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THE LIMITS OF CONDITIONALITY: NUCLEAR REACTOR SAFETY IN CENTRAL AND EASTERN EUROPE, 1991 - 2001

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KEY TERMS

ASSET	Assessment of Safety Significant Event Team
CMEA	Council for Mutual Economic Assistance
EBRD	European Bank for Reconstruction and Development
EdF	Electricité de France
EIB	European Investment Bank
IAEA	International Atomic Energy Agency
NEA	Nuclear Energy Agency
NEK	Bulgarian state-owned firm running Kozloduy plant
NSA	Nuclear Safety Account
NUSAC	G-24 Nuclear Safety Assistance Coordination Mechanism
OSART	Operational Safety Review Team
PHARE	Pologne: Hongrie: Actions pour la Reconversion Economique
PWRs	Pressurized Water Reactors
RBMK	Russian acronym for Large Capacity Channel Reactor
SAR	Safety Analysis Report
SE	Slovenske Elektrarny (Slovak)
SIP	Safety Improvement Program
VATESI	Lithuanian regulator for the Ignalina plant
VVER	Russian acronym for Water-cooled, Water-moderated Reactor

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Conditionality has become an increasingly prominent feature of international politics in recent years.[1] Once mainly associated with the macroeconomic stabilization programs of the IMF, since the collapse of communism it has been used by the EU, NATO, the OECD, and the Council of Europe to promote a variety of political, economic, and social objectives – everything from abolishing the death penalty to privatizing national monopolies. With increased use has come increased controversy. Critics of conditionality argue that it is often applied in ways that ride roughshod over national sovereignty, ignore local circumstances, and impose economic hardship. Others note the frequent inability of recipients of conditional aid to fulfill commitments to international donors. Even when measured by its own narrow objectives, they argue, conditionality often fails.

Although the debate over conditionality has produced a voluminous academic literature, one area that has not been analyzed is nuclear safety – conditional programs initiated by the G-7 and other institutions to secure the closure or upgrading of Soviet-built nuclear power plants in Central and Eastern Europe.[2] At first glance, such programs appear to confirm the failure of conditionality. Notwithstanding a widespread expectation in the early 1990s that the most unsafe plants would be rapidly decommissioned, more than a decade after the fall of the Berlin Wall approximately 65 Soviet-designed nuclear reactors continue to operate.[3]

A closer look suggests that conditionality has been at least partially successful. Although it is impossible to prove, the fact that there has not been another Chernobyl-type disaster may be the result of safety upgrades made under pressure from Western donors. A few of the more dangerous reactors have been shut down and most

governments are committed to phasing out Soviet-built plants in exchange for Western assistance.

Against the background of the academic and policy debate surrounding conditionality, this paper examines its role in the nuclear sector. It begins with an overview of the nuclear safety problems that became apparent shortly after the collapse of communism and the West's response to these problems. This article then offers case studies of three countries – Bulgaria, Slovakia, and Lithuania – that are especially interesting for having been subject both to conditionality linked to financial incentives and conditionality arising from their bids to become EU members. A concluding section analyzes the record of conditionality in the nuclear safety sphere and draws overall conclusions about its effectiveness as an instrument of international policy.

Problem and Response

The growth of nuclear power in the Council for Mutual Economic Assistance (CMEA) was mainly based on four reactor models: the graphite-moderated RBMK of the kind installed at Chernobyl and three generations of pressurized water reactors (PWRs): the VVER-440/230, the VVER-440/213, and the VVER-1000.[4]

The RBMK was based on a technology developed for plutonium-producing military reactors in the Soviet nuclear weapons program. This technology was known in the West but was not used in the nuclear power industry.[5] At the time of the breakup of the Soviet Union, 16 RBMK reactors were in operation at five sites: 11 in Russia, 3 in Ukraine, and 2 in Lithuania. Because of its plutonium-producing qualities, the Soviet Union did not export the RBMK to Eastern Europe.

The oldest PWRs, the first-generation VVER-440/230s, were built between the 1960s and the early 1980s. At the time of the breakup of the Soviet Union, 10 VVER-440/230s were in operation: 4 in Russia, 4 at Kozloduy in Bulgaria, and 2 at Bohunice in what is now the Slovak Republic. Six others had been shut down, 2 in Armenia and 4 at Greifswald in the former East Germany. The newer PWRs included 14 VVER-440/213 reactors in Russia, the Czech Republic, Hungary and Slovakia, and 18 third generation VVER-1000 reactors in Russia, Ukraine, and Bulgaria. In addition, a large number of newer-type reactors (mainly VVER-1000s) were planned or under construction in accordance with the ambitious programs for expanding nuclear power in CMEA countries.

None of these reactor types fully met international safety standards, but Western experts generally considered only the RBMKs and the first generation VVER-440/230s as "high risk." On the basis of extensive post-Chernobyl analysis they concluded that the RBMK suffered from an inherent design flaw – one that could be ameliorated by hardware and software upgrades but never fully eliminated.[6] The VVER-440/230s were similar to PWRs built in the West and did not have "inherent" defects. Nonetheless, Western experts were concerned about the absence of safety features common in the

West and the aging and “embrittlement” of the reactor’s pressure vessel.[7] A key objective of Western policy thus became to secure closure of these high-risk reactors.

Although the April 1986 Chernobyl disaster highlighted the dangers posed by Soviet-built reactors and led to some East-West dialogue on nuclear safety, it was not until the collapse of communism that Western governments were given a chance to play an important direct role in addressing safety problems. Initial involvement was mainly through the International Atomic Energy Agency (IAEA) and other inspection missions that turned up previously classified information about how these reactors were designed and operated.[8] These missions, notably the IAEA inspections of Kozloduy in 1990 and 1991, revealed an alarming picture of poor and rapidly deteriorating safety conditions.

