be in charge of instituting a passive safety regime in the two plants, and the Industry Minister had to draw up decommissioning plans for both plants.

In January 1991 the Cross-ministerial Committee on Prices (CIP) allowed ENEL to charge power consumers higher costs in order to fund the nuclear decommissioning programme.[272]

However, in the eight years following, the issues of nuclear waste management and decommissioning the Italian NPPs were completely neglected by several governments.

Only in 1998 did Industry Minister Bersani draw up a joint action plan on nuclear issues. It was soon clear to all stakeholders involved in the planning that the main problem was identification of a suitable site for a national nuclear waste storage centre.[273] In October 1998 the first phase of safety operations at Caorso finally started more than 10 years of the reactor being in active safety status, as there was still active fuel present.

In March 1999 the Italian government promulgated the act #79 putting into force the EU directive on the electricity free market. This obliged ENEL to set up a new company in charge of decommissioning the Italian NPPs and managing nuclear waste. SoGIN Co. was established in July 1999 to work on the four existing Italian NPPs. It also received funding accumulated by ENEL over the past few years for decommissioning purposes and 600 staff who had previously worked for ENEL-SGN.

In November 1999 a final agreement between the government and ENEL was reached to implement an 'accelerated decommissioning' of the NPPs, instead of a 'delayed decommissioning' as supported until then by ENEL. It has been calculated that more than US$2 billion have been spent since 1987 to keep the Italian NPPs at stand-by.[274] It is estimated that a further US$ 3.5 billion over the next 20 years will be necessary to implement an accelerated decommissioning and to manage the waste that will be produced during decommissioning.[275]

By January 2000, only the nuclear reactor of the Caorso NPP had been definitively deactivated. The Italian government has yet to decide where the 200 tonnes of spent uranium produced by the reactor can be stored.[276] In August 2000 SoGIN officially started decommissioning operations on the four NPPs to be completed by 2020.[277]

In 2000 the Parliamentary Committee on waste adopted a resolution for the establishment of an agency to be in charge of the construction and management of a national nuclear waste storage centre and the co-ordination of nuclear decommissioning operations in Italy.[278]

Nuclear waste in Italy now amounts to 24,500 cubic meters with 285 tonnes of active fuel still to be treated. It has been calculated that decommissioning activities will produce a further 100,000-150,000 cubic meters of nuclear waste.[279] 6,000 more cubic metres of concrete-stocked waste, sent from Garigliano, Trino and Latina NPPs, are due to come back from the nuclear processing plant at Sellafield, UK. In July 1996 Greenpeace strongly opposed the transfer of further nuclear waste from Trino I to Sellafield and managed to convince the local administration to block such operations.

The Italian Nuclear System

At the time of the nuclear referendum the Italian nuclear system, as in many industrialised countries, consisted of the National state-owned power utility, ENEL, (recently privatised), the nuclear safety authority, ENEA Disp (transformed in 1994 by the government into the national environment protection agency, ANPA), the nuclear industry and some research centers (including ENEA, still state-controlled, and some universities). During the implementation of the nuclear moratorium all these entities remained active in their operations abroad.

ENEL[280]

Under the governmental act following the 1987 referendum ENEL kept in operation all its personnel working at the four existing NPPs, and an expert group on light water nuclear reactor technology to research and develop passive safety reactors in the framework of international cooperation and operations abroad.

ENEL participated in the international initiative for the alignment of safety standards for new nuclear reactors in European countries, including Russia.

It gave technical assistance to the national Mexican Utility at the Laguna Verde NPP. ENEL experts were also consultants for the PHARE (Poland Hungary Assistance for Reconstruction) and TACIS (Technical Assistance to the Commowealth of Independent States) programmes. Under these programmes ENEL was awarded some contracts to give assistance at the site at Kalinin, South Ucraine, Beloyask.

ENEL participated in the re-engineering of the electric system at the Bilibino NPP, Russia, and the Medzamor, Armenia (in the latter case leading a consortium with Tractebel of Belgium and RWE of Germany).

ENEL has also been quite active in decommissioning NPPs. Through its Nuclear Management Division (ENEL-SGN), it bid with Nucleco for projects promoted in Eastern Europe and for the rehabilitation of the Chernobyl site funded by EBRD. ENEL is also considering the possibility of joining GNB, Germany, and other partners in waste management.

In 1999 the privatisation process of ENEL started. Although it has become a mostly private-controlled company, ENEL is still extremely influential in state-run energy policy and network management in Italy.

ENEA[281]

After 1987 ENEA continued its research programme on safety technology for nuclear reactors on an international level. Under the EU programme for improving the safety of NPPs in Eastern European countries, ENEA participated jointly with ANPA on some projects related to the TACIS and PHARE programmes concerning VVER reactors. ENEA co-operated with Russian authorities in a technical review of the Chernobyl accident. Furthermore ENEA worked with VUJE from Slovak Republic and HDEC from Hungary to improve safety standards on VVER reactors. It also contributed to the G24 database from the Nuclear Safety Account Committee.

ANPA[282]

ANPA is quite active internationally in several activities concerning NPP safety, nuclear waste management and NPP decommissioning. It also joined the EU initiative aimed at defining safety standards for future European nuclear reactors.

ANPA participates in EU, EBRD and IAEA projects, mainly in operations implemented under the PHARE and TACIS programmes as a member of international consortiums.

As part of its Regulatory Assistance Management group's activities, ANPA works on safety aspects related to seismicity in neighbouring Slovenia, Romania (where Italian industries are active), Russia and Lithuania. Within its Technical Safety Organization's operations ANPA is active in Russia (waste management), Slovak Republic, Czech Republic, Lithuania, Armenia, Hungary and Bulgaria (NPP decommissioning). ANPA has also been very active in decommissioning and waste management operations at Chernobyl and within the Shelter Implementation Plan that is being funded by the G7.

Detailed History of ECA Support for Nuclear Projects

Until the beginning of the 90s Italy had two export credit agencies, Mediocredito Centrale and SACE.

Mediocredito Centrale was founded in 1952 as a state-owned agency for mid-term lending to small and medium enterprises operating abroad. Under the 1977 Ossola Act, Mediocredito Centrale took charge of export credit operations. In particular the agency could concede supply credits to Italian companies involved in operations abroad or buyer credits for Italian or foreign banks involved in operations abroad with foreign companies. Under the OECD agreements on trade, special procedures for nuclear component supplies were adopted. Mediocredito Centrale also managed bilateral ODA funds. Over the last few years Mediocredito Centrale was privatised and became part of the Italian banking group Banca di Roma, basically becoming a merchant bank.

SACE, originally *Sezione Speciale per l'Assicurazione del Credito all'esportazione*, was established at the end of 70s to provide investment insurance to private investors operating abroad and guarantees for the operations of Italian companies involved in projects abroad.

In 1990 the Italian government created a new agency: SIMEST, *Società Italiana per le Imprese all'Estero* with a mission quite similar to that of Mediocredito Centrale, and partially intended to replace it. SIMEST is 76 per cent controlled by the state. It also helps Italian companies to participate directly in foreign corporations. Compared with SACE, SIMEST has a smaller portfolio.

A 1998 act transformed SACE into the *Istituto per i Servizi Assicurativi del Commercio con l'Estero*. SACE has been put under direct control of the Treasury Ministry, with the head of the Treasury Ministry as President and the head of the Foreign Trade Ministry as Vice-President. SACE's board is the V Committee on foreign trade policy (named *Cabina di Regia*) of the Cross-ministerial Committee for Economic Planning (CIPE). It is headed by the Foreign Trade Minister and includes the Ministers of Treasury, Industry, Foreign Affairs and Agriculture.

SACE's activities are concerned with Italian companies and Italian foreign banks. It can issue guarantees for supply, project-based and investment activities of Italian companies operating abroad. SACE can also give insurance on credits and investments by Italian private banks and foreign public and private banks in operations abroad in which Italian companies are involved with supply and project-based exporting activities.

Under its new mission SACE is experiencing an enormous expansion of its operations and portfolio. In 2001 SACE will benefit from an increased budget of US$5 billion and US$4 billion has already been committed for 2002.

Italian ECAs have not been active in supporting the nuclear industry in foreign operations. During the 70s and 80s the nuclear industry was focused on domestic operations. The national power system was completely controlled by the state-owned utility that was also the commissioning body of nuclear activities by public and private nuclear companies. Most contractors were state-controlled as well. While the new nuclear Unified Programme was being considered, the Italian industry became more interested in potential activities abroad. The phase out process triggered by the 1987 referendum encouraged the Italian nuclear industry to look at foreign markets for its survival.

The role of Italian ECAs in potential long-term nuclear investments in countries that are commercially and politically risky has now become extremely important for the Italian nuclear industry's operations abroad.

Furthermore, commitments signed during the '90s between EU and accession countries to shut down some old and unsafe Russian-type nuclear reactors in Bulgaria, Lithuania and Slovakia are providing new opportunities for Italian nuclear companies to invest in central and Eastern European countries. Proponents of CANDU technology, which includes Ansaldo Nucleare, depict it as one of the safest types of nuclear reactor. Western countries could find it useful to shift nuclear power production to Eastern Europe and import this new and cheaper electricity. The long partnership between Ansaldo and Atomic Energy of Canada Limited (AECL) on CANDU technology export could potentially put the Italian company in the forefront of investment in new or re-powered NPPs in CEE counties and elsewhere. Ansaldo is still state-owned. Privatisation of the company was scheduled by 2000 and then delayed. The eventual privatisation could generate more requests for guarantees and credits to Italian ECAs in order to minimize the risks in running BOT (Build Operate Transfer) or BOOT (Build-Operate-Own-and-Transfer) nuclear projects in Eastern Europe in the future.

An Eye on SACE Campaign collected information about NPP construction and main nuclear engineering and technical assistance operations. Italian ECAs have been involved in only one case, the Cernavoda NPP project in Romania.

Project: Cernavoda 1
Amount: US$150 million
Company: Ansaldo Nucleare
Object: balance of the plant
Deal Signed: 1991
Other Companies: AECL, RENEL, GE

The Cernavoda case: exporting risks, importing energy

The case of Cernavoda is the first example of the export of a Western-designed nuclear power plant to an Eastern European country.

Romania and Canada agreed in 1977 to cooperate on atomic energy, and the CANDU-6 design was chosen as Romania's basic plant. About 15-20 CANDU reactors were planned in the long term. AECL, the Canadian state-owned corporation, that develops, designs and markets CANDU power reactors, has always depicted this technology as innovative compared to others. The Romanian

government was soon attracted by the possibility of building CANDU nuclear power stations that seemed to offer opportunities for Romania to be self reliant in the nuclear sector (in terms of uranium and heavy water needs). However, true self-sufficiency would require a waste disposal strategy. At present, this involves interim storage at the reactor site followed by permanent disposal,[283] although no details about this permanent waste disposal are available.[284]

Cernavoda NPP, Romania

Source: www.ansaldo.it

Cernavoda 1

In 1979 agreement was reached between the Romanian government and AECL and Ansaldo of Italy for the planned five-unit CANDU-6 station at Cernavoda. Each unit was to have a net capacity of 620 MWe (700 MW gross installed capacity).[285] In 1981 Ansaldo was awarded the contract for the balance of the plant.[286] Construction works at Cernavoda started in 1984, but the project soon suffered from delays. There were quality problems with components manufactured in Romania, from inadequate project management and faulty construction. Adding to the scandal, reportedly forced labour (the so-called 'black battalions' of conscripted labour) was used in the construction of Cernavoda, apparently with the knowledge of the construction companies.[287] Difficulties in political decisions and instability in the country, which led to the revolution in 1989, caused further delays. In the last years of his reign, Ceaucescu decided to end all foreign debt and repaid all foreign loans, thus stopping work at the plant.[288]

Nevertheless, an estimated US$10 billion was spent on the nuclear program in Romania in the 80s.[289] This massive investment resulted in only one operating reactor at the end of 1996, the first reactor at Cernavoda, which represents less than 4% of the country's total installed electrical capacity.

Under the new democratic government an attempt was made to complete and commission the Cernavoda unit 1. In September 1991, the Canadian government announced a new agreement to form the AECL/Ansaldo Consortium (AAC), a joint venture located in Genoa, Italy. The consortium was responsible for finding financing; by then, the cost of this reactor was about US$1 billion. The salvage package included a loan of $315 million (Cdn) through the Canadian EDC, the takeover of project management by AECL and Nuclear Construction Managers, and the provision of services and components from other Canadian companies.[290] The other partners in the consortium included Ansaldo of Italy (balance of plant), and the newly established Romanian Electricity Authority, RENEL.

The Italians came up with US$135 million in funding through the Mediocredito Centrale,[291] and the Romanians were to provide US$100 million.[292 293 294]

This time construction works at Cernavoda progressed approximately as scheduled Work resumed at the site in mid-January 1996, since the Romanians reassured Canada and Italy that they could repay the current billion dollar debt and come up with the further US$100 million needed to link unit-1 to the grid.[295] The Cernavoda 1 reactor reached criticality in April 1996 and went into operation on December 2nd 1996, about 20 years after the first agreement between Canada and Romania was signed.[296] The final cost of the first CANDU reactor at Cernavoda was an estimated US$2.2 billion.[297] This unit is expected to produce 4.2 TWh, about 8% of the overall power production in Romania.[298]

Cernavoda 2

Completion of Cernavoda 2 is the second step in Romania's nuclear power programme. About 25% of the basic work on the reactor Cernavoda 2 has been completed.[299] In March 1998, the Romanian utility CONEL (then called RENEL) reached agreement with Credit Suisse First Boston to get the estimated US$750 million needed to complete Cernavoda 2.[300]

On April 27th 1998 a consortium headed by the Canadian company AECL with Ansaldo had been awarded a contract worth US$142 million by RENEL to continue work on Cernavoda 2. The contract was to be financed by RENEL funds (US$40million),[301] bank loans and loans from export credit agencies. A long-term contract with full financing to complete Cernavoda unit 2 was expected to be available before the end of this interim contract's nine-month period.

On May 25th 1998, Romanian President Emil Constantinescu complained to the Canadian government about the strict conditions attached to Western loans. Referring to the total completion package for Cernavoda-2, the Romanian President requested a longer payback period and a four-year holiday before re-payments started and complained about the 100% guarantee requested on loans.[302 303] However, under the terms of the Consensus Agreement of the Organization for Economic Cooperation and Development (OECD) Western countries are forbidden to offer concessionary loans in order to promote the sale of nuclear power plants.

In addition, because of Romania's weak financial position and slow movement on market reforms, the International Monetary Fund (IMF) has put a constraint on Romania against taking large foreign loans, such as would be required to complete Cernavoda-2.[304] In 1998 the IMF suspended its last US$410 million standby credit after accusing the government of falling short of targets. The country then suffered downgrades by international rating agencies, citing both slow reforms and political uncertainty.[305]

On August 5th 1999 the economic situation in Romania improved when the IMF approved an eight-month Stand-By credit for Romania for an amount equivalent to US$547 million to support the government's economic stabilization and reform programme.[306] On June 7th 2000 the Executive Board of IMF reviewed this credit and approved its extension to February 28th 2001.[307] Romania's financial rating by international agencies started improving again.

During his 1999 visit to Canada vice-president Adrian Nastase made it clear that work at Cernavoda Unit 2 could start in September 1999.[308] After meeting AECL and Canadian Foreign Affairs representatives, Nastase stated that *"part of financing of works at Cernavoda Unit II, totalling about US$50 million, could come from EDC of Canada and SACE of Italy"*. SACE has already been contacted by Ansaldo about the construction of Cernavoda second unit. SACE's possible

involvement in the Cernavoda project is clearly confirmed in a letter sent on March 16th 2000, by EDC Chairman Patrick Lavelleon to Mr. Karygiannis which states that *"ANSALDO has approached Mediocredito Centrale and SACE, the Italian export credit agency, for financing support of any Italian participation".* No final decision has yet been taken by SACE, which has never denied its interest in the project.

Work on Cernavoda 2 is continuing and is expected to be completed in 2006. The involvement in the construction of the second unit at Cernavoda NPP would represent a first step for AAC, and in particular for Ansaldo, to be awarded contracts for the construction of the next three units of the plant in the future. Most of the work on these units still needs to be done: Cernavoda 3 is 15% complete, Cernavoda 4 is 5% complete, and Cernavoda 5 is 4% complete. Construction is not currently proceeding on these units because they are still awaiting financing.[309]

Energy Needs in Romania and Export Opportunities

Electricity demand in Romania has sharply decreased from 70.4 TWh in 1987 to 49.6 TWh in 1998 due to the fact that the expected recovery of the post-Ceaucescu Romanian economy has been slowed down by new financial difficulties.

The upgrading of existing capacity and the start-up of Cernavoda 1 in 1996 put Romania for the first time into a position to stop importing energy from neighbouring countries and even to export significant amounts of electricity.[310] It has been reported that Romania now has four times more electrical capacity than it needs,[311] and it is clear that electricity from the Cernavoda-2 reactor is superfluous. Canadian Prime Minister Chrétien has suggested that Italy could buy electricity from Cernavoda-2, but there is no contract and the terms of such a deal have yet to be negotiated.[312]

Relations between Romania and Bulgaria have deteriorated recently in the wake of an ultimatum from the European Commission to Bulgaria to set a schedule for the early closure of the four reactors at its Kozloduy nuclear power plant as a pre-condition for European Union accession talks. Ministers and the media on both sides have chosen trade insults, rather than to work together to find solutions. While Bulgaria views the early closure of the Kozloduy plant as a blow to its economy, Romania is perceived as over eager to exploit the economic opportunities that it believes will ensue.

Since 1999, the Bulgarian media have accused Romania of waging a smear campaign against their country. They have denounced the proposal as a conspiracy by Western companies attempting to enter the regional electricity market. *"Italian and Canadian companies that have put money into Romania's nuclear plant at Cernavoda would like Romania to replace Bulgaria as a Balkan energy supplier"*, said the Sofia daily 24 Casa.

With over-capacity in electricity generation and shrinking domestic energy demand, Romania has pinned its hopes on the Kozloduy shutdown to help it become the leading regional electricity exporter.[313]

Forgotten risks

The Cernavoda NPP is located in an earthquake area. From 1979, three major earthquakes occurred. RENEL has never been informed about the problems that have occurred in other CANDU plants in the world.

The first Romanian power plant has already experienced problems. The first shipment of fuel to Cernavoda had an accident and contaminated a small area.[314] At the beginning of July 2000 during

an extremely hot week the first unit of the nuclear power plant was temporarily turned off when the temperature within the plant reached 70 degrees and triggered the alarm system.[315]

Examples of Nuclear Projects which have been Rejected/Abandoned

The only nuclear project in which SACE was involved that was subsequently abandoned was the highly controversial Akkuyu NPP project in Turkey.

The Akkuyu Case[316]

Following a cabinet meeting in Ankara on July 25th 2000 Turkish Prime Minister Ecevit announced the cancellation of the controversial NPP that was proposed at Akkuyu Bay on Turkey's Mediterranean coast north of Cyprus.