As the magnitude of the safety challenge became apparent, these relatively low-cost advisory efforts were supplemented by grant technical assistance, much of which was used to purchase and install equipment that promised to have short-term safety benefits at high-risk plants. The major providers of such aid were the EU’s PHARE and TACIS programs, the U.S. SEED and Freedom Support Act programs, and the bilateral programs of other G-24 countries.[9] To coordinate assistance, in 1991, the G-24 countries established a Working Group on Nuclear Safety. A G-24 steering group was made responsible for establishing permanent and *ad hoc* technical working groups and monitoring their work. The European Commission was asked to serve as the secretariat for the G-24 mechanism. The IAEA and the OECD-affiliated Nuclear Energy Agency (NEA) provided expert assistance. These mechanisms later became known as the G-24 Nuclear Safety Assistance Coordination Mechanism (NUSAC).[10]

The Western powers formulated an overall strategy toward the nuclear safety issue at the July 1992 G-7 economic summit in the form of a multilateral action program.[11] Near term, the program was to focus on operational, technical, and regulatory improvements that promised "early and significant" safety gains.[12] Over the longer term, the program was to explore shutting down less safe plants and replacing lost capacity by developing alternative energy sources, reducing demand through efficiency improvements, and possibly upgrading nuclear plants of more recent design. The G-7 agreed to establish a "supplementary mechanism" to fund "immediate operational safety measures not covered by bilateral programs." This became the Nuclear Safety Account (NSA), established in February 1993 under the auspices of the newly formed European Bank for Reconstruction and Development.[13]

Although conditionality was not explicitly mentioned in the Munich action program, after 1992, it became a central element of Western strategy. The West in effect divided all reactors into "non-upgradable" (VVER-440/230, RBMK) and "upgradable" (VVER-440/213, VVER-1000) categories.[14] The strategy was to focus on short-term and relatively low cost improvements to the non-upgradable units, followed by closure as soon as was practical. Larger and more fundamental assistance was to be provided for the upgradable reactors, many of which were still under construction.

This strategy was shaped by the political and financial constraints under which the G-7 operated. It required walking a thin line between those who were opposed to *any* expansion of nuclear power and thus sought to block the completion or upgrade of reactors, thereby removing the incentive side of conditionality (chiefly in the West) and those who wanted to *expand* the use of nuclear power and were prepared to pocket Western aid to upgrade or complete second and third generation reactors *without* following through on pledges to shut down the oldest and most unsafe units (mainly in the transition countries).

Other problems with the strategy grew out of the disparity between needs and resources. Western governments were prepared to offer grant aid for short-term safety upgrades, but they could not foot the bill for completing third generation commercial reactors. Resources on this scale were not available, and even if they had been, large-scale underwriting of capital costs would have undercut the goal of moving the target countries toward sound financial management based on cost recovery principles. This meant that completions and upgrades had to depend on loans (EBRD, European Investment Bank (EIB), bilateral export-import, and potentially commercial bank), which in turn introduced new criteria and *de facto* conditionality, as banks had to follow established lending practices and obtain assurances that loans would be repaid. The loan approval process was rendered especially complicated by the restructuring underway in these countries' energy sectors and the extraordinary difficulty of forecasting how much electricity they would need and at what prices it could be sold.

In carrying out its nuclear safety strategy, the West drew upon the resources of an array of permanent and *ad hoc* organizations, most of which were eager to get involved in and contribute to the nuclear safety game. The IAEA continued with its Operational Safety Review Team (OSART) and Assessment of Safety Significant Event Team (ASSET) missions and undertook projects relating to the safety of different reactor types. It also convened the 1991 International Conference on the Safety of Nuclear Power that led to the conclusion, in June 1994, of the Convention on Nuclear Safety, which all countries operating Soviet-built reactors eventually signed and ratified.[15]

The NEA developed a safety program that stressed transfer of safety knowledge and research as well as support for regulatory authorities. It also established links with the Association of Safety Authorities Operating VVER-Type Reactors, an organization set up in late 1993 by the regulatory authorities in the transition countries to promote safety through the exchange of information and experience.[16] The World Association of Nuclear Operators played a major role in organizing twinning arrangements between nuclear power plants in Central and Eastern Europe and plants in Western Europe and the United States.[17]

In addition to providing grant aid, Western governments recognized that large-scale credits would be needed in the nuclear sector. The EU led the way by approving, in June 1993, an ECU 1.1 billion line of credit to be funded by Euratom, which for the first time was mandated to extend its operations outside of EU territory. Loans from the EIB also were made available.[18] The EBRD declared its readiness to make loans to finance

upgrades at existing nuclear plants or to complete plants intended to replace power generated by older plants. Export promotion banks were another potential source of credit. The World Bank did not as a matter of policy make loans for nuclear power, but it took an active role in restructuring the energy and electricity sectors of the transition countries and, thus, was part of the overall solution to problems in the nuclear sector.

Although the mechanisms available were generally the same, as the 1990s progressed Western policy toward the various transition countries increasingly diverged. Russia, which in 1993 accepted EBRD funding with certain safety-related conditions attached, soon breached its commitments, effectively brushing aside Western conditionality.[19] The gap between the aid on offer and Russia's needs simply was too great to constitute effective leverage, as was the disparity between Western and Russian views of Russia's nuclear future. Bulgaria, Slovakia and Lithuania also evaded or violated early commitments to the G-7. As the decade wore on, however, they became increasingly subject to a new form of conditionality – that imposed by Brussels in connection with their bids for EU membership. Initially rather weak and imprecise, this conditionality became firmer and more clearly defined after 1998, as the EU Accession Partnerships demanded specific steps toward plant closures under agreed timetables. (Ukraine was an intermediate case. Not a formal candidate for EU membership, it was not subject to the pressures and rewards arising from the pre-accession process, but it wanted to bolster its Western credentials and its long-term prospects for EU membership by accommodating Western expectations with regard to the closure of Chernobyl.)

Bulgaria

With six reactors – four first-generation VVER-440/230s and two third-generation VVER-1000s – Bulgaria's Kozloduy plant is the largest Soviet-built plant outside the former USSR, accounting for 45.5 percent of national electricity production in 1994. The four VVER-440/230 units were completed between 1974 and 1982. Unit 5 was completed in 1988 and was the only VVER-1000 outside the USSR in operation before the breakup of CMEA. Unit 6, also a VVER-1000, was largely finished at the time of the 1989-1990 revolutions and became operational in December 1993.

An IAEA mission to Units 1-4 took place in November 1990 and highlighted the overall absence of a safety culture as well as a number of specific safety problems. In June 1991, an IAEA on-site safety review team made another visit to Kozloduy and reported poor work practices, industrial safety hazards, poor radiological protection, lack of structured training for operators, and incomplete operating procedures. Although many of these problems were of longstanding duration, conditions at the plant were said to have worsened in the spring of 1991, following the departure of Russian technicians in a wage dispute. The IAEA informed the Bulgarian government that it was imprudent to continue operating the reactors under observed conditions. The Bulgarian authorities somewhat reluctantly announced that Units 1 and 2 would be closed for extensive safety-related modifications and upgrades, and both units were in fact shut down by November 1991.[20]

In 1991, the EU committed ECU 11.5 million of PHARE money for nuclear safety projects in Bulgaria. An important element of the program was a twinning scheme between Kozloduy and a French plant operated by Electricité de France (EdF). The United States also funded a program that paired the Bulgarian operator with Central Maine Power & Light for technical exchanges and visits by managers. Germany provided large quantities of spare parts from the Greifswald power station on a cost-free basis. A consortium of West European regulatory agencies began working with the Bulgarian authorities on a PHARE-sponsored project to set up a Western-style licensing inspectorate. Units 1 and 2 resumed operations in late 1992, following inspections by a governmental commission and an international regulatory consortium.[21]

In 1993, Bulgaria became the first recipient of grant aid from the EBRD NSA and the first country to accept explicit conditions regarding plant closure in exchange for Western assistance. In June of 1993, Bulgaria and the EBRD concluded an agreement under which ECU 24 million in NSA funding was made available for short-term upgrades at Kozloduy, including measures for fire protection, in-service inspection of critical components, improvements in control room technology, an emergency feedwater system, and other improvements. The Bulgarian government committed itself to the shutdown of Units 1 and 2 by the end of 1997 and of Units 3 and 4 by the end of 1998. This was to be accomplished in the context of an overall plan for the electricity sector aimed at dampening demand and increasing supply from other sources.

NEK, the state-owned firm that ran Kozloduy, incorporated the NSA-funded upgrades into its Short Term Program for Units 1-4, to be completed by the end of 1997. Safety conditions improved, although to what extent remained controversial. IAEA missions concluded that there had been significant improvements in the operation, maintenance, and management of Units 1-4 but that safety still lagged behind international norms. According to NEK, the entire program cost ECU 125.1 million, of which ECU 24 million was provided by the EBRD, ECU 30.0 million by PHARE, ECU 13.3 million by other international sources, with the remaining ECU 57.8 million from NEK's own resources.

As NEK made substantial investments from its own resources in upgrading Kozloduy, it became increasingly reluctant to write off this investment in four years by closing the plant. Political changes – the defeat of the Union of Democratic Forces (UDF) and the return to power of the Bulgarian Socialist Party (BSP) after the December 1994 elections – reinforced this trend. By mid-1995, the Bulgarian authorities had begun to distance themselves from the agreement with the EBRD, claiming that with proper maintenance Units 1 and 2 could operate until 2004 and Units 3 and 4 until 2010-2012. In July 1995, the Committee on Power Supply adopted a national strategy for the electricity sector that called for operating Units 1-4 until 2003 and Units 5 and 6 until 2010. In October 1995, the Commission on State Energy Regulation approved the Guidelines for Energy Development Until 2010 that focused on increasing electricity production capacity in a way that suggested continued need for six or more nuclear reactors.

These trends led to increasing tension between Sofia and the Western donor community. Differences came to a head in October 1995, over the issue of the restart of Kozloduy 1 following a temporary shutdown for routine maintenance. Given its age and the accumulated evidence of the brittleness exhibited by the older PWRs, Western authorities, led by the European Commission and the governments of France and Germany, wanted tests made on the unit before it was refueled and put back on line. G-7 ambassadors in Sofia delivered a demarche to the Bulgarian government requesting that Kozloduy 1 not be restarted without extensive further testing. The Bulgarian authorities contended that the reactor's pressure vessel, the main item of G-7 concern, had been thoroughly tested by Bulgarian institutes and Gidropress, the Russian reactor design organization.

The controversy over Kozloduy 1 unleashed strong national feelings in Bulgaria. Officials in Sofia more or less admitted that they had no intention of adhering to the 1993 agreement with the EBRD, the signing of which one commentator called "an act of national nihilism" perpetrated by the previous government.[22] The chairman of the Committee for Peaceful Uses of Atomic Energy stated that "no one is entitled to state and set any deadlines for operating the reactor. The reactor may operate as long as it is in a condition to do so and has the required service life, or until someone decides to shut it down."[23] This was generally estimated by officials as likely to occur in 2003 or 2004, although some speakers referred to 2008-2009, or "after a service life of 35 years." International condemnation of Sofia was severe. The European Parliament unanimously passed a resolution calling for an immediate shutdown of Kozloduy 1 and EU environment ministers came under pressure to boycott the "Environment for Europe" conference scheduled to take place in Sofia in late 1995.[24]

The furor over Kozloduy 1 was defused in the fall of 1995 with an agreement regarding further tests. At a meeting convened by the IAEA that brought together NEK, the Bulgarian regulatory authority, Gidropress, and ISPN and GRS (the reactor safety institutes of France and Germany), the Bulgarians outlined cautionary measures which they would be taking with regard to the operation of the reactor in the next six months.[25] However, they held firm to their initial decision: the reactor was restarted on October 4. Under an arrangement subsequently worked out with the European Commission, they agreed that the reactor would be shut down in May 1996 and that templates would be cut from the reactor's casing for testing over the summer. The Commission agreed to pay some ECU 10.9 million to cover the costs of the testing and to purchase fuel for the production of more expensive replacement power at thermoelectric plants.[26]

The Bulgarians more or less stuck to their pledges. In May 1996, Kozloduy 1 was shut down. Contractors completed the removal of samples from the reactor pressure vessel and tests were carried out at the Kurchatov Institute in Moscow in early fall. The tests indicated that the condition of the unit was better than many experts had predicted; the reactor pressure vessel would be able to withstand a sudden cooling that it was feared might precipitate an accident. While ISPN and GRS conceded that the results were more positive than expected, they continued to maintain that Kozloduy 1 was safety deficient

in several areas. Operation of the unit beyond the end of 1998 should be conditioned, they argued, on further tests and major safety upgrades.