The Akkuyu NPP was opposed for several reasons, including the risk of earthquakes at the site and the possibility that it would contribute to nuclear weapons development.

Some of Turkey's most prominent earthquake experts demanded a halt to the nuclear plant until further research was conducted on the Akkuyu area. The Turkish government and the nuclear vendors never considered the real earthquake risk at the Akkuyu site. An earthquake could have been the cause of a catastrophic nuclear accident at Akkuyu, with devastating consequences for the 165 million people in the Eastern Mediterranean region. The Cyprus Parliament strongly protested against the project and there was unprecedented opposition in Turkey as well.

Nuclear power generation has always had the potential to contribute to nuclear weapons proliferation, either through the production of plutonium or through the transfer of sensitive nuclear information, technology and materials. Turkey's nuclear programme would have put political stability in the Middle East at high risk. Turkey's push for its own nuclear fuel capability and indigenous reactor design, both pointed to possible nuclear weapons development. The support of prominent Turkish citizens for nuclear weapons development confirms this.

The decision to cancel the project was a serious shock for the three vendors bidding to build the nuclear plant and a major setback for the international nuclear industry. Canada's AECL was competing together with Ansaldo against Nuclear Power International, a consortium of the German company Siemens and the French company Framatome, and a partnership of the American-British Westinghouse and the Japanese Mitsubishi. The AECL-Ansaldo consortium offered to equip the NPP with two 700 MW CANDU reactors at a total cost of US$2.572 billion.

The extraordinarily high cost of nuclear power was indirectly the cause of Turkey's decision. In any case, the Akkuyu project financing would have been particularly risky. TEAS, the national Turkish power utility took advantage of the buyer's market for power reactors to demand that the winning consortium should provide 100% of the project financing. Furthermore, in Spring 2000 the Turkish Treasury department refused to provide a sovereign financial guarantee for the loans being made by vendor country governments for the NPP. Surprisingly Westinghouse and AECL offered to proceed without a sovereign guarantee. Hermes from Germany was the only ECA to state that it was no longer interested in giving financial support to the French-German consortium.[317]

Ansaldo never reacted publicly to the cancellation of the project. At the beginning of 2000, An Eye

on SACE Campaign asked SACE for clarification about SACE's interest in the project. SACE never replied to the request.

Main Companies Involved with Nuclear Exports

The nuclear industry in Italy has consisted of a few large state-owned companies. The national power utility, ENEL, which has recently been privatised, commissioned most nuclear power plants and operations in Italy in the past. The main industrial group involved in nuclear activities has been Ansaldo, which is still controlled by the State, since plans for its privatisation have experienced delays and internal difficulties.

Ansaldo Nucleare

The Ansaldo Group of Italy is one of the world's leading integrated electromechanical engineering groups. The Finmeccanica Group, which incorporated the Ansaldo Group, is the last group of the state-owned "IRI" industrial umbrella group in Italy to be privatised. Finmeccanica/Ansaldo operates mainly in the industry, transport and energy sectors, in the latter through the Ansaldo Energia company. The nuclear department of Ansaldo Energia, Ansaldo Nucleare, works on the research of passive safety reactors and construction and assistance operations in NPPs abroad. Sopren, a 90% Ansaldo-controlled company, is involved in the engineering of nuclear reactors.[318]

In 1967 Ansaldo Meccanico Nucleare obtained a General Electric licence for BWRs, while in 1974 NIRA S.p.A. obtained a CEA licence for the fast Breeder reactor (FBRs). Ansaldo Meccanico Nucleare and NIRA S.p.A. subsequently merged to form the Ansaldo Nucleare department of Ansaldo Energia.[319] In 1980 Sopren S.p.A. obtained a Westinghouse licence for Pressurized Water Reactors (PWRs).

After the 1987 decision for a nuclear phase-out, Ansaldo Energia continued to invest in its nuclear department, Ansaldo Nucleare. Ansaldo Nucleare currently employs about 350 people, 200 of whom work in the Ansaldo Nuclear Division dealing with nuclear system and component engineering and the rest in component manufacturing. The latter incorporated the former Breda Termomeccanica Company, which had wide experience in the field of nuclear technology and components.[320]

Under the privatisation of the whole Finmeccanica Group, scheduled by the end of 2000 but delayed by the Italian government, it is likely that the Ansaldo group will be divided and sold to different, mostly foreign, companies, who have reportedly already shown interest. The trade unions active in Ansaldo Nucleare have also requested meetings with Ansaldo's management and the Industry ministry to discuss strategic plans for the future. At present, Ansaldo Nucleare continues to be 100% state-owned controlled and no official take-over offers have yet been made by other companies.[321]

Operations in Italy[322]

Ansaldo Nucleare has been a leading company in the engineering, construction, and component manufacturing for NPPs from the 60s to 80s.

In joint ventures with General Electric, Ansaldo supplied turnkeys for Caorso NPP and the uncompleted Alto Lazio NPP.

Under a contract from ENEL, it also developed a reference design for the system to be employed in the Italian Standard Nuclear Power Station (2x970 MW). In 1986, ENEL awarded Ansaldo the

contract to supply the first unit of the NPP to be built near the existing Trino Plant. The project was halted after the 1987 referendum.

Ansaldo has also been very active in Italy in nuclear research and development, through construction, waste management and decommissioning, which extended after the 1987 nuclear moratorium.

Ansaldo was the architect engineer, main contractor and project manager for the PEC plant (120 MW) at Brasimone, Italy. PEC was built to test the fuel elements designed in cooperation with European Research organizations for the LMFBR Creys-Malville Plant. The construction was again interrupted by the 1987 moratorium.

Ansaldo was the main contractor for the Nuclear Island of the Cirene demonstration plant for Enea and Enel located in Latina. Work was completed up to the start-up phase before being interrupted in 1987. Subsequently, in 1994 Ansaldo completed a supply contract to the EEC for the decommissioning of nuclear installations, which included work in Latina.

In 1995 Ansaldo signed a construction contract with ENEL for the design, construction and testing of improved air locks for future NPPs.

The same year, Ansaldo signed an engineering contract under the Italian Genesi Consortium (Ansaldo, leading partner, and Fiat Avio SpA, established in 1990) with ENEL for the preliminary design and licensing of a spent fuel dry storage, the selection of the most suitable technology, and the selection of adequate sites where to locate it.

Regarding waste management, Ansaldo worked at the ENEA liquid waste management plant in Cora together with SGN, Nucleco and Techint. It has also been commissioned by the EEC to implement liquid waste storage operations at the ISPRA plant jointly with SGN and Sogedec.

Ansaldo was also commissioned by SoGIN to conduct some decommisioning studies on the Caorso NPP.

Operations abroad[323]

Ansaldo Nucleare has been quite involved in nuclear operations abroad over the last 15 years either by participating in companies and consortiums constructing NPPs or by providing assistance to nuclear operations. After the moratorium on nuclear activities was imposed in 1987, Ansaldo Nucleare became more active in foreign operations, and now has its own representatives in Bucharest, Paris, New Providence and Moscow.

NPP Construction Projects

Ansaldo Nucleare is gaining new opportunities for investments through the completion and building of new NPPs in Central and Eastern Europe and South-East Asia.

As detailed earlier, Ansaldo formed part of the consortium that built the Cernavoda Plant in Romania, which was connected to the grid in July 1996. Ansaldo, in co-operation with AECL and ITALIMPIANTI, was also awarded a contract by CNEA to build the 650 MW PHWR (Candu) Reactor of the NPP in Embalse, Argentina that was connected to the grid in 1983.

Apart from the completion of Cernavoda Unit 2 (see earlier), Ansaldo Nucleare is also participating in international bidding for work on two W-AP 600MW reactors for re-powering the Paks NPP in Hungary. It also took part in the bidding for the two CANDU 600 reactors Akkuyu NPP in Turkey

before the Turkish government cancelled the process (see earlier). Ansaldo Nucleare has also expressed interest in new plants to be built in South-East Asia.

Engineering and Technical Assistance

Between 1983 and 1994, Ansaldo received supply contracts from Batan, the R&D National Agency of Indonesia, concerning the design, manufacture and supply of tools and experimental laboratories.

In 1985 Ansaldo received service contracts from the Novatome Nira Service Consortium (NSS, of which Finmeccanica owns 40%) for assistance in operations on Superphenix Unit 1 Fast Breeding Reactor at Creys-Malville, France, a 1200 MW Sodium Cooled Fast Breeder Reactor. Ansaldo was in charge of 30% of the plant assembling activities and provided 35% of the station components in a joint venture with the Italian industries Tosi, Fiat and Belleli. First criticality was achieved in September 1985 and the plant was connected to the grid in 1986. Since 1989, NSS has been contracted to work on safe shutdown operations at the plant.

In Central and Eastern Europe Ansaldo Nuclear Division has been awarded contracts by national utilities to provide equipment and engineering services and to participate in projects under the EU TACIS and PHARE programmes. From 1993, engineering and technical assistance contracts were awarded to Ansaldo directly or through the European Nuclear Assistance Consortium (of which Ansaldo holds 13.5%) to upgrade VVER technology plants.

In 1993 Ansaldo completed a supply contract to Ganz Machinery and Energy Co. Ltd. Budapest for the design, manufacture and testing of the control system for the Temelin NPP Units 1 and 2 (VVER 1000) fuel handling machines.

In 1994 and 1995 Ansaldo won supply contracts to NEK (Bulgarian National Utility) under the auspices of the EBRD Nuclear Safety Account Programme for the Kozloduy NPP. In 1995 it signed an engineering and supply contract with the Bulgarian Natsionalna Elektrichesa Kompania to upgrade two fuel handling machines of Kozloduy NPP.

Nuclear Manufacturing

Ansaldo is active in nuclear components manufacturing too. It provided components for steam generators and spent fuel casks in Europe and USA and more recently was awarded two contracts to replace Westinghouse and ABB steam generators.

Recently Ansaldo has produced components for the Superphenix plant (France), the Ringhals (Sweden), the Asco and Almaraz plants (Spain), the Bennan project (Germany), and the Point Beach - 2 and Shearon Harris plants (USA).

In 1991 and 1994 Ansaldo signed construction contracts with ENEA and Westinghouse Electric Corporation to design and implement test equipment for the AP600 reactor.

ANSALDO has also consolidated its success in the replacement of steam generators, supplying generators or their components for the Palo Verde Nuclear Generating Station in Arizona, USA in 1999, and earlier for the Kewaunee NPP, Wisconsin USA, and the Krsko NPP in Slovenia.

Waste Management and Decommissioning

Regarding nuclear waste management and decommissioning activities Ansaldo Nucleare has expressed strong interest in operations in Ukraine as a first step to enter the Eastern European

market. Ansaldo is already involved with SGN and Belgatom in liquid waste handling operations at Chernobyl under the TACIS programmeme. Recently Ansaldo Nucleare was awarded a contract to supply handling equipment for a dry deposit at Wlissingen in the Netherlands, based on research carried out by Ansaldo Nucleare and commissioned by ENEL, ENEA and JRC.

Development of Advanced Reactors

In 1990 Ansaldo was awarded a supply contract by Euratom-Ispra JRC for the design, manufacture and commissioning of devices for the NET and ITER experimental fusion reactors.

Ansaldo is also very active in research and development of new types of fissile nuclear reactors. As part of the Genesi Consortium, Ansaldo signed contracts in 1991 and 1992 for design work, performance analysis and component design and manufacture for future Italian passive plants, including joint work with Westinghouse and General Electric in the development of the AP600 and SBWR designs and their certification by US NRC. Ansaldo is involved in the European Passive Plant research programme too. Finally and most importantly, in 1993 Ansaldo signed an engineering contract with Westinghouse Electric Corporation for the detailed design (First-of-a-Kind-Engineering) of the AP600.

Decision Making Mechanism for Awarding ECA Loans or Credit Guarantees

SACE management is in charge of the assessment of the economic and financial feasibility of any request for guarantees and investment insurances made by companies or private banks. SACE has to take the final decision about its yearly maximum financial exposure per country and specific procedures to be taken, usually based on international financial ratings.

If operations to be approved by SACE have political implications beyond SACE's remit, the board must give a specific political approval. This is what happened in 1999 in the case of a guarantee, still to be conceded, requested by an Italian company contracted for the construction of the controversial Ilisu Dam in Turkish Kurdistan.

Transparency

SACE does not make any information on specific operations available prior to their final decision on them. SACE, in common with many export credit agencies, has always cited the necessity of maintaining commercial confidentiality on such information in order to protect the competitiveness of companies that request SACE's financial support.

New environmental guidelines recently adopted by SACE do not consider the possibility of making such information available before projects are approved. Nevertheless the new guidelines commit SACE to develop a specific information policy by the end of 2001.

SACE does not routinely issue information after a project is approved. It is still unclear, according to the new environmental guidelines, what kind of information will be made available after approval and during projects' implementation. It is likely that SACE will still argue the need to withhold such sensitive information on the basis of protecting free competition.

Accountability to the Parliament

Every year, the Treasury Minister has to publish the annual report on SACE's activities. The annual report and the associated financial report do not provide any information on specific projects or activities supported by SACE.

In July 2000 the Italian Parliament approved an act for the relief of foreign debt that highly indebted poor countries owe to Italy. Since part of these debts was accumulated through SACE's operations, this will require a more detailed annual report from SACE in the future.

Opportunities for Public Participation or Environmental Impact Assessments

Environmental Guidelines

Last year SACE and SIMEST contracted an Italian private consulting firm, Golder Associates Geoanalysis S.r.l., to develop environmental guidelines for their operations. The SACE board approved the framework paper by Golder on January 24th 2001.[324] [325]

These new environmental guidelines should draw upon a draft agreement reached within the OECD Working Party on Export Credit and Credit Guarantee in the last months. In particular the new guidelines should be based on a 'benchmarking approach'. According to the document SACE will have its own Environment Unit —consisting of two staff— by the end of 2001. Their work will be overseen by the Environment Committee (yet to be established) that should also include external experts; it is still unclear whether the Environment Ministry will be part of it.

From January 1st 2001, every company or bank approaching SACE for financial support for a foreign project has to complete an environmental questionnaire. SACE then screens the responses on the basis of several criteria dealing with the industrial sector and location of the project. SACE has adopted the EBRD exclusion list, which will exclude support for the trade of raw and processed nuclear material and radioactive waste. As regards energy generation using nuclear fuels, it is still unclear whether this exclusion list will only allow funding for the completion of NPPs or extend it to building new NPPs.

For operations taking place in OECD countries, no further environmental assessment is requested by SACE, although some OECD countries have still not adopted high or binding environmental standards.

The initial environmental screening of projects aims to classify them into one of three categories on the basis of the need for further environmental studies. Such studies could be a more specific environmental questionnaire or a full environmental impact assessment (EIA) whenever projects affect protected areas or are assessed to be at risk according to the EU legislation on EIAs. Relevant environmental information should include the location, use of the land, environmental quality, industrial process, potential environmental impact, scale of impact and mitigation measures. The accuracy of such information will vary from case to case. The benchmarking approach will compare this with a chosen environmental standard, e.g. the EU, host country, MDBs, or the exporter's country. On the basis of such comparisons, potential mitigating actions will be defined.

If a full EIA is requested, then SACE will also initiate further environmental monitoring by requiring the company/bank to complete specific monitoring questionnaires on a regular basis. However, SACE will not itself implement any monitoring in the field.

Consultation and Access to Information Policies

After SACE's board approved the framework paper on environmental guidelines, both SACE and the Foreign Trade Ministry started a consultation process with all stakeholders, including NGOs, Unions and the private sector, and made public the document for comments.

The approach followed in the document does not consider the need for a specific policy for consultation on environmental matters with appropriate stakeholders, apart from private corporations or banks involved in SACE's operations.

Regarding the access to information regarding projects in the pipeline or supported by SACE, the paper just mentions that SACE should elaborate a general 'communication policy' by the end of 2001. So far no NGO or trade union have ever been consulted or allowed access to SACE's files about specific controversial projects that have or could have critical environmental, social and labour impacts.

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Japan

Japan's nuclear power industry is comprised of five groups, each of which corresponds to one of the old financial cliques (zaibatsu) dismantled following the Second World War. The groups were formed between 1955 and 1958 when the United States offered Japan assistance in nuclear power development. One could say that nuclear power provided the thrust that breathed new life into the old zaibatsu.

Of the five groups, those involved heavily in commercial nuclear power are the Toshiba/Mitsui Group of the former Mitsui Zaibatsu, the Tokyo Atomic Group (Hitachi Group) and the Mitsubishi Group of the former Mitsubishi Zaibatsu. The first two groups are working on Boiling Water Reactors (BWRs) through a technology alliance with America's General Electric Co.(GE), while Mitsubishi is working on Pressurised Water Reactors (PWRs) through a tie-up with America's Westinghouse Electric Corp (WH). These partnerships were originally formed for thermal power plants but were later extended to nuclear plants.

This arrangement means the Japanese market is split roughly in half between BWRs and PWRs, with BWRs being slightly more common, thus giving a distribution of core types that is internationally unusual. (Taiwan also has more BWRs than PWRs.)

Japan's first commercial reactor, Tokai I (166MW), was a gas-cooled reactor (GCR). The reactor, which was imported from General Electric Co. Ltd. (GEC) of the U.K. began operation in 1966. It stopped in 1998, as it had become very costly to operate and it was too expensive to build any more GCRs. Tokai I was the only GCR built in Japan. All subsequent commercial reactors built have been light-water reactors (LWRs). Between 1970 and 1997, 28 BWRs and 23 PWRs started operation in Japan. There are 4 BWRs currently under construction, but no PWRs. Mitsubishi is building 23 of these reactors, Toshiba 20 and Hitachi 12 (which includes reactors built with the U.S. manufacturer as the major contractor, or built jointly with a U.S. manufacturer.)

For the construction of Tokai I, 38% of the entire construction cost (17.4 billion yen) was obtained through loans from GEC and UKAEA (UK Atomic Energy Authority). For the construction of Tokai II, 35% of the entire construction cost (32 billion yen) was obtained through loans from the Export-Import Bank of U.S.A (Exlm), and U.S. commercial banks. For the construction of Tsuruga 1 reactor, 39% (14.8 billion yen) was obtained through loans from Exlm and GE. Loans from Exlm, WH and U.S. commercial banks were also made for 38% of the construction of Mihama 1 and 2 reactors (total cost 29.4 billion yen), 23% of Takahama 1 and 2 (total 30.5 billion yen) and 21% of Ohi 1 and 2 (43.7 billion yen). Loans from Exlm, GE, and commercial banks were extended for 36% of the construction of Fukushima 1 and 2 (42 billion yen) and 46% of Fukushima 6 (38.3 billion yen).

History of the Exportation of Nuclear Power Plant Materials and Equipment

Japanese manufacturers have been exporting a large amount of materials and equipment for nuclear power plants. Large-scale equipment exported has included reactor pressure vessels, reactor containment facilities, steam generators, and turbine/generators. However, no Japanese manufacturer has operated as the main contractor, but only supplied items to foreign main contractors. In the case of the Lungmen nuclear plant (Advanced BWR, 1350MW x 2 reactors) in Taiwan, Hitachi and Toshiba are the manufacturers of the reactor system, making them the main contractors on a practical level, although GE of the U.S. is the main contractor formally.