In January 1997, Kozloduy 1 was reconnected to the grid. Through much of 1997, NEK continued to work on an in-depth safety assessment carried out with the assistance of key Russian institutes.[27] In December, NEK announced that it had completed its Short Term Program and was planning a new program of upgrades on the four VVER-440/230 units to prepare them for possible life extension. Called the Complex Program for Units 1-4, these upgrades were to be based on the Russian-Bulgarian safety assessment, which had been completed in October. By late 1997, there were increasing indications that the Bulgarian government intended to delay the
closure of the oldest units at Kozloduy.

In March 1998, Bulgaria confirmed that it would not close the units as agreed with the EBRD in 1993. The chairman of the state energy committee declared that Units 1-4 would "have to remain in service until 2004 or 2005, when the modernization of Units 5 and 6 is due to be completed."[28] The following month, the EBRD bowed to necessity and agreed to the postponement. For the moment, Bulgaria appeared to have won its confrontation with the EBRD over fulfillment of the conditions in its 1994 agreement. The units that had triggered such alarm in 1991 were likely to operate until 2003, if not beyond.

By this time, however, the question of Bulgaria's nuclear future was becoming intertwined with the issue of EU accession. The Commission opinion on Bulgaria's application for membership, issued in July 1997 as part of *Agenda 2000*, stressed the need for adaptation to EU safety norms and concluded that "the problem of nuclear safety needs to be dealt with and realistic programmes, including closure where necessary, need to be agreed upon and implemented in due course."[29] It was unclear, however, how strongly the EU would condition progress toward membership on closure. More importantly, for reasons mostly having nothing to do with nuclear issues, Bulgaria was not included on the list of six countries that the European Council decided, in December 1998, were ready to begin accession negotiations. With membership talks deferred, explicit terms on nuclear closure were thrust into the background, as Bulgaria was encouraged to concentrate on improving its overall economic and political performance. The Commission assessment thus had little initial effect on Bulgarian nuclear policy.

EU pressure gradually came to carry more weight, however, particularly as accession for the leading candidate countries neared and as the anti-nuclear bent of some member state governments (and in the European Parliament) became more pronounced. The EU-Bulgaria Accession Partnership, concluded in March 1998, specified as one of six short-term priorities the development of a realistic timetable for the closure of Kozloduy in line with the terms of the NSA agreement. The Bulgarian government continued to encounter domestic political resistance to closure, however, and in its November 1998 progress report on Bulgaria, the Commission concluded that no progress had been made in this area.[30] The EU's growing emphasis on nuclear closures was reflected in the European Council, which, at its June 1999 session in Cologne,

specifically directed the Commission to examine nuclear safety in its next set of enlargement progress reports, scheduled for release in the fall of 1999.[31]

Bulgarian officials continued to argue that they might be able to close Kozloduy 1 and 2 by 2008, but they wanted the option to operate Units 3 and 4 well beyond this date. Prime Minister Ivan Kostov criticized Commission demands that the government establish a firm timetable for closure as a "meaningless diktat."[32] In May 1999, the head of the State Nuclear Committee argued that early demands for shutdown had been based on obsolete knowledge of the technology and that with yet another safety improvement program that NEK was planning, the life of all four VVER-440/230s at Kozloduy could be extended well beyond the closure dates the EU was demanding.[33] In its 1999 progress report, the Commission concluded that Bulgaria had made progress in meeting all of the short-term priorities of the Accession Partnership *except* in the nuclear sector.[34] To try to move the process along, the sides agreed to establish a special working group of Commission and Bulgarian officials to work out a timetable for closure and the level of aid that Bulgaria would need for decommissioning.

By late 1999, it was clear that the Commission and the EU member states wanted to move the six second-tier candidate countries into the negotiating stage of the accession process. They were reluctant to let the nuclear sector alone hold Bulgaria back. The Commission accordingly recommended that Bulgaria be invited to participate in the second wave of enlargement talks scheduled to begin in early 2000 – on the condition that it finalize a timetable for closure of Kozloduy. This final exercise of leverage seemed to do the trick. In late November, the Bulgarian government announced an agreement with the EU under which Units 1 and 2 will be closed by 2003 and Units 3 and 4 by 2006.[35] The EU agreed to provide 200 million euros by 2006 in grants to assist with decommissioning. In addition, Euratom provided a 212.5 million euro loan to underwrite the modernization and safety upgrading of Units 5 and 6.

Slovakia

The nuclear safety question in Slovakia has been dominated by controversy concerning completion of the Mochovce plant in southeastern Slovakia and the shutdown of older units at Jaslovske Bohunice.[36] The Bohunice facility consists of two VVER-440/230 and two VVER-440/213 reactors, which together accounted for about half of the national electricity production at the time of Slovakia's split from the Czech Republic. Mochovce had four unfinished VVER-440/213s, two of which were nearly completed and two others that were far less advanced. The Meciar government was strongly committed, for economic and political reasons, to nuclear power and pursued a policy of pressing for the completion of Mochovce while delaying for as long as possible closures at Bohunice.

IAEA teams visited Bohunice in September and October 1990 and again in April 1991. The IAEA experts noted problems in operating procedures, fire protection and other areas, and recommended the development of a comprehensive safety upgrade

program. They also questioned the advisability of the long-term operation of Bohunice, given the age of and design problems with the VVER-440/230 reactor.

In 1991, the Czechoslovak government and the plant's owner, Slovenske Elektrarny (SE), launched a major upgrade of Units 1 and 2, the so-called Small Reconstruction. This work, much of which was financed by PHARE, was completed in 1991-1993. It was followed by the more extensive Gradual Reconstruction, which was implemented in 1996-1999 at a total estimated cost of $180 million. Much of the work was contracted to Siemens, with Czech, Russian, and Slovak companies also involved.[37] Western experts welcomed the second Bohunice upgrade and the improved levels of safety that resulted, but they did not see it as a long-term solution that would obviate the need to close the plant. As in Bulgaria, however, as the state-owned utility made extensive investments in the plant it became increasingly reluctant to contemplate closure within the time frame favored by the West.

Construction at Mochovce began in 1984 but was suspended for financial reasons in 1990. In 1992, SE and the Czechoslovak authorities began negotiations with Western companies, banks, and international financial institutions regarding completion of the project. After lengthy negotiations involving many parties, in 1995, the EBRD agreed in principle to a DM 412.5 million loan to enable a consortium of Western firms to complete two Mochovce units at an improved level of safety. Led by EdF, the consortium included Siemens, Bayernwerk, and PreussenElektra. The German utilities were to distribute excess power from the plant in Germany, the revenues from which would be used to service the loan.

The EBRD attached six conditions to the financing: (1) the project had to be the most cost-effective alternative for Slovakia; (2) two units at Bohunice had to be shut down by the year 2000; (3) all recommendations by independent safety advisers regarding Bohunice had to be implemented; (4) Slovakia had to raise electricity prices; (5) Slovakia had to ratify the Convention on Nuclear Safety; and (6) management of the Mochovce project had to be undertaken by a renowned firm with experience in running nuclear power plants (generally taken to mean EdF).[38] Despite opposition within the EBRD staff and in Austria, in March 1995, the Bank's board of directors signaled that it was prepared to go ahead with the loan. However, at the last minute, the Slovaks withdrew their request for the loan. They were unwilling to accept the conditions set by the EBRD, in particular the stipulation that Bohunice 1 and 2 be closed and that electricity prices be raised.[39]

In subsequent months, a number of proposals for completing Mochovce without EBRD financing were made. A Czech-Russian consortium offered to do the job for about a third less than the EdF proposal, with the Russians providing $150 million in finance.[40] From a Western perspective, such an outcome was seen as having a doubly negative safety effect – Mochovce would be completed to a lower standard while Bohunice would continue to operate. Austria threatened to block Slovakia's admission to the EU if Mochovce was completed on terms other than those set by the EBRD and the European Commission.

Despite these threats, the Slovak government continued to explore alternatives to the EdF proposal. In the course of 1995, the Slovaks tilted increasingly towards the Russian option, a result both of technical and financial calculations and the deterioration in Slovakia's relations with the West. Talks between the EBRD and the Slovak government failed to produce an agreement and Bayernwerk and PreussenElektra announced their withdrawal from the project. In September, the government announced that the only acceptable financing package was one offered by a consortium consisting of the Russian government and two Czech banks.

SE further announced that Skoda Praha had won a public tender to become the general contractor for completion of Mochovce and that a final contract would be signed by the end of January 1996. Skoda Praha's partners were the Prague-based Energoproject and the Russian firms Atomenergoeksport and Zarubezhatomenergostroy. The proposal called for the first unit to be completed by the end of 1997 and the second to be operating roughly 8 to 10 months later. To allay security concerns in the West and perhaps to gain influential allies in the two largest EU member states, in April 1996, SE awarded safety-related sections of the project to EUCOM, a Framatome-Siemens consortium.[41]

Despite strong protests from Austria and environmental non-governmental organizations, SE announced that fuel loading at Mochovce 2 would begin in April 1998 and that the plant would become operational in early July. SE also confirmed that the utility had no plans to close any of the units at Bohunice. In an official communication to the G-24, the Slovak regulatory authority stated that SE intended to operate Bohunice 1 and 2 beyond 2000 and Units 3 and 4 until 2014 and 2015 respectively.[42] In the West, it was suspected that these dates might be extended still further. SE developed a four-stage program for Units 3 and 4 that included modernization and safety enhancements in 1996-2006 (Stage 3) and lifetime extension measures in 2006-2015 (Stage 4). Life extension for Units 1 and 2 was not formally on the table, but unofficially, plant managers at Bohunice stated that SE would have to operate these units beyond their original planned shutdown dates of 2003 and 2005 in order to recover investments in the Gradual Reconstruction program.

For the moment, at least, it appeared that Slovakia had won its confrontation with the West over the nuclear issue. Austria warned that it might veto Slovakia's admission to the EU if it persisted with plans to activate Mochovce without clearance from international safety experts, but this threat carried little weight in view of Slovakia's rather dim prospects for early admission.[43] The European Commission also seemed to downplay any link between EU membership and the nuclear sector. *Agenda 2000* concluded that the 1996-1999 upgrade program at Bohunice should "increase the safety level towards EC safety standards" and that the safety of Mochovce "is considered to be close to safety objectives generally accepted in the EU, once the upgrading programme will be completed."[44]

The EU-Slovakia Accession Partnership, concluded in March 1998, set as a medium-term priority a requirement that the Slovak government develop a realistic

program for the closure of Bohunice. However, domestic legislation and Slovakia's own National Program for the Adoption of the *Acquis* seemed to sidestep this requirement as Bratislava prepared for the long-term re-licensing of Bohunice 1 and 2 in 1999 and began a new upgrade program for Bohunice 3 and 4 to be carried out in 2000-2006, as well as a plan for the completion of Mochovce 1 and 2 (and possibly 3 and 4).[45]

The political context surrounding the nuclear issue finally changed in September 1998, with the electoral defeat of the Meciar government. In its November assessment of progress toward accession, the Commission noted that Slovakia had made limited progress in many areas, including the nuclear sector. However, along with others in Western Europe, the Commission expressed optimism about Slovakia's rapid progress in the near future under a new and more democratic government. These hopes were largely confirmed. The new government began to reevaluate Slovakia's positions on nuclear power, both as part of its effort to be more responsive to EU and other Western demands in all areas and because more realistic, market-based assessments of future electricity demand called into question the assumption that Slovakia would need to operate six (and possibly eight) nuclear reactors well into the 21st century.