Japanese manufacturers prefer working as subcontractors because there is a better chance of recovering their investment, and they are not obliged to provide services like fuel supply and reprocessing. There have also been suggestions that Japanese manufacturers are simply not capable of developing new systems.

Some Japanese manufacturers have tried to take on a greater role in exporting nuclear power plants. From the 70s, the idea of Japan acting as an exporter of nuclear plants was repeatedly voiced, though then very far from reality. It was not until the latter half of the 80s, when the number of domestic orders began to decline, that manufacturers began to accept orders from foreign countries. In the 90s, the number of domestic orders decreased even further, and manufacturers became more interested in exportation.

In March 1992, Mitsubishi Heavy Industries canceled a technical contract with WH, which required Mitsubishi to pay a fee for using the technology introduced by WH. To replace the old contract, a cross license contract was drawn up between the two firms, accelerating Mitsubishi's attempts to increase their role in nuclear projects.

Despite this, Mitsubishi and other manufacturers have still not won a bid as a main contractor. The reasons behind this are said to be that their costs are too high, there have been difficulties in meeting the conditions required by the Japanese government for such exports and the electric power companies have been unco-operative. In previous projects in which manufacturers worked as the subcontractor, projected costs have been high compared to those of rival countries, although still the minimum manufacturers would require to break even. Even though the costs of building a plant abroad were also considerably lower than building one within Japan, manufacturers could in the past afford to take the order because the loss would be offset by domestic sales. However, since domestic orders have declined, and domestic clients are also pressing for lower prices, it is becoming harder to cover the loss generated by export projects.

Manufacturers complain that government regulations on exporting nuclear power related materials are preventing them from making more attractive offers to foreign clients. As Japan is a member of the Supply Control on Related Equipments and Materials of Nuclear Weapons, the government requires the importing country to accept the conclusion of the Treaty on Non-Proliferation of Nuclear Weapons (NPT) and full scope safeguards. As security to this agreement, the government requires a bilateral nuclear agreement, or exchange of a verbal note between Japan and the partner country, and a guarantee on 4 points. Firstly, the usage of materials and equipment must be limited to peaceful and non-explosive purposes. Physical protection measures, and IAEA safeguards, must both be applied. Lastly, in the case of retransfer, the above guarantees must be obtained from the nation receiving the retransfer. Consideration will also be given to whether the government of the

receiving country has concluded the Comprehensive Nuclear Test-Ban Treaty (CTBT).

As conditions required for receiving the trade insurance from the Japanese government and the Japan Bank for International Cooperation's (JBIC) export financial supply, the government calls for *"the security of safety and measures against radioactive waste, and confirmation of the existence of a sufficient consideration toward establishing an appropriate system for handling a situation where a nuclear accident has occurred".* This quote was obtained from two written responses (March 2000):one by the Ministry of International Trade and Industry (MITI, which is now the Ministry of Economy, Trade and Industry or METI), and another by JBIC. Both were responding to an inquiry submitted by Mizuho Fukushima, Upper House member of the Diet, and contained exactly the same lines. Because any JBIC loan is granted under the precondition of obtaining METI's export permission, the final decision depends upon METI.

The screening is based on the two country's statuses regarding various international nuclear treaties, such as the Nuclear Safety Treaty, Convention on Early Notification of a Nuclear Accident, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, Convention on Prevention of Marine Pollution by Waste and Other Matter (London Treaty) and Vienna Convention on Civil Liability for Nuclear Damage or Convention on Third Party Liability in the Field of Nuclear Energy (Paris Convention). METI also calls for the exporting company to provide after-care services, including maintenance and training services.

It is hard to believe that the above mentioned requirements are enough to prevent nuclear proliferation or disaster. Additional requirements for safety assurance, the first since June 1995, were made when the Energy Investigation Committee's Nuclear Power division released a report titled, '*Multilateral Measures for Securing Nuclear Power Safety in Neighboring Asia under International Cooperation'.* It introduced the idea of exporting nuclear plants in *"a complete package containing safety measures".* Manufacturers, however, complain that these prerequisites are *'too strict'* when compared to international standards.

The reality is that the prerequisites may not be strict enough. In the case of a nuclear plant export to Taiwan, for example, the prerequisites were applied very loosely. Approval was given to the plan with only a verbal note (assuring that the U.S. will consult with Japan, in case there is a suspicion of using the plant to produce nuclear weapons) written by the U.S. Department of State and addressed to the Japanese Embassy in the U.S. This occurred because there are no diplomatic relations between Japan and Taiwan.

Outline of Export Credits Granted to Nuclear-related Export Projects

Japan has two large public economic cooperation administrations, the Japan Bank of International Cooperation (JBIC) and the Export, Import and Investment Insurance Department (EID) of METI.

JBIC was established on October 1st 1999 in a merger between the Export-Import Bank of Japan (EIBJ) and Overseas Economic Cooperation Fund (OECF). It is the world's largest source of development finance with an annual budget of around 2.5 trillion yen (approx. US$20 billion). JBIC has two operational departments: the Overseas Economic Cooperation Operations which provides Official Development Assistance (ODA) loans, while the International Finance Operations (IFO) provides loans and guarantees for exports and foreign investments by Japanese firms. The IFO also provides untied loans for the public sector, mainly for 'sustaining the international financial order'.

Being a bilateral agency, JBIC has roles and functions similar to those of Multilateral Development Banks. A large portion of the Bank's loans goes to Asia.

The EID, currently within METI, is expected to separate from it in April 2001 and become an independent administrative agency. Together with JBIC, it provides trade insurance in order to cover the risk of being unable to export, or collect the fees after exportation. It can also be applied to emergency cases where, for example, the receiving country decides to put a limit on foreign exchange transfer, or where there is a war. In 1997 EID insured around 15 trillion yen (approx. US$12 billion), of which 4% was for medium and long-term insurance. Projects receiving JBIC loans are usually covered by insurance issued by EID.

The conditions required for receiving economic assistance from the government for the exportation of nuclear materials and equipment have already been stated. The term of redemption and the loan interest rates are based on an *"agreement on the export credit for nuclear power plants"* included in the OECD export credit guideline. Under the stipulations, IFO can be, while ODA cannot be, used for the exportation of nuclear power plants. Japanese citizens' groups criticize that it is unjust for the government to use any kind of public fund to provide low interest loans for the export of nuclear power plants, and for the government to cover the risk of the loan recovery.

On December 17th 1996, the foreign affairs committee of the Diet's Upper House approved and sent to the cabinet a petition submitted by the citizens' group, 'Stop Nuclear Plant Export Campaign'. This asked the government not to use public funds or give government permission for the export of nuclear power plants. Unfortunately, the petition has so far remained ineffective although the fact that it was approved by the committee is remarkable.

The nuclear power industry is now asking the government whether ODA can be used for feasibility studies (FS), given it cannot be used for the export of nuclear materials and equipment. The government's response so far, based on its interpretation of the OECD guideline, has been that ODA cannot be used for FS either. As a result, ODA was not used for the FS project in Indonesia carried out by a Japanese company. Instead, a loan based on the OECD guidelines was granted.

Export Credit-funded Projects

Information about projects funded by ECAs is limited. The following three projects were the only ones where data has been made available:

Loan Granted to FS in Indonesia.

In July 1993, EIBJ, the forerunner of JBIC, decided to grant a loan to NEWJEC, a subsidiary of Kansai Electric Power Co. (KEPCO), for conducting an FS for a nuclear power plant in Indonesia. The total assessment cost was 1.5 billion yen. The EIBJ loan was for slightly less than 700 million yen. The rest was co-financed by private banks. In the decision-making, EIBJ emphasized that *"decisions on loans for assessment and actual construction were made separately".* NEWJEC's FS project was completed in May 1996.

Loan for the 3rd Project of the Qinshan Nuclear Power Plant (Qinshan-III) in China

In January 1997, EIBJ decided to provide a loan to the China State Development Bank to be used as funds for the purchase of a turbine and generator used for Qinshan-III (CANDU, 700MW x 2reactors). The Qinshan-III project includes the construction of two reactors, which began construction in June 1998 and September 1999 respectively. Commercial operation is scheduled to begin in February 2003 and November 2003.

Out of the total US$280 million cost of the project, US$168 million (60%) was provided by EIBJ, and the rest was co-financed by the Industrial Bank of Japan and the Bank of Tokyo-Mitsubishi. The EIBJ loan for this project has been reported in the media as *"the biggest ECA for a nuclear-related project in Japan".*[326]

The Japanese manufacturer is Hitachi Ltd., and the trading firm that will handle the export is Itochu Corp. The main contractor is Atomic Energy of Canada Ltd. (AECL). The reactor system supplied by AECL will be financed by EDC (Canadian Export Development Corporation). The transformer facility supplied by Bechtel Corp. of the U.S. will be covered by U.S. Export-Import Bank's export finance.

Loan for a LWR construction project in North Korea

In January 2000,JBIC signed an untied loan contract with the Korean Peninsula Energy Development Organization (KEDO) for a maximum amount of 116.5 billion yen, to fund the building of two 1000MW LWRs. [Information obtained from JBIC]

Additional information was obtained by contacting JBIC, which provided information on two projects after 1997. Though we were unable to receive information about projects prior to 1997, it seems there were no major projects during those years.

Loans relating to Qinshan II and III

In relation to the Qinshan III project mentioned earlier, a loan contract for the sum of US$112 million as supplier's credit was signed in January 1997. The borrowers were the Industrial Bank of Japan and the Bank of Tokyo-Mitsubishi. The amount matches the amount marked by the two banks as a syndicated loan (see above). Furthermore, between March and April 2000, three suppliers' credit contracts were signed. In these contracts, EIBJ granted loans to the following companies and projects: 1.29 billion yen of the 1.84 billion yen allotted for reactor coolant pumps were granted to Mitsubishi Corp. and Mitsubishi Heavy Industries, and Mitsubishi Corp. and Mitsubishi Electric Corp were granted 2.04 billion yen of the 2.91 billion yen allotted for gas insulating switches, and 2.16 billion yen of the 3.08 billion yen allotted for the gas insulating switches of Qinshan-II (PWR, 600MW x 2) .

Loans for the purchase of Laguna Verde nuclear plant parts

EIBJ loaned the following amounts to the Comision Federal de Electricidad (CFE) of Mexico: in July 1997 30 million yen out of a total 40 million yen syndicated loan, in July 1997 20 million yen out of a total 30 million yen, in December 1999 80 million out of a total 130 million, and in May 2000 80 million out of a total 130 million yen. The loans were for the export of exchange parts used in turbines and generators. The name of the manufacturer was not disclosed.

An article in the May 9 1996 issue of the Denki Shimbun (newspaper for Japan's electric industry) stated that the Japanese government was *"going to consider applying EIBJ loans and trade insurance"* to assist Mitsubishi Heavy Industries' export of reactor pressure vessels for Qinshan II – 1, and reactor coolant pumps and charging pumps for Qinshan II – 1 and 2. It was also written that *"if the application is approved, it will become the first case where the government's export credit is granted to the export of nuclear material and equipments."* Responding to our inquiry about the case, JBIC said the loans were never made for reasons which they declined to clarify.

During a study meeting held between opposition party diet members and members of the citizens' group "Stop Nuclear Plant Export Campaign", a MITI officer in charge stated that *"trade insurance was applied to a part"* of the project. However the details were not disclosed.

According to Masaru Suwa, EIBJ has given loans in a syndicated loan programme with private banks to Maeda Construction Company Ltd. and another major trading firm. Some 3 billion yen was granted to Maeda Construction for constructing the buildings of the Guandong Daya Bay 1 and 2 reactors (PWR, 984MW each), and some 500 million yen loaned to another trading firm for the transformers of the same plant.

The following table gives a full list of all the projects that received EIBJ/JBIC loans.

Examples of Projects that were Cancelled

As stated earlier, there have been several cases where manufacturers submitted unsuccessful bids for projects. During the 1970s, political pressure, at a time when the Japanese and South Korean governments were being criticized for being overly attached to one another, forced companies like Mitsubishi Heavy Industries and Hitachi to give up nuclear-related exports to South Korea.

There have also been many cases where projects were cancelled or postponed by the client, e.g. the U.K. and Turkey.

No projects have been cancelled because they were unable to receive the export credit, although in e.g. Qinshan II, the reason for cancellation was not disclosed.

Reorganization of the Nuclear Industry

Japan's nuclear industry has been suffering from a decrease in domestic orders, and a feeling of uncertainty for the industry's future. The industry is now going through major rationalization and reorganization. According to the Japan Atomic Industrial Forum, Inc.'s (JAIF) 1999 fiscal study on the nuclear industry, sales of the entire industry rose over the previous year to 1.68 trillion yen. This increase was the largest for four years, though the amount has still not even reached the level of 2 years ago. The JAIF report states: *"The future is still unclear".*

The subsidiary companies established by each of the major companies in the industry for handling only nuclear power-related businesses have been re-absorbed by their parent companies. In 1989, Nippon Atomic Industry Group Co. Ltd. (NAIG) was absorbed by Toshiba, and in 1995, Mitsubishi Atomic Power Industries, Inc. (MAPI) was absorbed by Mitsubishi Heavy Industries.

Projects that received EIBJ/JBIC loans

Contract term	Client country	Plant name	Materials /equipments	Loan receiver	Amount	% held by loan
?	China	Guangdong Daya Bay 1,2	Construction of reactor building	Maeda Construction Co. Ltd.	Approx. 3 bln yen	
?	China	Guangdong Daya Bay 1,2	Transformer firm	Major trading	Approx. 500 mil. yen	
1993	Indonesia		FS	NEWJEC	Nearly 700 mil. yen	Approx. 50%
1997	China	Qinshan III 1,2	Turbine/ generators	China State Development Bank (Itochu Corp., Hitachi)	$168 mil.	60%
1997	China	Qinshan III 1,2		The Industrial Bank of Japan/ Bank of Tokyo- Mitsubishi	US$112 mil.	100%
1997	Mexico	Laguna Verde	Exchange parts for turbine/ generators	CFE	30 mil. yen	75%
1999	Mexico	Laguna Verde	Exchange parts for turbine/ generators	CFE	20 mil. yen	67%
2000	China	Qinshan III 1,2	Reactor coolant pumps	Mitsubishi Corp., Mitsubishi Heavy Industries, ltd.	1.29 bln. yen	70%
2000	China	Qinshan III 1,2	Gas Insulating Switches	Mitsubishi Corp., Mitsubishi Electric Corp.	2.04 bln yen	70%
2000	China	Qinshan II 1,2	Gas Insulating Switches	Mitsubishi Corp., Mitsubishi Electric Corp.	2.16 bln yen	70%
2000	North Korea		KEDO		116.5 bln yen	
2000	Mexico	Laguna Verde	Exchange parts for turbine/ generators	CFE	80 mil. yen	62%

Each company is now carrying out restructuring plans. These include measures such as transferring nuclear power technicians to either thermal power or chemical plant divisions and manufacturing thermal power or chemical plant-related equipment at nuclear power equipment plants. In the mid 1980s, Mitsubishi Heavy Industries had about 5,000 employees, including those of MAPI, working for its nuclear power division. This dropped to about 3,500 by the end of the 1990s. Sales slumped to half or even a third of their peak level.[327]

Hitachi and Toshiba are also cutting the number of employees working in their nuclear power divisions by about 1,000. Both companies renewed their corporate system and introduced the 'in-house company system',in which semi-independent company-like entities are created within the company (although not subsidiaries). The nuclear power division of Hitachi became a part of the

Electric Power/Electronic Business Group and at Toshiba it became a part of the Electric Power System Company.

Manufacturers have also been strongly affected by the recent 'liberalisation' of the electric power business which has forced them to compete in the development of thermal power plants. Manufacturers are offering Independent Power Producers thermal power plants for half the price that was offered to the utility companies. Demands to lower the costs of related materials and equipment also became so strong that Hitachi recently had to re-import condensers and other materials from its Chinese joint venture firm.

In 1997, Hitachi and Toshiba jointly established the Asian ABWR (Advanced BWR) Promotion Organization in order to begin exporting ABWR, which was jointly developed by GE of the U.S. and the Tokyo Electric Power Co. (TEPCO). Furthermore, Hitachi, Toshiba, and GE considered ways to strengthen their relationship, such as launching a nuclear power joint venture firm. In January 2000, the nuclear fuel divisions of Hitachi, Toshiba and GE were united to establish Global Nuclear Fuel (GNF). Following this, Japan Nuclear Fuel (JNF), which was jointly capitalized by the three companies, became GNF's subsidiary.

Meanwhile, Hitachi and Toshiba agreed with Mitsubishi Heavy Industry to form an 'all Japan force' that will work on the export of nuclear power plants to Vietnam.[328] Although Hitachi and Toshiba manufacture BWRs and Mitsubishi makes PWRs, their aim is to work cooperatively in receiving orders despite their differences. It is also suggested that this agreement between the three companies will probably speed up the integration of their nuclear power business. Rumors about the three firms combining their nuclear power business have been aired for several years. In contrast to the American and European nuclear industries which have been through major reorganization, it was always thought that Japan's nuclear industry would be able to maintain the supply system. This assumption no longer holds and the industry needs to be watched closely.

Decision Mechanisms for awarding ECA loans or credit guarantees

Ordinarily, when an application for support is made by a project sponsor, the JBIC examines the feasibility of the project from economic, technical and environmental perspectives. Projects are categorized into Category A, B, or C, based on the information in the 'screening form' submitted by the sponsors. For all Category A projects and some Category B projects, the Environment & Social Development Division conducts a detailed review. On approval by the Board, operational staff negotiate with project sponsors regarding loan agreements, taking into account the findings of the Environmental Division.

Although most projects are reviewed in this way, JBIC admitted that special procedures are applied to nuclear projects, which have not been made public.

The environmental review process of the EID is quite similar to that of JBIC, though the roles of the Environment Division and the Board are not clear. EID also reviews nuclear projects on issues such as security and measures for radioactive waste processing as well as nuclear accidents, through procedures that are undisclosed. Interestingly, the environmental statement format for nuclear projects funded by EID makes no mention of nuclear-related risks. The environmental review procedures for ODA projects are different from those described above in some points, and new environmental guidelines are being prepared for release by autumn 2001.

Opportunities for Public Participation or Environmental Impact Assessments

EIA is required only for Category A projects whose locations are described as “sensitive areas,” such as national parks or wetlands. It is also required for some Category B projects, which form the majority of JBIC projects. However, there is no opportunity for the public to be informed of or comment on any projects before the final decision is made. Projects being supported, and EIA or other environmental documents are not disclosed even after JBIC approves a loan.

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Russia

Overview of the Russian Nuclear Sector

The Domestic Nuclear Sector: Short Overview

Russia currently has 29 nuclear units at 9 nuclear power plants (picture 1, source: Minatom). A new unit at Rostov 1 was loaded with nuclear fuel in February 2001[329] and should be connected to the national grid by the summer of 2001. Nuclear plants currently provide Russia with 12-13% of its national electricity.