Slovakia's 1999 EU Accession Partnership agreement called for development of a decommissioning plan for Bohunice 1 and 2, along with continued safety upgrades for the two remaining units at Bohunice and the units at Mochovce. In June 1999, the Commission and the Slovak government formed a joint working group to analyze the consequences of closure at Bohunice. In September, the Slovak government announced that Bohunice 1 and 2 would be shut down in 2006 and 2008 respectively, considerably earlier than previously planned. EU aid was pledged for decommissioning and for upgrades at Units 3 and 4, which would continue to operate. Bratislava also announced that plans to complete Mochovce 3 and 4 were being cancelled due to an expected oversupply of electricity in the national and European market after EU accession.[46]

Despite continued unhappiness in Austria, the EU largely dropped its objections to Mochovce, relying heavily on a program of regulatory exchanges and inspections and on the safety upgrades for which the Siemens-Framatome consortium was responsible.[47] Work at the nearly completed Mochovce 2 went forward. Loading of fuel began in October 1999, and the reactor reached full commercial status in March 2000, a month after Slovakia, as one of the second wave candidate countries, began accession negotiations with the Union.

Lithuania

With independence, Lithuania gained the distinction of being the country with the world's highest dependence on nuclear power for its electricity supplies: 88.1 percent in 1993.[48] It operates two 1500 MW RBMK reactors at Ignalina – the only "Chernobyl-type" units in a country scheduled for EU membership. Commissioned in 1983 and 1987, in the late 1980s, these reactors were a target of local environmentalists and the Lithuanian independence movement, which saw them as a symbol of Soviet domination and a threat

to the Lithuanian people.[49] Once Lithuania became independent, however, Ignalina became a pillar of national sovereignty. The alternative to the plant would have been increased imports of Russian oil and gas, which Moscow had already cut off once in its attempts to suppress the nationalist movement.[50]

The Ignalina reactors were seen as posing a major threat to the entire Baltic region. Western governments talked about shutting down all RBMKs as quickly as possible, but Lithuania's heavy dependence on Ignalina ensured that closure was never seriously pursued as a short-term option. Instead, the international community followed a policy of working to upgrade the safety of the plant through short-term assistance and linking assistance to securing commitments for eventual shutdown. Sweden launched the Barselina project, a cooperative effort to transfer safety assessment methods and improvements from Sweden's Barsebäck plant to Ignalina. Within TACIS, the EU-funded RBMK Safety Review Consortium produced more than 300 recommendations for hardware changes and operational reforms at RBMKs.

In February 1994, Lithuania and the EBRD signed an agreement under which Lithuania received an ECU 33 million ($41.6 million) NSA grant to be used for short-term safety upgrades. The latter included fire protection devices, a training simulator, and environmental monitoring equipment. As in the case of NSA aid to Bulgaria, the grant was conditioned upon acceptance of a plan for eventual closure. The Lithuanian government agreed that the operation of the older unit, Ignalina 1, beyond June 30, 1998 would be subject to a re-licensing procedure that would be based on a safety check by independent experts and the findings of an in-depth study of future energy demand and the cost of further upgrades. It was further specified that an in-depth safety assessment of both units would be completed by mid-1996 and that the operation of both units would not continue beyond the time when existing pressure tubes needed to be replaced (estimated to be sometime between 1998 and 2004).

Between 1993 and 1996, the Ignalina plant carried out a large number of upgrades and improvements, including improved fire protection and alarm systems, improved procedures for equipment maintenance, better training, and some hardware changes in the reactor itself. These measures were funded by TACIS, the NSA grant, U.S. and other bilateral assistance, the Barselina project, and Ignalina's own investments. Together, these measures constituted the first Safety Improvement Program, or SIP-1.[51] Much of the work was undertaken by British, Swedish, German and Russian contractors.[52]

In early 1994, Lithuania issued a long-term national energy plan. It concluded that Ignalina's two units could operate safely until 2005-2010, provided safety upgrades were made, and that improvement programs could be financed by long-term agreements to export electricity to neighboring countries. The 1994 plan was not technically inconsistent with the NSA agreement, but its emphasis on operating Ignalina well into the next century clashed with the West's desire to place the burden of continued operation on the Lithuanians and to set demanding conditions for any future upgrades.

In 1996, the Ignalina plant carried out the in-depth safety assessment called for under the 1994 EBRD agreement, with support from U.S. and European regulatory bodies as well as the Russian reactor designer. The assessment was to be comparable to the standard Safety Analysis Report (SAR) that in OECD countries is submitted to the national regulator to obtain a plant license. It was the first such analysis carried out on an RBMK reactor. In accordance with the terms of the agreement, the EBRD commissioned an International Safety Panel to monitor and supervise the plant as it conducted its review. The panel's function was not only to review the safety of the plant but to assess the performance of Ignalina's management in producing and of the Lithuanian regulator (VATESI) in using the in-depth assessment.

In February 1997, the international panel submitted its report to the EBRD and the Lithuanian government. It was highly critical of the in-depth assessment, stating that the management of the plant and VATESI had failed to cooperate adequately with the assessment and that neither "fully understand and accept their roles and responsibilities to resolve the identified safety issues. If their roles and responsibilities are not clearly defined, understood and aggressively implemented, this would be a significant issue requiring immediate shutdown."[53] The panel estimated that the modifications called for in the SAR would cost an estimated $120 million, not including an additional 125 person-years of staff work to implement new operational procedures. It concluded that neither of the two reactors should be reactivated after routine maintenance scheduled for late 1997, unless certain key safety issues were settled. The European Commission's opinion on Lithuania's application for membership to the Union, issued in July 1997, also stressed the need for "rapid implementation of the programmed closure."[54]

By this time it was apparent, however, that the Lithuanian government was considering operating Ignalina for perhaps as much as another 10-15 years. Ignalina announced a second Safety Improvement Program, SIP-2, to be carried out in 1997-2000, that it claimed covered all of the SAR recommendations. The Lithuanian government also issued a new national energy strategy updating the recommendations of the earlier plan. It concluded that the least cost source of energy was electricity produced at Ignalina for the life of the plant. Thus, while seeming to endorse the specifics of the international safety review, the Lithuanian authorities disregarded the central premise that short-term safety upgrades should not be turned into life extension programs.