There is one nuclear reprocessing plant in Russia – Chelyabinsk "Mayak". "Mayak" was started in 1949 and first served as a production site for nuclear weapons. In 1972 a reprocessing facility for high-level nuclear waste was set up there. This allowed the extraction of reactor-grade plutonium from spent nuclear fuel from VVER-440 and BN-600 Russian commercial reactors, submarines and research reactors. Spent fuel from RBMK-1000, VVER-1000 and EGP-600 reactors is not reprocessed in Russia. Prior to 2000, "Mayak" also had several contracts with Eastern European countries operating Soviet-designed reactors for reprocessing their spent fuel. However, since 2000, according to the plant officials, "Mayak" has had no international contracts.

The Russian Ministry of Atomic Power (Minatom) has developed a strategy for the importation of nuclear waste. A bill regulating this process was introduced to the Russian parliament and passed its first reading in December 2000. However, the future of the scheme is in doubt as a result of strong opposition from public groups and regional legislators across Russia. Public opposition can be effective as was shown during the last decade when, according to environmental groups, the building of 108 Minatom facilities was halted through mass public protests.

USSR/Russia's Nuclear Export Activity: Overview

Russia actively exports nuclear material, technology and services. In 1955 the USSR signed the first agreements with several countries to help them develop nuclear science centers. In 1956 the USSR started to export nuclear reactors to Czech Republic and Germany. Since the end of the 1960s, the USSR has helped to construct around 30 reactors in former socialist countries and Finland. Traditionally, reactor exports are accompanied by the export of nuclear fuel and modernization services.

After the collapse of the Soviet Union in 1991, there were significant changes in Russian legislation in an attempt to fall into line with international laws regulating nuclear export and services. The Russian nuclear industry currently works in several countries, building or modernizing Soviet-designed reactors. Russia offers nuclear services to Eastern Europe, for example exporting nuclear fuel to Hungary, Czech, Slovakia, Bulgaria, Ukraine and Finland, and reprocessing spent fuel from some of these countries. Export relations exist with signatories and non-signatories of the Non Proliferation Treaty (NPT). Contracts with Iran and India have often been criticized by developed countries on the grounds of nuclear proliferation. As will be shown, these contracts should not be seen as direct payments to the Russian nuclear industry, even though such payments often appear

as credit offered by the Russian government. However, the Russian export credit system was established very recently, and differs somewhat from its Western counterparts.

Originally, Soviet nuclear exports had exclusively political goals and were not economically oriented. The Government was the only exporter. After the USSR collapsed, export activities became available for non-governmental bodies as well. Russian nuclear technology came onto the world market at a time when Soviet export policy no longer existed, but a new policy had not yet been developed. Many institutions decided to export technology to solve their cash problems. Because nuclear export operations are much more regulated in the developed world, the Russian nuclear industry preferred to target less developed countries where rules were more relaxed and established nuclear legislation did not exist.

Compared to the West, the involvement of the private sector in the nuclear industry is very low in Russia. This is partly because the Russian business sector is only now developing. On the other hand, nuclear exports are still of high political importance to the Russian government, and such interest does not attract Russian business. Strong American interests (manifesting as control) in this field are contributing to this lack of interest.

The large funds involved in nuclear exports could potentially attract private banks, especially in the Russian regions where components for reactors are manufactured. However, they have also been put off because nuclear exports are characterized by payments made partly in cash, and partly by services and goods such as food products and clothing (e.g. in Bulgaria, nuclear fuel is exchanged for food). The banks are only interested in cash transactions. They, too, are also discouraged by the high level of government influence over decisions.

Decisions about nuclear exports are mainly influenced by 4 sectors:

1. Russian enterprises manufacturing parts of nuclear reactors and other products for export;
2. Companies exporting these products;
3. Interested ministries (such as Minatom and the Ministry of Foreign Affairs), and
4. Banks serving these ministries.

In the last decade, Minatom has worked with Konversbank, Alpha-bank and Vnesheconombank, but in 2000 Minister Evgeny Adamov decided to move all Minatom's accounts to Konversbank. Traditionally, including during Soviet times, the main bank used for all nuclear export contracts was Vnesheconombank. It remains close to Minatom and is keen to preserve its central role.

Minatom is not only lobbying the Russian government on decisions and implementing actual contracts, but also leading negotiations for nuclear exports. In theory, the Government of the Russian Federation controls proliferation aspects of nuclear exports and participates in all nuclear export contracts. In reality, the level of government influence depends on Minatom's ability to prove that it can establish effective control over nuclear operations implemented with foreign partners.

The legislative foundation for nuclear exports is the 1999 Law 'on export control', the 1995 Law 'on governmental regulation of foreign trade activities' and government and presidential decrees. The 1999 Law is an amended version of the 1995 Law.

Current thinking states that nuclear non-proliferation is the only issue which will influence decisions on nuclear exports. This demonstrates how the Russian government regards the issue exclusively as political rather than economic.

Economic Assessment

Economic assessment of nuclear export projects is currently the responsibility of the Ministry of Economic Development and Trade. Previously, it was the responsibility of the Ministry of External Economic Relations (MVES), but in 2000 this ministry was dissolved and the Ministry of Trade set up instead. MVES had its own view of nuclear exports: *"[foreign] technical cooperation plays an important role in the improvement of the Russian export infrastructure, and also in providing Russian enterprises with contracts and people with jobs; this kind of co-operation is a priority for government external (i.e. foreign) economic policy".*[330] MVES was another supporter for nuclear export credits at any cost and in any circumstances. So far, the Ministry of Trade has not changed this priority.

As far as it was possible to investigate, only the Ministry of Finance (Minfin) reviews nuclear export projects and credits from a traditional economic point of view. Minfin has disagreed with Minatom that nuclear export brings profit. During negotiations, Minfin has insisted that foreign partners of Minatom pay back nuclear credits in cash only. This stance presents serious problems for the nuclear industry in organizing new nuclear export credits.

Minfin's policy includes the prevention of further credit to countries that have not paid back previous credit. In the 1990s Minfin strongly rejected several Minatom proposals to give credit for the building of a nuclear plant in Cuba.

System of Export Credits

Russia has just started to build an effective system of export control and, as part of it, a system of export credits. It comes as no surprise that the export credit system is not yet well developed.

Democratic Russia had to establish a new export control system after the breakup of the USSR. In 1999 a new Law 'on export control' defined export control as action aimed at maintaining a system for the export of goods, information, services and results of intellectual activity which can be used for producing weapons of mass destruction, in accordance with established rules. The new Law included a clear definition of foreign trade activity, and aimed to establish stronger control over all possible channels of technology transfer abroad. Under the new legislation, the federal authorities in Russia were responsible for government credit (export credit) and other kinds of economic help to foreign countries. Actual agreements were to be signed by the responsible governmental body (in the case of nuclear export credits, most likely to be Minatom).

The federal programme for development of foreign trade activity must be developed each year by the government and presented together with the federal budget to the parliament. This programme includes plans for export credits to be taken from the federal budget and for payments by foreign countries for credit given previously.

Licensing

Licensing is a key element of the export credit system. The license is the confirmation of governmental approval for export-import operations under specified conditions (including guarantees that exported production or technology will be delivered only to a declared receiver who will use it for declared goals). Officially, export-import licenses are issued by the Ministry of Trade. The foundation for the licensing process is the list of goods, technologies and services subject to

export-import control. In the 1990s, the licensing mechanism was changed several times. However, Russian legislation does not take into account the list of countries under export control restrictions (black lists) and the Russian government is negative about the use of such lists. The only conditions for the control by Russian government are UN restrictions (sanctions) and agreements concerning nuclear non-proliferation. Minatom is heavily involved in the licensing process —it has an export council, and one of its Vice-Ministers chairs the council which exclusively works on the pre-licensing phase, preliminary agreements and field-trips. However, its interest lies in creating as many nuclear export contracts as possible, and there is no effective control over its activities. There is therefore a serious threat of weakening control over sensitive exports.

Decision Making and Responsibilities

According to the constitution, the president is responsible for external (foreign) policy. In the field of export control, the president's responsibility includes approval of export operations. The President can veto decisions made by parliament.

Parliament's responsibilities include the approval of laws and ratification of agreements.

The Government of Russia issues decrees on how export-import operations involving sensitive materials and technology should be implemented. It also decides on negotiations in military- and nuclear-related fields.

Export control is also the responsibility of the President's Security Council. On May 29th 1998, the Security Council established a special commission on the non-proliferation of weapons of mass destruction.

The Ministry of Foreign Affairs is responsible for international aspects of export control related to the non-proliferation policy.

The government Commission on Export Control is responsible for the co-ordination of all interested government organizations on issues related to sensitive exports.

The Federal Service on Currency and Export Control (VEK) is a special government body which makes assessments and official conclusions on whether export contracts can go ahead.

The Ministry of Trade is responsible for issuing and canceling licenses. This ministry also make an economic assessment of export contracts (necessary for issuing a license), holds databases on licenses, provides exporters with information about violations of export control regulations and takes part in negotiations and consultations.

The secret services are also involved in decisions over export, but only inasmuch as it pertains to nuclear non-proliferation.

Before 2000, the step-by-step system of control was:

a) Approval of both the Commission on Export Control and the Ministry of Foreign Affairs for preliminary agreements;
b) Assessment and conclusion by VEK on the possibility of export;
c) Final approval by all [responsible] ministries;
d) Licensing;
e) Custom control.

Russian officials expect major changes in the export control system. The new law introduces a new

element to this system, that of government assessment of foreign trade deals subject to export control. However, the law does not say which body is responsible for making this assessment.

Government organizations therefore take one of three roles in export control:

- licensing;
- approving (approving final conclusions on whether a deal goes ahead or not);
- consulting.

Comment

Because of the specific situation in Russia, the responsibilities of different government bodies are often changing, as well as the situation inside those bodies. This makes the whole process extremely unstable and creates great opportunities for manipulation of decisions about export contacts and their implementation. The main lobbyist for nuclear exports —Minatom— is not concerned about the details of inter-governmental agreements on nuclear exports. In implementing projects, Minatom is able to 'correct' agreements as it likes because this activity is not controlled by other government bodies. Only the Russian government is responsible for the consequences of such 'corrections'. We were not able to find any cases where Minatom was punished for not following agreement terms or export control norms. However, recently, the Chief-Prosecutor office's announced that a criminal case on the leakage of sensitive (nuclear) technology had been opened and Minister of Atomic Power Evgeny Adamov had been called as a witness. This gives hope that the days of uncontrolled nuclear exports in Russia are numbered.

Companies Involved in the Nuclear Sector

Export

Three companies were historically involved in nuclear export from Soviet times: Tehsnabexport (also known internationally as Tenex), Atomenergoexport and Zarubezhatomenergostroy.

Tehsnabexport comprises six companies, each responsible for different parts of export contracts. These are Uranservice, Tvel, Raznoimpex, Avtopribor, Televideo and Tenex-M. Tehsnabexport is responsible for the HEU-LEU deal between Russia and USA, in which low-enriched uranium is produced out of weapon-grade uranium and transported from Russia to the US. The company also exports fresh nuclear fuel to Hungary, Czech and Slovak republics, Bulgaria and Finland. Prior to 2000 Tehsnabexport was responsible for the transportation of spent nuclear fuel from Eastern Europe back to Russia. However, last year it announced that "Mayak", the only reprocessing facility in Russia, would not sign any more contracts for the reprocessing of foreign spent fuel.

Atomenergoexport was established in 1973 by the Ministry of Foreign Trade, and *Zarubezhatomenergostroy* (formerly *Soyuzglavzagranatomenergo*), which was in turn established by Minsredmash (Ministry of Medium Level Machines Construction). Both companies had been involved in the design, manufacture and building of nuclear reactors outside Russia. Together they built about 30 commercial reactors and 10 nuclear research facilities across the world.

In 1998 Minatom formed a new company called Atomstroyexport for 'improving export activity in the nuclear sector', in a merger of Atomenergoexport and Zarubezhatomenergostroy. The new company retained all the responsibilities of both companies and their names in contracts. The main

responsibility of the new company is the implementation of contracts including the building and maintenance of nuclear reactors. Atomstroyexport also exports all kinds of materials and equipment needed for the operation of reactors. According to independent analysts, the unification of these companies helped Minatom establish full control over the nuclear export sector.

Manufacturing and Design

The main companies involved in the design of nuclear reactors are Atomenergoproekt, Gidropress and the Kurchatov Institute (the first nuclear weapon design facility in the USSR). Equipment manufacturers are the Izhorsky enterprise, Ordzhonikidze enterprise and Elektrosila (producing generators for nuclear and hydro plants).

Atomenergoproekt is the oldest and largest designer of energy facilities. It has designed power plants since 1929, and nuclear plants since 1951. In total Atomenergoproekt has designed 90 facilities with an established capacity of 29,72 million kWt, of which 7,891 million kWt is nuclear capacity. Plants and facilities have been built in Poland, Vietnam, Cuba (Huragua nuclear plant), Egypt, North Korea, Algeria, Croatia, Iraq, Czech and Slovak republics (Dukovany, Bohunice, Mohovce and Temelin nuclear plants) and Finland (Loviisa nuclear plant). Atomenergoproekt is currently working on the design of a nuclear plant in China, as well as upgrading the Kola, Beloyarsk, Kursk, Smolensk and Leningrad nuclear plants in Russia. It designed the VVER-640, VVER-1000, VVER-1500 and BN-800 reactors.

Countries of Operation

Bulgaria

In July 1999, Bulgaria signed an agreement with a European consortium of nuclear companies for the modernization of two VVER-1000 nuclear reactors – Kozloduy 5 and 6. The cost was ¤ 314 million. The consortium consisted of the German company Siemens, the French Framatome and the Russian Atomenergoexport (part of Atomstroyexport). The Russian part of the contract amounted to approximately 30%.[331] According to the Bulgarian national energy producer NEK, the modernization will cost ¤ 490 million in total. NEK is contributing to the programme, which started at the beginning of 2000.

The European consortium is responsible for about 90% of the modernization programme, with the remaining 10% to be implemented by US-based Westinghouse. In 1999 Westinghouse and NEK signed another contract amounting to US$ 70 million, aimed at improving the control systems of Kozloduy 5 and 6.

In April 2000, Euratom approved a ¤ 212,5 million loan to NEK under guarantees from the Bulgarian government. This loan was only approved after Bulgaria promised the European Union that it would shut down Kozloduy 1-4 units, which *"cannot be upgraded to Western safety standards".* Reactors 1 and 2 will be shut down by 2003, and 3 and 4 by 2006 or earlier. Bulgaria also promised to reform its energy sector.[332]

On October 19th, 1996, the Russian government issued decree N 1243 *"on the participation of Russian organizations in modernization of units 5 and 6 of Kozloduy nuclear plant in Bulgaria".* Another decree N 705 was issued on September 18th, 2000, giving details of the Russian-Bulgarian

contract: *"credit of US$ 150 million, to be issued by Russian Export-Import Bank (Roseximbank), for financing of contracts of Atomenergoexport… under guarantees from the Bulgarian government".* Minatom is responsible for Atomenergoexport implementing its part of the contract. The Ministry of Economic Development and Trade is responsible for financial control of the contract.

This credit must be included in the Russian budget from 2000. The conditions for the issue of the credit are:

- no more than 15% can be used for advanced payments;
- no more than 15% can be used for payments to Bulgarian organizations;
- credit can be used to purchase equipment in republics of the former Soviet Union if Russian enterprises cannot produce necessary equipment;
- the interest rate is 7.5% per year;
- the credit must be used within 6 years;
- the credit must be paid back after 15 years;
- back payments must start not later than 6 months after the credit has ended, but not later than 4.5 years after it has started.

The agreement between Bulgaria and Russian Roseximbank was signed in Sofia on October 26th 2000. Credit was offered under guarantees from NEK as an agent of Bulgarian government.

The Russian government owns about 96% of Roseximbank funds (Rosbusinessconsulting agency). The bank was established by the government specifically for financing export operations, but Kozloduy represents the first time it has taken part in nuclear exports. According to Tatyana Mirumyan, the Director in charge of managing credits and guarantees for Roseximbank: *"the reasons for the bank's lack of participation in nuclear exports are political rather than economical".*

Russian financial participation in the modernization of Kozloduy 5 and 6 represents about 30% of the total. This will be taken out of the Russian budget and will not be returned before 2022, if ever. According to the government decree, the main reason for Russia's participation is the *"willingness of Atomenergoexport to participate".* The only goal is to support Minatom's foreign business. Nor did the Russian government insist on closing down Kozloduy 1-4 before credit was offered.

China

On December 18th 1992 the Russian and Chinese governments signed an initial agreement to co-operate on the construction of a nuclear plant on Chinese territory and offering Russian credit for that purpose. The agreement included construction of two VVER-1000 nuclear units at the Lyanyungan nuclear plant, although the original plans were to build 4 units on site in Jiangsu province.[333]

Further contracts were signed in 1996 and 1997. The amount of contract was reduced from US$ 2.5 billion (as specified in the initial agreement) to US$ 1.5 billion. Unit 1 was to be finished by 2004 and unit 2 by 2005.

Russia offered credit for 13 years (with interest at 4% per year). China was to pay 10% of the contract amount in advance, 5% after the contract was signed (2.5% in cash, 2.5% in goods) and 5% during its implementation. Atomstroyexport was responsible for supplying equipment and the Chinese company Jiangsu Nuclear Power responsible for implementation of the contract. According

to Strana.ru, the national internet news agency, and Expert magazine, the total cost of the Russian-Chinese contract was about US$ 3 billion.

In December 1998, Russia and China amended the 1992 agreement in order to offer Russian companies advanced payments (amounting to US$ 70 million) to start producing equipment for the plant. The 1999 Russian budget included US$ 100-160 million for starting the construction of the plant (RRub 2300-3680 million as of January 20th 1999).

In 1999 Russia prepared the technical documentation necessary for construction and passed it on for approval to the Chinese authorities, which was quickly given.[334] In May 2000, construction of the plant started, although the completion date of unit 1 was postponed from 2004 to 2005.[335] In March 2000, Russian and Chinese counterparts signed an agreement for fresh nuclear fuel supply (Russia to China).[336]

In July 2000, Vnesheconombank and Bank of China signed an agreement that included the *"support of each other in the investment field and co-operation in the credit field".* The heads of the Russian and Chinese governments signed a similar agreement in November 2000. An agreement between the Jiangsu Nuclear Power company and Minatom on advanced payments was signed the same day (according to the Chinese embassy in Moscow).

The agreement on advance payments was necessitated by the difficulties that the Russian nuclear industry was having in getting funds from the national budget. Even though it had signed agreements to construct the nuclear plant and offer credit, Russia was unable to fund their implementation. Russian banks could not offer the necessary amount of credit to the industry. In the past, Russian companies have lost contracts abroad because of problems with funding. For the Chinese deal, the situation was resolved when the Jiangsu Nuclear Power company agreed to offer credit in place of the Russian banks.[337]

The Russian-Chinese deal, involving practically zero fulfilment of the Russian part of contract, is typical. Out of all the nuclear contracts involving export credit, the Chinese deal is the only one that has got as far as manufacturing equipment. It is at this point that Russian industry is experiencing tremendous problems.

Minatom did all it could to prevent this kind of problem. On June 16th 1998, the government approved a decree, based on Minatom's proposals. This gave to Minatom, together with Vnesheconombank and Atomstroyexport, the right to decide on the financing system for each foreign nuclear contract.

As stated earlier, Russian export credit practice has involved re-payments not only in cash, but in the form of goods and services (up to 90% of the credit amount). This, of course, has not attracted the Russian banks' participation in export credit as the banking system cannot run on the basis of barter of food and goods. The main reason why payments by exported goods are still made is Minatom' readiness to accept them.

Minatom is responsible for all the problems resulting from such a policy, but it is the only body to control its own export operations. At present, other institutions such as Minfin are not involved in financial decisions on export operations. This allows Russia to sign agreements which then cannot be honoured due to a lack of financial resources.

Cuba

The USSR started to build the Huragua nuclear plant in Cuba at the end of 1970s. The design included two VVER-440 units. The plant was about 65-70% completed when, in 1992, Russia halted construction of the reactors and financing of the project. Minatom has tried to restart construction several times, but has been unable to due to a lack of financial resources.

On July 7th 1993, the Russian and Cuban governments signed a protocol *"on the financing system of the building of the nuclear plant Huragua in Cuba in the period before a final decision is adopted".* According to this document, the Russian government would provide credit of US$ 30 million to Cuba (with interest of 4% per year). This was provided for conserving the construction site of the Huragua plant. This credit was to be paid back within 12 years, but no period for using the credit was defined – it was extended several times by decrees from the government. Repayment was to take the form of *"goods traditionally exported by Cuba and through services".*

According to the Nuclear Proliferation Journal (1999), between US$ 400 million and 500 million is needed to finish the plant. Experts from the PIR-center in Moscow estimate the cost of completion at US$ 1 billion with the chances of Cuba returning credit as unlikely.

In 1998, with the participation of the Russian authorities, the Russian-Cuban Association was established to *"complete the nuclear plant construction"*, though the institutions behind this association were never publicly revealed. In 1999 a new agreement to finish construction was signed between Russia and Cuba. It is still questionable whether this agreement is supported by adequate funds.

In 1998, Minatom asked Minfin to review the possibility of financing the completion of Huragua. Minfin has a firm policy not to offer credit to countries not paying back previous credit. It was for this reason that Minfin blocked a 1999 deal between the Russian Commission on Trade and Economic Co-operation and Cuba.[338]

According to Strana.ru, *"Atomstroyexport cannot start the implementation of the [Cuban] agreement for lack of funds".* The company persists in the belief that the deal is still viable, one reason being because about 65% of Cuban enterprises can pay for electricity in cash. Atomstroyexport also insist that Huragua construction does not need approval from international bodies such as the IAEA because it regularly inspects the plant. Russian industry did attempt to establish an international consortium for finishing Huragua, but failed because of political pressure from the US. According to Atomstroyexport officials, the company insists that the deal is good.

Some Russian officials say the Cuban plant can be finished in 4 years, although according to high-level Minatom officials, the Cuban plant will not be finished in the near future. *"The Cuban plant is a medium-term prospect. It was conserved about 10 years ago and we do not know the present condition of the construction site. The climate may play an important role."* The main barrier remaining within government is the Russian Minfin. However, according to independent analysts and numerous articles in the Russian press, the question also remains as to whether Cuba hasenough specialists to run a nuclear facility and if the old construction site can still be used. Apparently, a lot of equipment has been stolen from the plant.

The Russian nuclear inspectorate GAN do not currently have an agreement with the Cuban nuclear inspectorate, although one existed during Soviet times. (GAN re-signed old agreements with China and India only.)

Cuba has no facilities for producing nuclear fuel. According to the Russian-Cuban agreement, Russia is responsible for supplying nuclear fuel to Cuba. However, Russia is unable —technically and financially— to implement this part of the agreement.

The construction of the Huragua nuclear plant is the only Russian nuclear project ever to be criticized on environmental protection grounds. The US expressed serious concerns over the project based as much on non-proliferation arguments as environmental concerns.

At present, the conservation of the Huragua construction site is financed by the Russian budget. Independent analysts like GAN and Minfin officials are opposed to the continuation of the project on safety and economic grounds, but Russia continues to offer credit to Cuba and this will probably continue in the near future. However, it remains unclear as to whether the credit funds are really being repaid or not. The amount of credit taken from Russian budget funds could exceed US$ 30 million.

India

USSR and India have a long history of co-operation in scientific, military and economic fields. Their first agreement on scientific and technical cooperation was signed on January 22nd 1979. The amount of co-operation between Russia and India has not yet reached the level enjoyed by the USSR, but the Russian government views India as an important strategic partner and is attempting to increase co-operation between the two countries in the future. Russia considers the joint building of the Kudankulam nuclear plant in India as very important in this respect.

The agreement for the construction of the Kudankulam nuclear plant was signed on November 20th 1988, which included the construction of VVER-1000 nuclear units. Implementation of this agreement was postponed for economic reasons, although negotiations continued in 1992. In June 1998, the Russian Minister of Atomic Power Evgeny Adamov signed an additional protocol which included such technical aspects as the storage and reprocessing of spent nuclear fuel. India would keep nuclear fuel exported by Russia on its own territory for reprocessing. In the same protocol, Russia offered US$ 2.5 billion of credit for the construction of the two reactors. 25% of credit was to be returned through the export of Indian goods and food. Credit was to be used within 10 years and repaid not later than 12 years after it was issued. The total estimated cost of Kudankulam exceeded US$ 3 billion.

Implementation of the additional protocol started in 1998, but was then postponed for economic reasons. In 1998 Atomenergoexport offered US$ 29.3 million for design work related to the Indian nuclear plant, but these funds only became available in 2000. This is the only part of the project financed by Russia so far.[339]

The additional protocol regulated all aspects relating to credit, although negotiations between the Russian and Indian authorities are yet to be completed. According to a Prime-Tass report of April 9th 1999, Russia offered India US$ 2.6 billion of credit. It was also reported that Vnesheconombank sent a letter to the Indian authorities confirming the issuing of this credit. *"Russia will offer credit to India for construction of Kudankulam in hard currency, but 10% of the deal will be financed through Indian debts from Soviet times"*, stated Russian ambassador Albert Chernyshev. In 1999, Vnesheconombank and the Indian Ministry of Finances signed an agreement regulating the Russian credit (Vnesheconombank release). In October 2000, another agreement between Vnesheconombank

and the Indian Export-Import Bank was signed. According to Vnesheconombank, this was to *"help to improve the credit co-operation of both countries".*

In November 2000, a representative of the Indian Commission of Atomic Power reported that the contract, including construction of the two nuclear reactors, would be signed at the beginning of 2001. However, according to Russian officials, the contracts cannot be signed before the second half of 2001.[340]

Russian specialists are currently working on technical and economic assessments of the project. This work must be done by April 2001 and passed on to the responsible Indian authorities for approval. As of the end of 2000, about 50 Russian organizations (about 30,000 people) were involved in the Russian-Indian deal.

The completion of the Kudankulam nuclear plant is expected by 2008 at the earliest[341] or in 2012.[342] Independent sources predict the project will continue for another 15-20 years.

There were protests from public groups in India at the announcement of plans to build the Soviet-designed nuclear plant, and these are expected to increase once actual construction starts. The project was mainly criticized on safety grounds: the construction site is located in an earthquake zone and the safety of Soviet-designed reactors is questioned following Chernobyl. A recent mass killing in India on Independence Day 2000, following an extremely strong earthquake, also puts the future of this project in doubt.

Iran

A Russian-Iranian agreement on the construction of nuclear plants was signed on August 25th 1992. This included the completion of one VVER-1000 nuclear reactor at Busher and training for Iranian specialists. According to the Russian press, Iran was also interested to negotiate the purchase of VVER-440 reactors. According to Russian government sources, the estimated total cost of the deal was US$ 1 billion, including US$ 850 million as payment for the construction of the reactor. Up to 20% of the project cost was to be repaid to Russia in the form of goods.

In 1994 about 150 Russian nuclear specialists started research on the potential location of the nuclear plant. In March 1998, the Russian Vice-Minister for Atomic Power Valery Bulgak announced that Russia and Iran had reached an agreement in principle on the construction of two additional nuclear reactors. In response to US criticism of this project on nuclear proliferation grounds, Minatom reported it would speed up construction.

In December 1998, the Russian national reactor operator Rosenergoatom agreed with Atomstroyexport to provide English translations of technical documentation for the Russian Balakovo nuclear plant, the model for Busher, at a cost of US$ 515,000. In 1999, US$ 162,500 was extracted from the budget for implementation of this agreement. In June 1999, Rosenergoatom also signed an agreement with Atomtehenergo for the organization of training of Iranian specialists at a cost of US$ 740,000. In 1999, about US$ 76,300 was extracted to start this work, and the Russian Balakovo nuclear plant and Kalinin nuclear plant accepted two groups of Iranians.[343]

Meanwhile, construction had been delayed by about a year. According to the Director General of Atomenergoexport Viktor Kozlov, this was because *"the plant was started by a German company which then left Iran. Much of the documentation for installed equipment had been lost. And the Ukrainian turbine manufacturer cancelled its involvement to this project under US pressure".* After

the 'Kharkovskaya turbina' enterprise in Ukraine decided to step out of project (cost of turbines US$ 45 million), Russia decided to manufacture turbines through the Russian LMZ enterprise. Russian-Iranian contracts are also blocked by Russian companies' lack of funds. Several Russian banks have given credit to companies involved, but not enough to improve the situation and speed up work.

In 1998 Russia and Iran agreed that the nuclear plant should be finished within 52 months. Russian companies were pessimistic about keeping to this date, but the Iranian side demanded the completion of the project to this timetable or else its cancellation. In order to keep the contract, the Russians signed it even though, according to Kozlov's interview in the Russian paper 'Vremya novostey', there is no chance of finishing construction within the allotted 52 months.

Iran paid approximately 5% in advance to Russian companies to start manufacturing equipment for the Busher plant, but this amount was is not enough to start implementing the agreement.

By August 2000, the Iranian ambassador in Russia, Mehdi Safari, reported that Busher was approximately 40% complete.[344]

Public Consultation

The Russian public has no involvement in decision-making over export credits in the nuclear sector, even though taxpayers' money is used to fund nuclear development in other countries. As a result of this lack of public involvement, environmental and social concerns over export credits are not aired. However, Russian taxpayers remain morally (and, partly, economically) liable for possible damages caused by nuclear export projects which are financed by Russian export credit.

Summary

Because of the specific situation in Russia, the responsibilities of different government bodies are often changing, as well as the situation inside those bodies. This makes the whole process extremely unstable and creates great opportunities for manipulation of decisions about export contacts and their implementation. The main lobbyist for nuclear exports —Minatom— is not concerned about the details of inter-governmental agreements on nuclear exports. In implementing projects, Minatom is able to 'correct' agreements as it likes because this activity is not controlled by other government bodies. Only the Russian government is responsible for the consequences of such 'corrections'. The first attempt to establish control over Minatom's foreign activities recently commenced with an investigation by the national prosecutor into the leakage of sensitive technology.

Rosexim, the Russian export-import bank, was established by the Russian government specifically to finance export credit. However, the Bulgarian Kozloduy modernization is the first nuclear export project in which Roseximbank has become involved. The main reason for Rosexim not taking part in nuclear export financing up to now has been because for political factors rather than economic ones. At the same time, Vnesheconombank which has traditionally served as Russia's export bank, remains close to Minatom and is keen to preserve its position.

Russian financial participation in the modernization of Kozloduy 5 and 6 represents about 30% of the

total. This will be taken out of the Russian budget and will not be returned before 2022, if ever. According to the government decree, the main reason for Russia's participation is the *"willingness of Atomenergoexport to participate."* The situation of other credit is similar: cash repayments are looking unlikely, with an unstable political situation in Russia and other countries making post-2020 planning and assumptions looking unrealistic.

The Russian-Chinese deal, involving practically zero fulfilment of the Russian part of contract, is typical. Out of all the nuclear contracts involving export credit, the Chinese deal is the only one that has got as far as manufacturing equipment. It is at this point that Russian industry is experiencing tremendous problems. Both Russian-Chinese and Russian-Iranian contracts are presently blocked by Russian companies' lack of funds. Russian companies have received credit, but not sufficient to improve the situation.

The Russian government gave Minatom, together with Vnesheconombank and Atomstroyexport, the right to decide on the financing system to use for foreign contracts. The main reason why credit repayments have been made not only in cash but also by exported goods is Minatom's readiness to accept it. Without independent control over Minatom activity, Russia will never get export credit back in cash.

The Ministry of Finance is the only government organization able to make real economic assessments of export credit, but its involvement in decision-making over foreign contracts is very low. As a result Minatom's policy has monopolised the field.

The construction of the Huragua nuclear plant in Cuba is the only Russian nuclear project which has ever received criticism on environmental protection grounds. The US expressed serious concerns about this project based as much on non-proliferation arguments as environmental concerns.

The conservation of the Huragua construction site is being financed by the Russian budget. GAN and the Ministry of Finance are opposed to the project on safety and economic grounds, but Minatom has tried several times to restart it. Russia continues to offer credit to Cuba and will probably do so in the future. It is debatable whether the apparent repayment of this credit is genuine or not.

United Kingdom

Summary

The UK's nuclear industry has stagnated in recent years: no new reactors are planned for construction, and other areas of the fuel cycle are finding it increasingly difficult to operate and gain orders either in the UK or worldwide. However, this appears to be changing, particularly as British Nuclear Fuels (BNFL) continues to expand its international operations.

Recently, the UK's Export Credit Guarantees Department (ECGD) has faced controversies over its support for arms exports and projects such as the Pergau dam in Malaysia and the Ilisu dam in Turkey. Partly as a result of these controversies, the role and functioning of the ECGD was reviewed in 2000 and an aim of taking social and environmental factors into account was established. However, this new aim falls far short of being a requirement to give due weight to these issues in the ECGD's assessment of projects. It is unlikely that social and environmental factors will ever prove a significant deterrent for ECGD support.

Since 1990, at least 5 nuclear power construction projects in China have been supported by the ECGD, with more than £680 million of credits granted. In addition, the UK Government is currently considering granting ECGD support to the K2R4 project in Ukraine, and the G8's programme to dispose of Russian and US weapons grade plutonium.

China's electricity production programme is likely to include more nuclear power plants. One of the most likely candidates for future construction projects is Westinghouse, the wholly owned subsidiary of British Nuclear Fuels Ltd (BNFL). BNFL is in turn wholly owned by the UK Government. The major shareholder is the Department of Trade and Industry, which is also the department responsible for the Export Credit Guarantee Department. There could be a major conflict of interest if Westinghouse/BNFL applied for ECGD support for future projects.

Although the ECGD is meant to break even on its support projects, there is the possibility of direct Government intervention in its support for specific high risk or uneconomic projects through the ECGD's 'Account 3'.

The Nuclear Industry in the UK

Background

There are three reactor designs operating in the UK – Magnoxes and Advanced Gas Cooled reactors, both graphite moderated and carbon dioxide cooled, and one PWR, at Sizewell in Suffolk. There are no further reactors planned or under construction in the UK. However, the industry has recently been pushing for new nuclear construction and further life extension, using climate change as the basis of their argument that nuclear power is environmentally sound.

The decision to abandon new construction followed a failed attempt to privatise the nuclear power industry along with the rest of the electricity supply industry in 1990. The AGR reactors and

Sizewell B were finally privatised in 1996 under the ownership of British Energy, although ownership of the Magnox reactors was transferred to BNFL and they remain in public hands. The position of the UK Government regarding new construction in the UK is ostensibly the same as in the mid 1990s - that there is no economic argument for new nuclear plants.

UK reactor designs were not widely exported. Only two overseas stations —Tokai in Japan and Latina in Italy— were ever built. Both these Magnox stations have now been closed down.

The most controversial part of the UK's nuclear industry is undoubtedly BNFL, the owner of the Sellafield reprocessing plant in Cumbria. The controversy surrounding the company has largely been centred on its environmental record and performance, although broader safety, economic and proliferation issues have also caused concern. Most recently, concern has focused on the discovery that BNFL had fabricated safety data on MOX fuel rods made for export to Japan. A subsequent inspection of the Sellafield site found that safety levels were *"only just tolerable".*[345] The company is currently waiting for Government consent to open a new MOX fabrication facility, the Sellafield MOX plant.

BNFL is wholly owned by the UK Government, with the Department of Trade and Industry holding all but one share in the company. The remaining share is owned by the Treasury. Despite this, BNFL is meant to function as an independent Public Limited Company.

The third major nuclear company in the UK is UKAEA, which owns the Dounreay site in northern Scotland. Although the fast breeder reactors and reprocessing plants are now closed, the environmental legacy of dealing with the resulting nuclear wastes remains. AEA have been criticised for not addressing past mistakes at the site, as well as failing to manage new problems adequately. The research and development and consultancy components of UKAEA were privatised in 1996 as AEA Technology.

The industry plans to build deep dumps for much of their low and intermediate wastes. Following the rejection of their application to build the first phase of such a dump in 1997, there are no proposals about where this should be done, or when. Similarly, there are no plans to site or build a dump for High Level Waste in the UK.