The NSA Assembly of Contributors extended the time limit for the issuance of a long-term license for Ignalina 1 from June 1998 to May 17, 1999, but it continued to press Vilnius to meet its commitments under the 1994 agreement. The prospect of indefinite delay in closing Ignalina also led to rising tensions with the EU. During a visit to the plant in March 1998, EU environment commissioner Ritt Bjerregaard declared that Lithuania had to close the plant if it were to become a member of the Union. Bjerragaard's remarks were dismissed by Lithuanian officials as financially impossible and "tantamount to blackmail."[55]

Vilnius also refused to give assurances, as demanded by the EBRD and the Commission, that it would not replace the fuel channels for Ignalina 1 in contravention of

its 1994 understanding with the EBRD. The Commission was especially disturbed by Lithuania's continuing failure to develop a realistic and comprehensive long-term energy strategy, in the absence of which it was impossible to discuss how the electricity generated by Ignalina could be replaced.[56] As the May 17 deadline approached, VATESI delayed for several months the restart of the plant following a shutdown for maintenance, insisting that certain short-term safety upgrades be completed.[57] This decision was praised by Western regulators but fell short of a commitment to closure. In late July, VATESI gave its permission to restart the reactor.

As in the case of Bulgaria and Slovakia, however, it was finally the prospect of missing out on the next round of enlargement talks that finally did the trick in moving Lithuania to make concrete pledges on decommissioning. In September 1999, just before the Commission was scheduled to issue its pre-accession progress reports and make its recommendations regarding a second wave of membership applicants, the Lithuanian government finally made a commitment to the closure of Ignalina, beginning with Unit 1 by 2005.[58] Without such a pledge, EU member state governments would not have agreed to include Lithuania in the group of countries scheduled to begin accession negotiations in early 2000. Lithuania also began setting up governmental mechanisms to manage decommissioning and the development of a non-nuclear electricity strategy.

In May 2000, the parliament approved a decommissioning law for Unit 1. The following month, the Lithuanian government hosted a donors conference in Vilnius that netted pledges of more than 215 million euros for decommissioning.[59] The government declared that it would not set a closure date for Unit 2 until 2004, when it was scheduled to issue a revised version of the national energy strategy. The Commission countered that Lithuania had to make an earlier commitment to closure if it was to have any chance of being in the first wave of applicant countries to join the Union – an unlikely prospect in any case. More importantly, the Commission reiterated that the closure of Unit 2 should take place by 2009 at the latest.[60]

The tenuousness of the domestic political support for closure was further underscored in late 2000, when newly elected Prime Minister Rolandas Paskas spoke out against the commitment of the previous government to closing Igalina. Paskas suggested that Lithuania should construct a third nuclear power plant, arguing that electricity exports were the country's largest earner of foreign exchange. Paskas' government subsequently backed off this position and in January 2001, the parliament approved a detailed plan for closure of Ignalina 1 by 2005.[61]

Conclusions

In the early 1990s, Western policy with regard to nuclear reactor safety in the former communist countries had clear, ambitious objectives. There was a widespread expectation that the oldest and least safe Soviet-built reactors would be decommissioned within a few years. Conditional aid was to play a key role in implementing this policy.

By mid-decade, it was apparent that meeting ambitious goals for decommissioning would be more difficult than first thought. The French and German reactor safety institutes issued a joint statement in March 1996 in which they deplored three major decisions taken the previous year in defiance of Western requests: Bulgaria's decision to restart Kozloduy 1 without adequate testing of the reactor's pressure vessel; Slovakia's rejection of the EBRD plan for completing Mochovce in exchange for shutting down Bohunice 1 and 2; and, Armenia's re-commissioning of an old unit that the Soviet government had shut down after the earthquake of 1988.[62] Summing up the experience of the previous six years, the institutes concluded: "A few years ago, we were confident that the least safe plants would be rapidly decommissioned. Today, however, it is clear that the countries concerned will try, for economic and political reasons, to keep them running for as long as possible."[63]

As the difficulty of securing nuclear shutdowns became apparent, the G-7 did not formally abandon the 1992 Munich goals. Nonetheless, changes at the working level reflected a weakening of conditionality and at least a temporary pullback from emphasis on closure. In July 1997, the G-24 NUSAC Plenary Working Group adopted new terms of reference for NUSAC. The group reaffirmed the G-7 Munich priorities, but shifted the focus of its efforts from coordination among the G-24 to cooperation *with* the transition countries. According to NUSAC, countries “which operate RBMK and VVER reactors should take a key role in determining, with priorities, any strategic, managerial and organizational issues for discussion."[64]

The new terms of reference were a belated recognition of the obvious. The early approach of providing aid conditional upon medium-term commitments to close unsafe plants did not work. Donors had strong incentives to provide short-term upgrade funds as quickly as possible. Once NSA funds had been disbursed, however, there were no second or third tranches to use in compelling compliance with agreed conditions. By calling forth matching expenditures from the recipient countries, Western-funded upgrade programs created incentives for these countries to prolong the operation of reactors beyond their scheduled decommissioning dates – perhaps beyond what they might have been under the old socialist system. Western policy was further marred by delays and problems in the delivery of aid.[65]

Early expectations that high-risk reactors would be decommissioned were formed against a background of optimism about overall economic reform, including reform in the energy sector. This optimism was not borne out even in the most advanced transition countries, much less in Bulgaria, Slovakia, and Lithuania. The G-7 assumed that these countries would follow a reform path that would include ending subsidies to the energy sector, followed by increased prices, falling demand, and restructuring of the energy and electricity sectors, which in turn would result in energy investment decisions being made on rational, market-based criteria as in the West. Upgrading existing or completing unfinished nuclear plants might have been part of the overall solution for these countries' energy problems, but other alternatives were explored – for example, reducing overall demand for power or substituting gas-fired for nuclear generating capacity. With fundamental economic and energy sector reform delayed, this optimistic scenario did not

play out. Instead of being seen as a ceiling on the number of nuclear reactors in operation, the number of units each country had in 1989-1991 became a floor. No government wanted *fewer* nuclear units in 2001 than it had had a decade earlier, even though many factors – falling demand associated with economic restructuring, interconnection with the West European power grid, and the availability of alternative lower-cost sources of power – argued in this direction.