Future Strategies

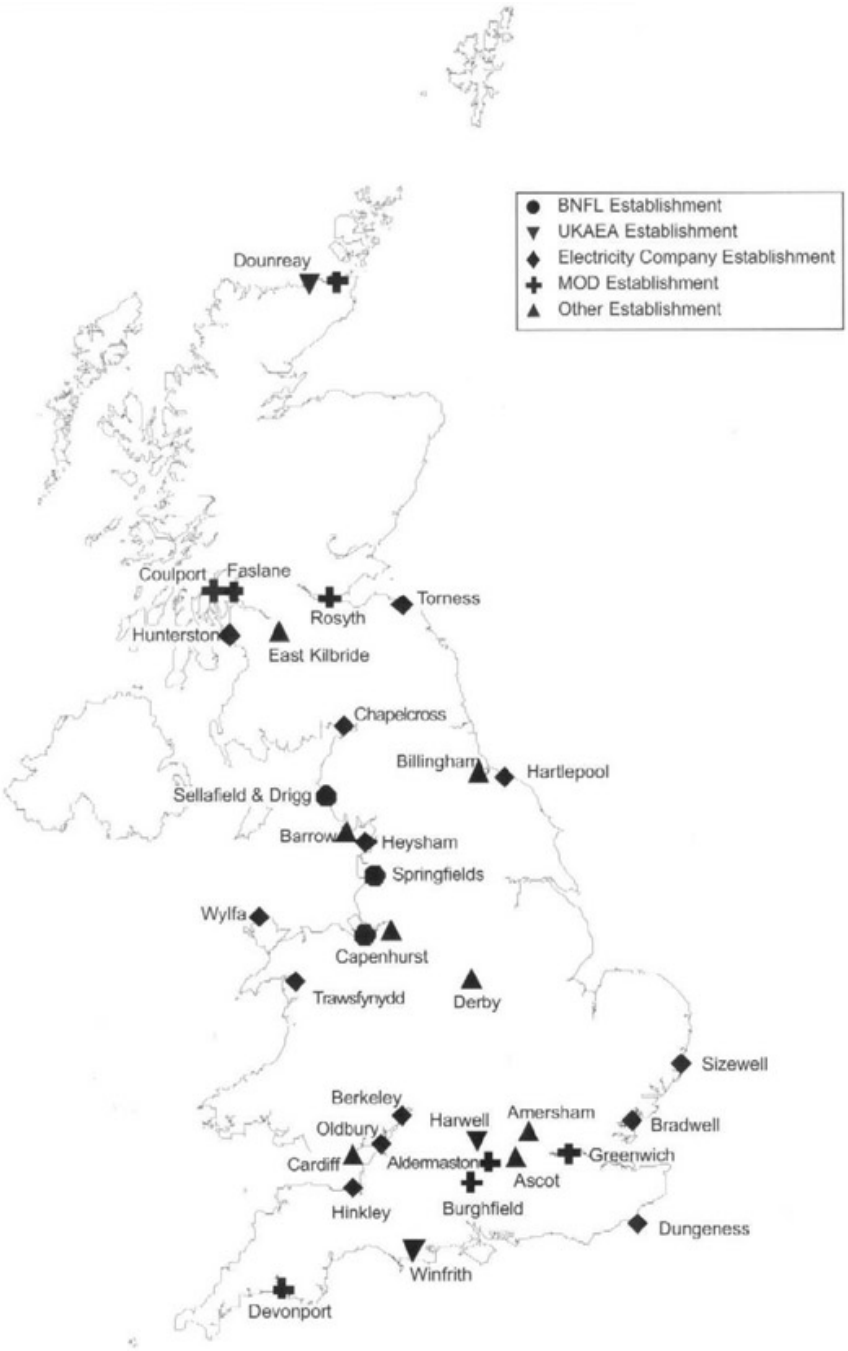
The privatisation of parts of the industry led to a change of strategy for British Energy. It has purchased a coal fired station in the UK and is moving into the emerging offshore wind power market. It is also contracted to operate nuclear power stations in the US and Canada on a lease system. These include the notorious Three Mile Island station.

UKAEA, and AEA Technology have, by contrast, distanced themselves from operational issues and are concentrating on decommissioning and clean up contracts.

BNFL is the only remaining UK nuclear operator with clear intentions of expanding its nuclear activities. Over the past few years, the company has expanded from a solely UK-based fuel cycle operation to an increasingly global force. Partly this has been achieved through the expansion of its core activities, especially nuclear waste management in the US through BNFL Inc, but it has also bought up other nuclear companies. In 1999, BNFL bought Westinghouse, which has provided nearly 50% of the world's nuclear power plants, either directly or through its licensees. This was followed by the purchase of ABB's nuclear businesses in 2000. These acquisitions mean that BNFL

has a strong capability in both the Boiling Water Reactor, and the Pressurised Water Reactor, markets. BNFL has also invested in the South African Pebble Bed Modular Reactor design. BNFL now has offices in 14 countries other than the UK.[346]

Nuclear Reactor Sites in the United Kingdom



BNFL also has reprocessing contracts for its THORP plant at Sellafield with a number of other countries. The contracts include the return of the separated plutonium to the country of origin, although the extent of the return of other nuclear wastes created by reprocessing remains undecided.[347] In addition, the Magnox fuel from the exported Italian and Japanese reactors has been reprocessed.

THORP Reprocessing Contracts

	1994 - 2003	2004 on
United Kingdom	2158	2400*
Germany	969	950
Japan	2673	
Switzerland	422	
Sweden	140	
Spain	145	
Italy	143	
Netherlands	53	
Canada	2	

BNFL's Main Subsidiaries and Undertakings

Subsidiaries/associated undertakings	Activities
Magnox Electric	Owns and operates Magnox nuclear reactors
BFNL Inc	Mainly waste management and decommissioning in North America
Westinghouse Electric Co Inc	Global nuclear construction. Incorporates Combustion Engineering and the former ABB nuclear business
International Nuclear Fuels Ltd	Shareholder of both Pacific Nuclear Transport Ltd an Urenco Ltd, which Enriches and supplies uranium

Having said that, there are clear indications that both British Energy and BNFL are engaged in a discreet lobbying exercise for new UK reactors.[348] New nuclear construction in the UK would be conditional on further public subsidy: the Government's response has so far been to reassert the position that new construction remains uneconomic at the moment, and state that neither company has yet put forward proposals.[349] However, there is an increasing suspicion that this position may change into a more favourable one for the industry following this year's General Election.

Export Credit Guarantee Department

Background

The Export Credit Guarantee Department (ECGD) is an agency of the Department of Trade and Industry, and is ultimately answerable to the Secretary of State for Trade and Industry. The ECGD is governed by the provisions of the Export and Investment Guarantees Act 1991. Its statutory role is to facilitate trade: it is also required to endeavour to break even financially.[350]

The ECGD provides insurance and supports finance packages for exporters of capital goods and services. It also provides political risk insurance for companies who invest overseas.[351] Although cover is primarily directed towards UK companies, many bids include non-UK content. The level of cover granted to foreign content is decided on a case by case basis.

The ECGD insures about £3-4 billion a year of capital goods and services, and exports and investments overseas. It supports just under 20% of UK capital goods exports to non-OECD countries.[352] The investments and exports it backs far outweigh the UK's annual international aid budget.

ECGD Guarantees*

	£ billion
1991/92	2.1
1992/93	3.8
1993/94	4.1
1994/95	3.0
1995/96	4.0
1996/97	2.8
1997/98	3,541
1998/99	3,725
1999/2000	4,662

*unadjusted.
Source: ECGD Annual Report and Trading Accounts

Historically, the ECGD's actions were subject to the consent of the Treasury, although in practice some activities could be undertaken without the Treasury's consent if actions and decisions were taken within an agreed framework. From April 2001, the ECGD will move towards operating its own capital system, and making its own decisions on risk. This new system will be fully implemented in April 2002, removing much of the perceived Treasury interference from ECGD's operation. The Treasury will, however, retain responsibility for strategic oversight.

This increasing operational independence may go some way to reducing political interference in the ECGD's activities. Key decisions about the ECGD's work in the past were made collectively by Ministers, including the Prime Minister in cases where there was disagreement between different Departments. This clearly opens up the working of the ECGD to direct political bias, as well as the effects of high-level lobbying by interested parties. As one retired Treasury official put it in evidence to the Trade and Industry Committee on the ECGD, the final decisions *"often owe more to political weight than to fine calculations of risk assessments".*[353] However, the extent of the ECGD's new

independence is yet to be tested, and there is still the potential for political direction through the ECGD's Account 3 (see below).

The ECGD has recently agreed a co-operation agreement with the US Exlm Bank which would allow the two agencies to co-finance projects.[354]

ECGD procedures

The ECGD divides its business into four Accounts. Account 1 contains loss-making business underwritten before April 1991; Account 2 contains all business underwritten since 1991 other than that contained in Account 3 (see below). Account 4 covers export finance activities.

Account 3 comprises business that the ECGD judges cannot be underwritten using its current underwriting criteria, and for which Ministers have instructed it to issue a guarantee on the grounds of national interest. The intention is that Account 3's use should *"continue but its use in future should be exceptional and confined to supporting business that cannot be accommodated within normal Account 2 cover arrangements and where there are significant wider Government policy interests at stake. Account 3 should not represent an 'escape route' for risky business that ECGD cannot accept under its Financial Objective. HM Treasury approval will be required for each transaction".*[355]

Account 3 guarantees do not appear to be issued often. There were none in 1998/99,[356] while the three issued in 1999/00 did not materialise.[357] However, despite the ECGD's statutory duty to break even, and the intention that it should become increasingly independent of Government and Treasury control, Account 3 allows direct political interference in the ECGD's activities. This raises the possibility of the UK underwriting high risk or uneconomic projects as a result of political commitment, rather than as a result of ECGD's obligation to encourage trade and break even.

The ECGD's Environmental and Ethical Record

The ECGD has been the subject of some sustained campaigning from human rights, development and environmental NGOs. Much of this criticism has been focused on the level of guarantees offered to arms exporters. In environmental and social terms, it has been particularly attacked over two large dam projects: the Pergau dam in Malaysia and the planned Ilisu dam in Turkey.

Part of the rationale behind the criticism was the Labour Government's stated commitment to an 'ethical foreign policy'. However, the reality of balancing wider political commitments with this policy has shown that the Government is unwilling to reduce trade if it looks as though British trade overall would suffer.

Both the Ilisu and Pergau deals have been criticised at a high level for failing to consider environmental damage when granting credit. The Ilisu deal in particular also failed to consider human rights issues and the impact of the project on the Kurdish communities in the region as well as the broader political impacts of building a dam 40 miles upstream from Syria and Iraq, who also rely on the Tigris for water. The International Development Committee summarised the shortcomings in the Ilisu project as follows: *"We have here a project proposed for ECA support that, despite having been in preparation for many years, fails almost every internationally agreed test in terms both of consultation and planning for environmental and social impact".*[358]

The failings identified with the ECGD's assessment procedures for the Ilisu dam led both the Trade

and Industry Committee, and the International Development Committee of the House of Commons to call for wide-ranging reforms of the ECGD. Final ECGD support for the Ilisu dam remains uncertain. Although the Secretary of State for Trade and Industry has stated that he is 'minded' to support the project, subject to the Turkish authorities addressing environmental and social concerns, no final decision has yet been taken.

ECGD's Mission Statement and Business Principles

In July 1999, the Secretary of State announced a review of the ECGD, with the intention of taking a 'fundamental look' at its functions and drawing up a clear Mission Statement to define its role over the next few years.[359] A number of similar reviews of the ECGD have taken place over the years. However, this one was unique in that it also examined the ECGD's broader role in environmental, social and human rights issues.

The review concluded that there was a strong case for retaining the ECGD, and for retaining its core aim of benefiting *"the UK economy by fulfilling its statutory purpose of facilitating trade".* The duty to aim to break even on projects also remains. However, the review also concluded that the ECGD should begin to promote the Government's other international policies more actively in ways that were consistent with the aim of facilitating trade. Accordingly, a new Mission Statement and Business Principles were devised, stating that the ECGD should, amongst other things, take account of the environmental and social impact of projects.[360]

A clear finding of the Mission and Status Review was that the *"ECGD should use its leverage to support projects which are economically sound, representing an acceptable risk, and to underpin the Government's international policies to promote sustainable development, human rights and good governance throughout the world".*[361]

The rationale for this remains firmly based in an economic analysis that poor environmental or social performance could increase risk for the ECGD and therefore the UK taxpayer: *"Ill-conceived and poorly executed projects can have negative impacts on the environment and local people and make for poorer quality risk. Bribery and corruption can also undermine the economic benefits of a project and even the economy of the buying country. It is in ECGD's self-interest to take full account of these factors in its assessments and to promote good projects".*[362]

This approach is consistent with the ECGD's statutory duty to try to break even on projects. However, it remains to be seen to what extent the ECGD is willing or able to assess the broad impacts of projects in future.

Since January 2000, all applicants for ECGD cover, other than those for defence or aerospace equipment, have had to complete an Impact Questionnaire. Initially this was limited to environmental issues, although it has subsequently been extended to cover social and human rights issues. It is not yet clear what the status of the social and human rights aspects of the Questionnaire is. In relation to environmental issues, its purpose is clearly not to constitute a formal evaluation of the environmental impacts of projects, as acknowledged by the Secretary of State for Trade and Industry: *"the environmental screening process… is designed to facilitate the identification of environmentally sensitive cases. Companies will not have to provide an environmental impact assessment in all cases".*[363]

ECGD's Business Principles

The following Business Principles set out our approach to achieving our goals:

We will promote a responsible approach to business and will ensure our activities take into account the Government's international policies including those on sustainable development, environment, human rights, good governance and trade.

We will provide a customer oriented, efficient and professional service and we are committed to continuous improvement.

We will be open and honest in all our dealings and will expect the same from others.

We will, in developing our services, consult widely and take account of the legitimate requirements and expectations of our customers and other interested parties.

We will apply these Business Principles through policies which have been grouped under the following headings:

- ECGD in Business
- Sustainable Development & Human Rights
- Developing Countries
- Business Integrity
- Transparency

These Business Principles will be applied through the following activities:

We will further develop our existing guidelines and working procedures to assist detailed implementation of our policies at a practical level. These will be kept under review and updated to take account of international developments and operational experience.

We will actively promote and communicate our principles and policies to all our customers, our overseas counterparts and other interested parties. We will prepare and support our staff to implement and apply the policies and procedures in an effective way.

We will develop appropriate performance indicators to enable us to monitor and report on the implementation of the policies and procedures. The Export Guarantees Advisory Council (EGAC) will keep our Business Principles under review and suggest any necessary modifications.

ECGD's Sustainable Development and Human Rights Principles:

Objectives

- ECGD will, when considering support, look not only at the payment risks but also at the underlying quality of the project, including its environmental, social and human rights impacts
- ECGD's approach in determining whether to support a project will be one of constructive engagement with a view to achieving necessary improvements in the project's impacts
- ECGD will press for reform on sustainable development and human rights issues in relation to export credits.

Policies

- ECGD will not support any exports (including those involving defence sales) which require an export licence, unless such a licence has been granted by the relevant authority
- ECGD will increase its awareness and understanding of project impacts, including environmental, social or human rights aspects of relevant projects
- ECGD will determine the acceptability of applications for cover, taking account of appropriate external standards, using its in-house expertise after consultation, where necessary, with other specialists
- ECGD will establish a mechanism for consulting other interested government departments on cases with significant project impacts
- ECGD will press for the establishment of a multilateral framework of common guidelines for assessing environment and social issues related to project implementation

In addition, there appears to be no published information on how the ECGD will assess the information provided, against what standards, or what action will be taken if the completed questionnaire indicates severe environmental impacts.[364] This lack of clarity led the Trade and Industry Committee to criticise the initiative: *"We recommend that an analysis of the costs and benefits of the screening process is published and there be clear, and published, criteria on which decisions will be based. The questionnaire is possibly the weakest form of environmental assessment that could have been chosen. We also recommend that the opportunity is taken to examine other options and we urge the publication of an analysis of all other possible tools of environmental assessment that are available to ECGD and the reasons for having rejected them in favour of a questionnaire."*[365]

Despite Government and ECGD proclamations about the 'radical' nature of these new considerations, there is still no clear requirement that the ECGD should require environmental impact assessments for projects or deals, and no requirement that they should, for example, produce emergency plans, or enforce rigorous safety standards on projects. Similarly, there is no requirement to ensure that there is public consultation on a project, no requirement to publish any environmental assessments that are carried out, no mechanism for outside auditing of the ECGD's performance and no compulsory compensation measures for people who may suffer as a result of a project.[366] In addition, other issues raised by the nuclear industry —in particular the proliferation of nuclear weapons-useable materials— are not included in the new ECGD guidelines.

The Business Principles are not designed to be a deciding factor in whether a project is or is not accepted for ECGD support. In this light, and in view of the fact that the ECGD's primary intention is to break even on projects, there is an obvious danger that environmental and social considerations will remain little more than a cosmetic part of ECGD's overall project assessments.

The Export Guarantees Advisory Council

The Export and Investment Guarantee Act established an Advisory Council to *"provide advice to the President of the Board of Trade at his request in respect of any matter relating to the operation of the Export Credits Guarantee Department"*.[367] This normally takes the form of advising the Export Credits Guarantee Department.

The Advisory Council has in the past been criticised for members' involvement with companies seeking ECGD support, and for its perceived role of nodding through projects. Its role was changed in line with the conclusions of the Mission and Status Review and is now to advise on the underlying policies and principles which ECGD needs to follow in order to achieve its new Mission, particularly how ECGD should take account of the wider impact of projects on overseas countries.

In order to reflect this broader role the Council's membership was revised to bring in outside expertise in the new areas in ECGD's Mission – taking greater account of the needs of smaller exporters, developmental aspects of ECGD supported projects and their environmental and other impacts.

The efficacy of the new Business Principles relies in large part on the Advisory Council. The impact of its new role and membership is yet to become clear. Although the Council now includes representatives from NGOs and academics, it is still dominated by big businesses such as Costain, and banks such as Barclays and Nat West.

ECGD and Nuclear Projects

Information on ECGD support for nuclear projects is hard to come by. Projects have not to date been consulted on outside Government, and there seems to be some difficulty in identifying past ECGD support. This is further complicated by the fact that ECGD does not publish the names of companies who have gained support for projects without their explicit agreement.[368]

China

Since the early 1990s, China has become one of the ECGD's top markets in terms of overall exposure, with significant investments in the electricity sector. Despite the UK Government's position that nuclear construction is not economically viable in the UK electricity market, the ECGD has supported several nuclear power projects in China. On the basis of the available information, the amount of ECGD guarantees totals at least £686 million.[369] Along with the US, Japan and Russia, China is a current priority export market for the UK nuclear industry.[370]

A recent Parliamentary Answer lists 3 projects: two for Qinshan Phase II, and one for Ling Ao.[371] However, the ECGD itself states that it has supported 4 projects,[372] while it in fact appears that 5 separate projects at 4 stations have been granted support (see table).

ECGD supported nuclear power projects in China

Project	Source	Value (£mil.)	Guarantee date	Bank	Company
Qinshan Phase II	Hansard Written Answer, 26 February 2001	37	1995/96	Standard Chartered Bank *	Weir Pumps Ltd
Ling Ao	Hansard Written Answer, 26 February 2001	576	1995/96		GEC ALSTOM
Qinshan Phase II	Hansard Written Answer, 26 February 2001	17	1996/97	Standard Chartered Bank *	Weir Pumps Ltd
Qinshan Phase III	House of Commons Hansard, Written Answers, 3 March 2000, Col 423; Hansard Written Answers, 17 March 2000, col 365; ECGD Annual Report and Accounts 1998/99, page 13	56	1998/99	China Development Bank	Bechtel/ GEC ALSTHOM
Daya Bay	ECGD Annual Report and Accounts 1995/96 and 1998/99, page 13	? *	pre 1995/96		GEC ALSTHOM

* The amount of support given by the ECGD is not known. However, ECGD's Annual Report and Accounts 1995/96 states that *"GEC ALSTHOM supplied turbine generators for the Daya Bay nuclear power station in China. ECGD has now also supported similar work by the company at Ling Ao"*. It is therefore entirely possible that the level of support equalled the £576 mil. support given to GEC ALSTHOM for the Ling Ao project.

BNFL is potentially involved through its Westinghouse subsidiary in the future construction of two 1000 MW PWR projects at Shandong and Sanmen. It has been reported that the China National Nuclear Corporation will join with Westinghouse to propose a design based on the Vandellos 2 station in Spain for Sanmen, on the basis that this is a proven design. In addition, the construction of an overseas-designed reactor is being explicitly linked by officials to the need to obtain foreign export credits.[373]

Negotiations for reactor construction contracts in China is now seen as *"a tug of war... between BNFL and Cogema"*.[374] It is not yet known whether BNFL's plans in China will involve ECGD support.

If Westinghouse did apply for ECGD support in the UK, there is significant potential for conflict of interest for the Department of Trade and Industry, which is both the major shareholder in BNFL, and is responsible for the ECGD.

Ukraine

The UK Government has promised US$28 million of the US$348.3 million of export credits envisaged for the completion of the Khleminisky 2 and Rovno 4 reactors. This support however, appears to be conditional on UK interest in the project. In a letter explaining the UK's position, the Secretary of State for Trade and Industry said: *"Any ECGD support will depend upon a potential UK exporter being involved and will be subject to ECGD's due diligence and underwriting requirements."* [375]
As of the end of November 2000, no UK companies had approached the ECGD for support for the project.[376]

In the absence of any UK applicants, there must be a question mark over the viability of any ECGD support for the project. An additional question mark is raised by the UK's credit rating for Ukraine: the ECGD withdrew support from exports to Ukraine because of *"a deterioration in [its] risk outlook"*.[377] The ECGD set out its assessment of Ukraine's economic position in its 1998/99 Accounts as follows:

"The country has suffered from fall-out from the Russian crisis, the currency has deteriorated markedly, inflation has increased and the external position remains vulnerable given the low level or reserves and bunching of debt repayments."[378]

Given these conditions, any support would presumably have to come from the ECGD Account 3, implying direct political interest in the project, rather than any perceived gain for the UK taxpayer.

Russia

In September 2000, the US and Russian Governments agreed to dispose of 34 tonnes of weapons grade plutonium each. Part of this deal envisaged the production and use of MOX fuel for use in nuclear reactors, possibly outside Russia. Russia has been negotiating with Siemens for the sale of components from the mothballed Hanau MOX fabrication plant in Germany. However, these negotiations have repeatedly stalled over the question of the cost of the components.

The UK is one of only 3 G7 countries that have so far expressed its willingness to provide financial support for the plan. So far this amounts to US$105 million for pre-operational expenses.[379]

Although there has been no official confirmation that the ECGD would be involved in supporting UK involvement in the deal, it would appear that this is the most likely option for the UK Government,

with BNFL as the most likely recipient of support. Given the non-commercial nature of any MOX fabrication plan, it is again likely that any ECGD support would be dealt with through Account 3.

It has been reported that BNFL will be ready to 'step into the breach' if negotiations between Siemens and the Russian Government over the sale of the Hanau MOX fabrication plant. Norman Askew, the Chief Executive of BNFL is quoted as saying that the company has *"already made contact with the Russian government and would be pursuing developments in Germany with great interest. The British Government would also be ready to provide financial support"*.[380]

United States

Brief History of U.S. Nuclear Development

The United States is the world's major commercial nuclear power, with nearly 1/4 of the world's operating reactors on its shores. Proportionately, nuclear power is less important to the U.S. than to some other countries; only about 19% of its electricity is nuclear-derived. Nuclear power is far less dominant for the U.S. energy scheme than seemed the case less than three decades ago, when then-President Richard Nixon confidently predicted 1,000 operating atomic reactors by the year 2000. Nixon was off by only 897 reactors. That is reflective of the history of the atomic power industry in the U.S.-many promises, but little delivered.

The nuclear power industry in the U.S. began with the Atoms for Peace programme, promoted by then-president Dwight D. Eisenhower. Seemingly intended mostly to assuage the guilt felt by those scientists who had participated in the bomb-making Manhattan Project, Atoms for Peace promised a new era of electricity 'too cheap to meter'. In reality, the programme gave the world Shippingport, a small reactor in western Pennsylvania that brought vast attention to the fledgling nuclear power industry, while basically failing at its primary task of providing reliable electricity for the region.

However, buoyed by presidential support and congressional action in passage of the Atomic Energy Act and the Price-Anderson Act (which limited liability for manufacturers and utilities involved in nuclear power production), several corporations began selling atomic reactors despite having no experience at producing commercial-size reactors. These companies were Westinghouse, General Electric (GE), Combustion Engineering, Babcock & Wilcox, and General Atomics.

GE was first off the block, offering utilities turnkey reactors: for a fixed price, GE would provide the utility with a completely operational reactor. Westinghouse quickly followed suit; but both companies discontinued the practice after losing money on their initial endeavors. All five companies, however, tried to obtain contracts for their own particular versions of nuclear power plants. Westinghouse won the lion's share of the utility bids, with GE a close second. The other companies were further behind, especially General Atomics, which had a gas-cooled reactor design completely unlike the other manufacturers.

In the end, however, all the manufacturers lost. High inflation and soaring construction costs, reduced electrical demand, and the 1979 Three Mile Island accident (whose reactor was designed by Babcock & Wilcox) —which brought about numerous new safety requirements— combined to end the nuclear industry in the U.S.

As many commercial reactors were ultimately cancelled after ordering as were actually built. No reactor orders placed after October 1973 were actually completed. The industry reached a peak of 112 operable reactors, a number which began falling in 1989 and fell more quickly during the mid-1990s, as several large power plants were permanently retired. These were victims of high operational and maintenance costs as well as the belief that impending utility deregulation would make reactors unviable in a competitive market.

That view changed in the later 1990s and early 2000s, as utilities forced under utility deregulation to sell their generating capacity found eager buyers (albeit at ten cents or less on the dollar) for their

aging reactors. As buyers were identified, as could be expected, the price for reactors – as well as any type of generating capacity-began inching upward.

Meanwhile, the prospect of new reactor construction grew ever dimmer. While the utilities were deregulating and restructuring, the reactor manufacturers began consolidating, in search of an advantage in the global atomic market.

Combustion Engineering was bought by the Swedish firm ABB (Asea-Brown-Bovi), which in turn was purchased by British Nuclear Fuels (BNFL), a government-owned entity. Babcock & Wilcox was purchased by Framatome of France. Westinghouse was also purchased by BNFL, leaving only GE and General Atomics-which had succeeded in obtaining only one, rather disastrous commercial reactor contract in the US-as the last U.S.-owned reactor designers.

This realignment of the world's nuclear power industry may have tremendous ramifications on the actions of the U.S. Export-Import Bank, which is chartered to provide loans to assist the export of U.S. goods and technologies.

Since the dawn of the atomic age, the Exim, as it is called, has provided more than US$7 Billion in loans to pay for the construction and upgrading of nuclear installations across the globe. In earlier years, most of this money went for reactor construction; more recently, as the pace of nuclear construction has slowed globally, it has gone for nuclear services contracts-especially the upgrading of reactors in Eastern Europe.

Most Americans continue to reject nuclear power; for example, Californians, despite their current energy woes, reject new nuclear reactors by a margin of 60% or more. Nuclear power attracts little more support across the rest of the U.S. New efforts by Exim to fund large new nuclear projects across the globe, even to benefit U.S. business, seem destined for substantial public opposition, especially in an age of increased public attention to the problems caused by unchecked corporate globalization. Attention that has been focused on operations of the World Trade Organization, World Bank and International Monetary Fund is now zeroing in on the activities of the taxpayer-funded and chartered Exim. Public opposition to many of its policies-especially its nuclear guidelines-seems destined to grow.

History of Exim's Nuclear Programme

According to an article in the March 2000 Progressive magazine, the U.S. Export Import Bank spent about US$7.7 Billion between 1959 and 1993 to sell U.S. nuclear reactors and equipment to other countries. The Bank itself says it doesn't know how much it has spent – that information is available only by filing a Freedom of Information Act request (which NIRS has filed). However, staff say the number 'sounds about right.'

Since 1993, the bank has slowed the pace of its nuclear spending somewhat. According to documents provided to NIRS, Exim provided loans of about US$710 million for nuclear projects over the past seven years. All of these funds went to controversial nuclear projects in Eastern Europe and mainland China.

Exim has been involved with many of the most controversial nuclear power projects ever attempted. These include the failed effort by Westinghouse to build a reactor on the Philippines' earthquake-prone Bataan peninsula, site of an active volcano. Exim gave support for Bulgaria's notorious

Kozloduy nuclear complex, described by a former U.S. Nuclear Regulatory Chairman as *"one of the two most dangerous nuclear plants in the world"* (the other being Russia's Kola nuclear facility). It also provided funding for Westinghouse nuclear projects in China-which refuses to sign the international Non-Proliferation Treaty.

In recent years, Exlm has funded new computers for Lithuania's Ignalina nuclear complex, which includes the world's two largest single reactors-both of the same design as Chernobyl. It provided loans to complete the Temelin nuclear facility in the Czech Republic, which has come in years late and some US$1 billion over budget-and still can't meet Western safety standards. In that case, Westinghouse had convinced the Czech government that it could effectively take an unfinished Soviet VVER-1000 reactor, improve its safety margins, and bring it in at budget. Westinghouse could not, and did not. Although Unit 1 has begun operations, it has experienced numerous technical problems and has yet to reach full power.

Exlm was also prepared to approve a loan for Westinghouse to build a new reactor at Akkuyu, Turkey – another seismically-active zone. However, the Turkish government finally decided a reactor was both economic and cultural suicide, and cancelled the project outright.

One critical decision is coming up that will say a lot about Exlm's future direction. The Bank is going to be asked to provide, by its standards, a relatively small amount of money to support the completion of two Soviet-era reactors in Ukraine, known as K2R4. Ukraine is currently banned from receiving Exlm loans, due to its ongoing financial crisis and mounting debt. The reactors are old, unfinished Soviet models, and cannot be brought to Western safety standards. Moreover, there are no plans to even attempt to upgrade them until after they are brought on line and operating.

The deal is part of a multinational effort to conclude the permanent shutdown of the last remaining Chernobyl reactor, which took place on December 15th 2000. In return for the closure of Chernobyl, the G7 countries said they would help Ukraine complete these already-aging reactors on condition that it could be shown to be the least cost option. The country seems unlikely to meet several conditions attached to its initial loan granted by the European Bank for Reconstruction and Development-most notably, major reform of its electric utility sector.

If Exlm chooses to reject loans for K2R4 —on economic, environmental or free market ground— the project may have to be abandoned. This could give Exlm a larger role in supporting U.S. companies that could provide sustainable energy technologies to Ukraine, and help strengthen those companies to compete for new loans in other countries.

Post 1993 Credit Guarantees for Nuclear Project

Date	Country	Reactor	Amount US$
1994	Czech Republic	Temelin 1 and 2	317 million
1996	China	Quinshan II and III	356 million
1999	Lithuania	Ignalina	19.8 million
2000	Bulgaria	Kozloduy 5 and 6	77 million
2001 (pending)	Ukraine	Khmelnitsky 2, and Rovno 4	131 million

Nuclear Lending Guidelines

Applicants for loans for nuclear projects are automatically assigned to a separate category (Category N) from other bank applications. These applications are reviewed under nuclear-specific guidelines, which vary depending on the type of reactor system and project.

Separate guidelines are published for:

1) reactors using U.S. sourced or licensed Nuclear Steam Supply Systems (NSSS);
2) reactors using non-U.S. sourced or licensed NSSS systems, except those using Soviet designs;
3) reactors using Soviet designed NSSS systems;
4) supply of nuclear fuel reloads and related equipment;
5) research reactors or the production of radioisotopes for medical or other purposes.

Other types of nuclear-related projects, such as fuel fabrication facilities and plant decommissioning, are handled on a case-by-case basis. Some loans, such as for reactor simulators, radiation monitoring equipment, plant surveillance equipment, and *"other equipment not directly connected with the operation systems of a nuclear facility"* including site evaluations and feasibility studies, are exempt from the guidelines.

All nuclear projects must meet the Bank's 'general environmental objectives,' which address air and water quality, non-nuclear waste management, natural hazards, socioeconomic framework, ecology and noise. For new reactors, an environmental assessment covering all of these issues must be prepared. For upgrades and retrofits to existing reactors, information must be provided *"to the extent available commensurate with the scope of the retrofit or upgrade, indicating the degree of compliance with the environmental guidelines..."*. These include an indication that radiation releases shall be ALARA (as low as reasonably achievable) as well as specific targets for discharges to water of various chemicals and of thermal temperatures.

Each nuclear application is assigned to the Engineering and Environment (E&E) Division for review. In addition to the environmental objectives, each applicant must show that *"the project will be designed and assurance provided"* that the facility will operate according to basic International Atomic Energy Agency (IAEA) guidelines, and will *"minimize the emission or release of radioactivity and the resulting risks to the health of plant personnel and the general public".*

For most projects, including all large-scale commercial reactors, the applicant must demonstrate that the host country has an established and functional nuclear regulatory authority and a backing legal code of regulations; has an acceptable regime for governing liability for nuclear damage; has sound emergency procedures and evacuation programmes; and, nuclear waste handling procedures in accordance with IAEA principles and an environmental monitoring facility. The host country must also provide a list of nuclear-related treaties and conventions it has signed.

For non-U.S. sourced or licensed reactors, the applicant must show that the reactor's design *"meets basic IAEA safety standards".* This includes an adequate containment structure, emergency core cooling system and other accident prevention and mitigation systems. (Apparently ExIm assumes that all U.S.-supplied reactors already have these attributes.)

This is not the case for all Soviet-designed reactors, however. According to ExIm, it *"supports the G7 policy to encourage the early shutdown of RBMK and VVER-440, Model V 230 nuclear power plants"* because of their lack of containment and an adequate emergency core cooling system. For

such reactors, Exlm says it will provide loans only to *"improve the near term and operational safety of these types of plants and which do not extend the useful life of the plants."*

Exlm will, however, support loans for other Soviet reactor designs. It claims the VVER-1000 reactors have *"a containment vessel and an adequate emergency core cooling system"* and that the VVER-440 Model V 213 has *"an adequate emergency core cooling system"* (implicitly acknowledging that design's lack of containment).

Shortcomings of Exlm Nuclear Guidelines

Exlm's nuclear guidelines fall far short of those required for the construction of or major retrofits to reactors inside the United States, leading to the impression that the U.S. government values human life and the environment less outside its borders. For example, commercial nuclear facility licensing in the U.S. is considered a major federal action affecting the environment. A full, binding Environmental Impact Statement (EIS) must be prepared following the regulations imposed by the National Environmental Policy Act (NEPA). Affected persons, including NGOs, state and local governments, and individuals, may comment upon a draft EIS, and may challenge a completed EIS in court. These entities may also usually participate in Nuclear Regulatory Commission (NRC) adjudicatory licensing hearings (although the NRC is now attempting to limit the ability of 'intervenors' to participate in such hearings).

Exlm requires a much more limited 'environmental assessment'. While it promises to review and analyze comments submitted by NGOs and others, it makes it clear that no legal standing is attached to the receipt of comments from any interested party.

Moreover, to *"protect competitively sensitive information,"* Exlm refuses to provide to the public *"specific information about the exporter, contract value or identity of the products for which Exlm bank financing is sought"* – making meaningful comments often impossible. If one does not know what product is being provided to a given nuclear plant, how can one offer substantive comments?

Ex-Im's essentially unquestioning support of nuclear projects is made clear on the first page of its guidelines. The Bank states that it *"is not attempting to regulate nuclear related exports… nor is it taking responsibility for the ultimate safety of these plants".* The document adds that even the Bank's guidelines *"are not binding rules or regulations",* and that the Bank's Board of Directors *"will exercise judgement"* in reviewing nuclear transactions. Moreover, the guidelines encourage applicants to *"submit information about the potential environmental benefits of the project".*

In other words, potential exporters need not really worry about the guidelines as no-one plans to hold the exporters to any particular standard. This is demonstrated by the Bank's approval of loans for Lithuania's Ignalina nuclear complex (RMBK reactors). This should not receive funding under the Bank's guidelines that supposedly encourage the shutdown of these reactors. In fact, the Bank has provided funding for modifications to these reactors that the host countries have boasted means they can continue to operate despite their well-known safety deficiencies. The guidelines on the Soviet VVER- 1000 design conveniently ignore that this type of reactor could never be licensed in the United States, or any other western nation.

Perhaps this is understandable given Exlm's statement in its nuclear guidelines that the Bank *"is committed to maintaining the competitiveness of U.S. exporters seeking to supply goods and*

services for foreign nuclear projects". Coming just as it does before Exlm's statement that the guidelines *"are not binding rules or regulations",* the Bank's intent is clear: it will do whatever it can to support the U.S. nuclear power industry.

But what constitutes the U.S. nuclear power industry? Globalization and consolidation have left the U.S. with only one clear domestic-based reactor manufacturer: General Electric. Does that mean Exlm, which after all is chartered to assist U.S. corporations compete in the international marketplace, cannot loan to any reactor manufacturer other than GE. According to staff at Exlm, that is not the case. In fact, Exlm will loan to any company, as long as it produces the goods and services that it intends to export inside the U.S.-regardless of where the profits may go. Thus, as long as BNFL continues to keep a Westinghouse nuclear division in the U.S., it is eligible to obtain U.S. taxpayer dollars to support its nuclear expansionist ideals.

Future of Exlm Nuclear Guidelines and Loans

The future of U.S. Export-Import Bank support for nuclear power projects is unclear. As a political institution chartered by the U.S. Congress whose chief executive is appointed by the President, the Bank is somewhat subject to the vagaries of presidential administrations and Congressional whims.

In the immediate case, given the strongly pro-nuclear sentiments of the Bush administration, it could be expected that overseas nuclear projects would be given strong impetus. However, the administration also has indicated it may cut Exlm's funding by as much as one-quarter, putting the Bank's ability to make large nuclear loans in some doubt. Uncertainty over the Bank's future under such a drastic potential budget cut and uncertainty over the direction of the Bank given the unknown leadership of a new chief executive appears to be hurting staff morale.

In addition, the Bank's current environmental guidelines are now being revised, with as yet unknown ramifications. Its nuclear project guidelines were set to expire on April 2nd 2001. However, in March 2001 they were extended until December 2001. Exlm staffers have suggested the need for NGOs to comment on the present nuclear guidelines, with an eye towards improving them. However, there is apparently no established framework to do so, and no transparent process to review or comment upon proposed guidelines. NGOs that wish to comment upon the current guidelines, and offer improvements, may do so through NIRS-which will assure the comments reach an
appropriate destination.

Recommendations

1) The U.S. Export-Import bank should cease funding for all nuclear power related projects, and instead fund projects to implement sustainable energy practices and technologies. These tend to be less capital-intensive, offer greater economic benefits to both the host country and the U.S. —particularly in terms of employment— and are environmentally beneficial, rather than detrimental.

2) To the extent that nuclear projects are considered, the U.S. Export-Import Bank should insist on full environmental impact statements as contemplated by NEPA, with full standing and judicial review provided to all commenters. Exlm should also, as a requirement for loan approval, require

full adjudicatory licensing hearings by host countries for all nuclear projects.

3) To the extent that nuclear projects are considered, the U.S. Export-Import Bank should establish binding rules and regulations, rather than breakable guidelines, to determine whether a given project might be approved for a loan. Full participation, including adjudicatory hearings, should be granted to interested entities, including NGOs.

4) To the extent that nuclear projects are considered, the U.S. Export-Import Bank should declare that its first priority is public and environmental health and safety, and not the profits of the nuclear power industry-most of which is not based inside the U.S. No presumption of environmental benefit should be granted to nuclear projects.

5) Projects involving Soviet reactor designs, including all VVER and RBMK models, should be rejected outright, as they cannot meet U.S. or other western safety standards. This includes new reactor construction, upgrades, retrofits, simulators and any other assistance for such reactors.

ANNEX 1

Nuclear Safety

Germany 1992 "the safety of Soviet Designed nuclear power plants gives cause for great concern… The new States concerned in the former Soviet Union and the countries of central and Eastern Europe must give high priority to eliminating this danger."

"A special effort should be made to improve the safety of these plants. We offer the states concerned our support."

Japan 1993 "We welcome the progress made in the nuclear safety programme agreed at the Munich Summit… We invite the World Bank, together with the IEA, to continue the dialogue with each of the countries concerned, and working with other lending institutions including the EBRD and the EIB, to support them in developing longer term energy strategies. Our aim is to agree as quickly as possible on a framework for co-ordinated action by all those involved following a country by country approach. We will review the progress make in 1994."

Italy 1994 "We welcome the progress made in the nuclear safety programme, agreed by the Munich and Tokyo summits, concerning [nuclear safety] in the countries of Central and Eastern Europe and former Soviet Union."

"An effective framework for co-ordinated action is now in place. The World Bank, working with other lending institutions including the EBRD and the EIB, and with the IEA, is helping countries develop long term energy strategies… The IFIs are invited according to their mandate to make full use of their lending possibilities for this purpose."
"We remain committed to the existing international initiatives to promote an early closure of high risk reactors. The closing down of the Chernobyl nuclear power plant is an urgent priority."

Canada 1995 "We welcome progress to date in improving levels of nuclear safety in the countries in central and Eastern and the Newly Independent States. We congratulate President Kuchma of Ukraine on his decision to close the Chernobyl nuclear power plant by the year 2000."

France 1996 "We have taken an important step toward enhancing international cooperation so that the use of nuclear energy is conducted all over the world consistently with fundamental principles of nuclear safety. We reaffirm our commitment, made in Moscow, to the highest internationally recognized nuclear safety level. In this regard, we underline that nuclear safety has to prevail over all other considerations."

US 1997 "We reaffirm our commitments from the 1996 Moscow Summit on Nuclear Safety and security to give an absolute priority to safety in the use of nuclear energy. We note that further substantial progress is still required in the countries of Central and

Eastern Europe and in the Newly Independent States, especially by strengthening regulatory authorities, enhancing reactors safety and improving safety culture. We consider further joint efforts to this end a major priority. In this regard, we attach the greatest importance to the full implementation of the Nuclear Safety Account Agreements."

London 1998 "Considering the new competitive pressures on our electric power sectors, we reaffirm the commitment we made at the 1996 Moscow Summit to the safe operation of nuclear power plants and the achievement of high safety standards world-wide, and attach the greatest importance to the full implementation of the Nuclear Safety Account grant agreements. We reaffirm our commitment to the stated mission of the Nuclear Safety Working Group (NSWG)."

Germany 1999 "We renew the commitment we made at the 1996 Moscow Summit to safety first in the use of nuclear power and the achievement of high safety standards worldwide. In this regard, we attach great importance to the results of the Nuclear Safety Convention peer review meeting and to the International Atomic Energy Agency Conference on Strengthening Nuclear Safety in Eastern Europe."

"We reaffirm our commitment to strengthen cooperation in the field of nuclear safety. We welcome the concerted efforts to address the Year 2000 computer problem ("Millennium Bug") in this area. With regard to the Nuclear Safety Account, we continue to attach great importance to full and timely implementation of the grant agreements."

Japan 2000 "We renew the commitment we made at the 1996 Moscow Summit to safety first in the use of nuclear power and achievement of high safety standards world wide. We agreed to continue to co-operate in promoting a high standard of nuclear safety. We continue to attach great importance to the full and timely implementation of the Nuclear Safety Account Grant Agreement."

Moscow Nuclear Safety Summit

To coincide with the 10th Anniversary of the Chernobyl disaster, in April 1996, the G7 and Russian Governments organised a special summit on Nuclear Safety in Moscow. The final statement from the Summit can be seen in the attached boxes.

1. The end of the cold war and the political and economic reforms in Russia have opened a new era in our relationship and have provided the international community with real possibilities for cooperation in the fields of nuclear safety and security. The Moscow meeting is an important step in the realization of these objectives. We are determined, at this summit and beyond, to work together to ensure the safety of nuclear power and to promote greater security for nuclear materials.

2. We are committed to give an absolute priority to safety in the use of nuclear energy. As we approach the tenth anniversary of the Chernobyl accident, it is our shared objective that such a catastrophe cannot reoccur.

We are ready to cooperate among ourselves so that the use of nuclear energy is conducted all over the world consistently with fundamental principles of nuclear safety. Further, we are committed to measures which will enable nuclear power, already a significant contributor to electricity supply in those countries choosing to exploit it, to continue in the next century to play an important role in meeting future world energy demand consistent with the goal of sustainable development agreed at the Rio Conference in 1992.

We recognize the importance of openness and transparency to obtain public trust which is a key factor for the use of nuclear energy.

3. The security of all nuclear material is an essential part of the responsible and peaceful use of nuclear energy. In particular, the safe management of fissile material, including material resulting from the dismantling of nuclear weapons, is imperative, not least as a safeguard against any risk of illicit trafficking in nuclear materials.

4. In the spirit of the decisions adopted during the New-York Conference of May 1995 on review and extension of the Non Proliferation Treaty (NPT), including the Decision on principles and objectives for nuclear non-proliferation and disarmament, we will increase our co-operation in the field of nuclear non-proliferation and disarmament i.e. by promoting universal adherence to the NPT, working vigorously to strengthen the IAEA safeguards system and through effective and responsible export control measures. We are issuing a separate text on a comprehensive Nuclear Test Ban Treaty (CTBT). We renew our commitment to the immediate commencement and early conclusion of negotiations on a non-discriminatory and universally applicable convention banning the production of fissile material for nuclear weapons or other nuclear explosive devices.

Nuclear Safety

5.Recognizing that the prime responsibility for nuclear safety rests with national governments, it is of the first importance to continue to enhance international collaborative efforts to promote a high level of nuclear safety worldwide.

Safety of Civilian Nuclear Reactors

6. Nuclear Safety has to prevail over all other considerations. We reaffirm our commitment to the highest internationally recognized safety level for the siting, design, construction, operation and regulation of nuclear power installations.
7. The promotion of an effective nuclear safety culture in each country with nuclear installations is essential to that end.

8. Sustainable nuclear safety also requires a supportive economic and legal environment whereby both operators and national regulatory bodies can fully assume their independent responsibilities.

9. Nuclear Safety can also be enhanced by greater international transparency in nuclear power activities, in particular by means of peer reviews, and this should lead to existing reactors which do not meet current safety requirements being brought to an acceptable level of safety or ceasing operation.

10. The adoption of the Convention on Nuclear Safety, which reaffirms these fundamental safety principles, is a major accomplishment in this field. We urge all countries to sign this Convention and to complete internal procedures to join so that the Convention can be brought into force expeditiously certainly before the end of 1996.

11. National efforts have been made in the countries of Central and Eastern Europe and the Newly Independent States to improve nuclear safety levels, often in cooperation with multilateral and bilateral programmes. In this regard, we acknowledge these important efforts to upgrade reactor safety and improve safety culture, but note that further substantial progress is still required. We reaffirm our commitment to cooperate fullly for this purpose.

Nuclear Liability

12. An effective nuclear regime must assure adequate compensation to victims of, and for damage caused by, nuclear accidents. In addition, to secure the degree of private sector involvement needed to undertake vital safety improvements, the regime should at the same time protect industrial suppliers from unwarranted legal action.

13. The essential principles in this area are the exclusive and strict liability of the operator of the nuclear installations and ensuring needed financial security for adequate compensation.

14. It is essential that countries with nuclear installations that have not yet done so establish an effective regime for liability for nuclear damage corresponding to these principles.

15. It is important to work together on enhancing the international regime of liability for nuclear damage with a view to ensuring that it will attract wide adherence and accommodate any state which may wish to become a party. We encourage the experts to make further progress to this end. In this connection, the reinforcement of regional cooperation is welcomed.

Energy Sector Strategies in transition countries

16. Efficient market-oriented strategies for energy sector reform are essential to promote nuclear safety. This will generate adequate resources for investment in safety upgrades and maintenance, and encourage, energy conservation. All countries in transition should pursue such market-oriented reforms and investment strategies based upon least cost planning, giving due regard to nuclear safety and environmental criteria, and to energy efficiency and conservation.

17. The International Financial Institutions have played a leading role in developing market-oriented energy sector reforms and investment plans. Their continued involvement and support is critical to ensure further progress.

Nuclear waste Management

International Convention

18. National authorities must ensure radioactive waste is managed safely and that provisions are made for its proper handling, storage and ultimate disposal. These are essential elements for any nuclear energy programme.

19. The development of the Convention on the Safety of Radioactive Waste Management, based on these principles, is of paramount importance. We call on all countries generating nuclear waste with nuclear installations to participate actively in the preparation of this Convention under the auspices of the I.A.E.A. and to encourage its effective finalisation and prompt adoption.

Ocean Dumping

20. We commit ourselves to ban dumping at sea of radioactive waste and encourage all states to adhere (at an earliest possible date) to the 1993 amendment of the London Convention.

Plutonium

2000

75. The transparent, safe, secure, environmentally sound and irreversible disposition and management of weapon-grade plutonium no longer required for defence purposes remains vital. The agreement on plutonium disposition reached between the United States and Russia, reinforced by their statement of intention concerning non-separation of additional weapon-grade plutonium, marks a critical milestone. The co-operation among the G8 countries has yielded significant results and our next steps should build on this co-operation and related international projects.

Our goal for the next Summit is to develop an international financing plan for plutonium management and disposition based on a detailed project plan, and a multilateral framework to co-ordinate this co-operation. We will expand our co-operation to other interested countries in order to gain the widest possible international support, and will explore the potential for both public and private funding.

1999

35. We recognize the continuing need to protect and manage weapons-grade fissile material, especially plutonium. In past years, G8 countries have worked on the issue of managing weapons-grade nuclear material no longer required for defense purposes. We affirm our intention to establish arrangements for the safe management of such fissile material. We strongly support the concrete initiatives being undertaken by G8 countries and others for scientific and technical cooperation necessary to support future large-scale disposition programmes. We invite all interested countries to support projects for early implementation of large-scale programmes and urge establishment of a joint strategy. We recognize that an international approach to financing will be required involving both public and private funds, and we will review potential increases in our own resource commitments prior to the next G8 Summit.

1998

74. Further regarding the safe and effective management of fissile material, with respect to such materials no longer required for defense purposes, we will continue our co-operation through concrete initiatives, in particular the French-German-Russian project to build a pilot plant in Russia to produce MOX fuel from weapons plutonium, which is open to additional states, and the related U.S.-Russian co-operation on the conversion of weapons plutonium.

ANNEX II

Sector Understanding on Export Credits for Nuclear Power Plant

Chapter I: Scope of the Sector Understanding

1. Scope of Application

a) This Sector Understanding, which complements the Arrangement:

– sets out the special guidelines which apply to officially supported export credits relating to contracts for the export of complete nuclear power stations or parts thereof, comprising all components, equipment, materials and services, including the training of personnel, directly required for the construction and commissioning of such nuclear power stations. It also sets out the terms which apply to support for nuclear fuel;

– does not apply to items for which the buyer is usually responsible, in particular, costs associated with land development, roads, construction village, power lines, switchyard and water supply, as well as costs arising in the buyer's country from official approval procedures (e.g. site permit, construction permit, fuel loading permit).

b) The terms of the Arrangement rather than the Sector Understanding shall apply to official support provided for the decommissioning of nuclear power plant. Decommissioning is defined as the closing down, or dismantling of a nuclear power plant. The common line procedures set out in Articles 70 to 77 of the Arrangement provide the possibility to restrict or extend repayment terms.

2. Review

The Participants shall review the provisions of the Sector Understanding annually.

Chapter II: Provisions for Export Credits and Tied Aid

3. Maximum Repayment Term

The maximum repayment term, irrespective of the country classification, is 15 years.

4. Minimum Interest Rates

a) A Participant providing official financing support through direct financing, refinancing or interest rate support shall apply minimum interest rates; the Participant shall apply the relevant Special Commercial Interest Reference Rate (SCIRR). Where the fixed SCIRR commitment is limited initially to a maximum period which does not exceed 15 years starting from the date of contract award, any official support for the remaining period of the loan shall also be limited to guarantees or interest rate support at the relevant SCIRR prevailing at the time of roll-over.

b) Where official financing support is provided for equipment for the partial supply of nuclear power plant for which the supplier has no responsibility for commissioning, the minimum interest rate shall be the SCIRR in accordance with Article 3 of this Sector Understanding. Alternatively, a Participant may offer the relevant CIRR in accordance with Article 16 of the Arrangement, provided that the maximum period from the date of contract award to the date of final repayment does not exceed 10 years.

5. Construction of SCIRRs

SCIRRs shall be set at a fixed margin of 75 basis points above the CIRR for the currency in question, except that for the Japanese yen, the margin shall be 40 basis points. For those currencies which have more than one CIRR rate, in accordance with the first tiret of Article 16 b) of the Arrangement, the CIRR for the longest term shall be used for constructing the SCIRR.

6. Local Costs and Capitalisation of Interest

The provisions of Article 25 of the Arrangement do not apply where official financing support is provided on the basis of the SCIRR. Official financing support at rates other than SCIRRs for both local costs and capitalisation of interest accruing before the starting point taken together shall not cover an amount exceeding 15 per cent of the export value.

7. Official Support for Nuclear Fuel

a) The maximum repayment term for the initial fuel load shall not exceed four years from delivery. A Participant providing official financing support for the initial fuel load shall apply minimum interest rates; the Participant shall apply the relevant CIRR. The initial fuel load shall consist of no more than the initially installed nuclear core, plus two subsequent reloads, together consisting of up to two-thirds of a nuclear core.

b) The maximum repayment term for subsequent reloads of nuclear fuel is six months. If in exceptional circumstances longer terms, but in any case not exceeding two years, are considered appropriate the procedures set out in Article 47 shall apply. A Participant providing official financing support for the subsequent reload of nuclear fuel shall apply minimum interest rates; the Participant shall apply the relevant CIRR.

c) Official support for the separate provision of Uranium Enrichment Services shall not be provided on terms more favourable than those which apply to nuclear fuel.

d) Reprocessing and spent fuel management (including waste disposal) shall be paid for on a cash basis.

e) The Participants shall not provide free nuclear fuel or services.

8. Aid

The Participants shall not provide aid support, unless this is in the form of an untied grant.

Chapter III: Procedures

9. Prior Consultation

Recognising the advantages which can accrue if a common attitude towards terms can be achieved for nuclear power plant, the Participants agree to engage in prior consultation in all cases where there is an intention to provide official support.

10. Prior Notification

a) The Participant initiating a prior consultation shall notify all other Participants at least ten days before taking a final decision of the terms it intends to support specifying, inter alia, the following details:

– cash payments;
– repayment term (including the starting point of credit, frequency of instalments for repaying

principal, and whether these instalments will be equal in amount);
– currency and value rating of the contract, in accordance with paragraph 7 of Annex IV;
– interest rate;
– support for local costs, including the total amount of local costs expressed as a percentage of the export contract value, the terms of payment, the nature of the support to be given;
– the portion of the project to be financed, with separate information for initial fuel load, where appropriate;
– any other relevant information including references to related cases.

b) Other Participants shall not take a final decision on the terms it will support during the ten day period specified in sub paragraph a) above but shall within five days exchange information with all other Participants in the consultation on the appropriate credit terms for the transaction with the objective of achieving a common attitude on such terms.

c) If a common attitude is not achieved through these means within the ten day period after receipt of the initial notification the final decision of each Participant in the consultation shall be delayed for an additional 10 days during which period further efforts to achieve a common attitude shall be made at face-to-face consultations.

Footnotes

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List of Main Abbreviations and Acronyms used in the Report

ABB	Acca-Brown-Bovi (Sweden)
AECL	Atomic Energy of Canada Limited
BNFL	British Nuclear Fuels Limited
BNP	Banque nationale de France
BWR	Boiling Water Reactor
CANDU	Canadian Deuterium Uranium Reactor
CEA	French Atomic Commission
CEE	Central and Eastern Europe
CIDA	Canada International Development Agency
CIRUS	Canada-India Reactor United States
CIS	Commonwealth of Independent States
CNNC	China National Nuclear Corporation
COFACE	Compagnie francaise d'assurance pour le commerce exterieur (France)
COGEMA	Compagnie générale des metières nucléaires
CTBT	Comprehensive Nuclear Test-Ban Treaty
DAE	Department of Atomic Energy (India)
DREE	Direction des relations économiques extérieures (France)
EAO	External Aid Organisation
EBRD	European Bank for Reconstruction and Development
ECA	Export Credit Agency
ECGD	Export Credit Guarantees Department (UK)
ECIC	Export Credit Insurance Corporation (Canada)
EDC	Export Development Corporation (Canada)
EDF	Électricité de France
EIBJ	Export-Import Bank of Japan
EID	Export, Import and Investment Department in METI (Japan)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
GE	General Electric
IAEA	International Atomic Energy Authority
IFO	International Finance Operations of JBIC
IMA	Inter-Ministerial Committee for Export Guarantees (Germany)
JBIC	Japan Bank for International Co-operation
KANUPP	Karachi Nuclear Power Project
KEDO	Korean Peninsula Energy Development Organisation
KEPCO	Kansas Electric Power Company

LWR	Light Water Reactor
METI	Ministry for Economy, Trade and Industry (Japan)
MINATOM	Ministry of Atomic Power (Russia)
MITI	Ministry of International Trade and Industry (Japan)
MOX	Mixed Oxide Fuels
NB Power	New Brunswick Electric Power Commission (Canada)
NEK	Bulgarian national Energy Producer
NEPA	National Environmental Policy Act (US)
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSA	Nuclear Safety Account
NSP	Nuclear Steam Plants
NSSS	Nuclear Steam Supply Systems
OECD	Organisation for Economic Cooperation and Development
OECF	Overseas Economic Co-operation Fund
OPIC	Overseas Private Investment Corporation
PHWR	Pressurised Heavy Water Reactor
PWR	Pressurised Water Reactor
ROSEXIMBANK	Russian Export-Import Bank
SACE	Sezione Speicale per l'Assicurazine del Credito all'esportazione (Italian)
SCFAIT	Standing Commission on Foreign Affairs and International Trade (Canada)
SCM	Subsidies and Countervail Measures Agreement (WTO)
UKAEA	United Kingdom Atomic Energy Authority
US ExIm	US Export-Import Bank
VEK	Federal Service on Currency and Export (Russia)
WH	Westinghouse Electric Corporation
WP ECG	Working Party on Export Credits and Credit Guarantees
WTO	World Trade Organisation