These findings are consistent with the academic literature on conditionality in other policy areas (e.g., micro- and macroeconomic reform), which confirms that non-compliance with conditionality is all too common. The reasons why conditionality did not work when applied to the nuclear safety problem in Bulgaria, Slovakia, and Lithuania in the early 1990s are also broadly consistent with those discussed in the literature. Checkel identifies three reasons why conditionality often does not result in compliance: politicization, domestic ownership problems, and poor or fragmented policy environments.[66] All of these factors were present in the cases examined in this paper.

Politicization was a factor throughout, although one whose overall consequences were not entirely negative. Given domestic sensitivities about Chernobyl, Western and especially West European governments came under strong political pressure to address nuclear safety issues in the transition countries. The West Europeans also came under pressure to embrace at least the Baltic and Central European countries and to speed their integration into Europe.[67] This undercut efforts to apply strict conditionality, but it also ensured a high level of Western engagement and a search for "second-best" outcomes when conditionality failed – intensive efforts to work with Bulgaria, Slovakia and Lithuania in upgrading their least safe plants, even if it meant stepping back from earlier conditional demands. While the best safety outcome might have been fulfillment of the conditions that the EBRD tried to impose in 1993 – closure of all high risk plants by 1997-1998 – the second best alternative was the one that actually played out in these three countries: immediate safety assistance to governments that were unwilling, or unable, to meet conditions relating to closure, combined with a commitment to conditionality that kept pressure on for eventual shutdowns. (The *worst* alternative was the one that the West, for all practical purposes, applied in Armenia and Ukraine: adherence to rigid conditionality regarding short-term decommissioning, failure to provide the incentives and penalties to compel compliance with these conditions, and provision of little or nothing in the way of immediate help to lower the short-term probability of disaster in what were arguably the most unsafe plants in the entire former communist world.[68])

Domestic ownership problems also were present, undercutting the effectiveness of conditionality. They were apparent at the political level – in governments, parliaments, and the general public – and even more so in the nuclear industries of the target countries. Motivated by financial interest and national and professional pride, the owners and operators of plants such as Kozloduy and Bohunice, had enormous difficulty in accepting that their chief task was to work with outsiders to hasten the elimination of their most prized assets. Strong and independent national regulators, which might have been expected to accept ownership of authoritative international safety norms, were slow in

developing – technically weak and politically cowed. In addition, the continued existence of a weakened, yet still resourceful Russian nuclear industry (abetted to a degree, it should be noted, by the Czechs) meant that domestic opponents of Western conditionality in Bulgaria and Slovakia (although to a far lesser extent in Lithuania) had external sources of psychological and material support in resisting conditionality.[69]

Finally, the fragmented policy environment that Checkel and others have cited applied in this area as well, undercutting the effectiveness of conditionality. The assumption that Condition A would produce Behavior B resulting in Outcome C simply did not hold. Elements of the policy mix that played negative roles included:

- The difficulty of raising electricity prices to market levels (the result of political resistance by populist governments but also of the unexpected ways in which transition economies operated, e.g., use of barter and widespread payment arrearages);
- the continued existence of separate nuclear fiefdoms not integrated into the broader structure of the domestic energy industry (which created strong pressures against consideration of gas and other alternatives to nuclear generation); and,
- entirely exogenous factors that were not considered by the West in 1992, such as the Kyoto Protocol and the incentives it created for countries to maintain the share of nuclear power in national electricity production.

As EU accession moved from being a distant prospect to a medium-term policy objective, conditionality arising from membership negotiations with the Union replaced financial incentives as the key element in Western strategy. Loans and grants remained important, but chiefly in helping the candidate countries to carry through on measures that they had promised to take to advance their candidacies for EU membership (e.g., decommissioning). For the moment, membership conditionality appears to be have been more effective than financial conditionality in advancing Western objectives in the nuclear safety sphere. Bulgaria, Slovakia, and Lithuania have made firm commitments to nuclear shutdowns in the context of their Accession Partnerships and are taking practical steps toward fulfillment of those commitments. The seeming effectiveness of EU membership conditionality may reflect the great leverage that the EU enjoys as a "hegemonic actor" that largely can dictate conditions to applicant countries.[70] This recent success may also reflect the elements of genuine partnership that are emerging in EU-candidate country relationships – something that still is largely absent in relations with Russia and Ukraine.

The experience of the last decade suggests a tension in policy between reliance on partnership and integration on the one hand and strict conditionality on the other. Since the early 1990s, membership in Western organizations (EU, NATO, OECD, Council of Europe, WTO) has been both a surrogate metric for an end – transition to market capitalism and democracy – and a means to promote that end. As transition has proceeded, elements of partnership and integration have become more prominent. In nuclear safety, strict conditionality increasingly has given way to looser, less clearly defined processes of participation (although there has been some sharpening and

refinement of conditionality, as in the Accession Partnerships). Participation inevitably weakens conditionality by affording what were previously "outsiders" chances to help set the criteria by which their performance is judged and by blurring somewhat the distinction between the objects and the subjects of conditionality. The process however, cuts two ways. While inclusion makes it more difficult for the power imposing conditions to take a rigid and legalistic approach, it also makes it harder for the target country to brush off conditions imposed by a partner organization. Expressed concretely, Bulgaria, Slovakia and Lithuania avoided compliance with conditions imposed by the West, but did so in a spirit and a style completely different from the way that Russia, for example, has rejected any Western attempts to shape its nuclear destiny.

Over time, integration is likely to supplant explicit conditionality as the main factor ensuring nuclear safety in Central and Eastern Europe. Much EU and other aid in the region has been aimed at promoting a "safety culture" among operators and regulators, getting those involved in the nuclear industry to internalize norms of behavior that the West initially tried to impose from outside. Market integration – in the form of physical interconnection of the power grids in Europe, deregulation and cross-border flows of electricity, and foreign investment in national utilities – is another way in which integration is likely to supplant conditionality in promoting safety.[71]

Nonetheless, a word of caution is in order. Those familiar with the history of EU enlargements will recall Margaret Thatcher's famous advice to Prime Minister Felipe Gonzalez at the time Spain was seeking to join the European Community: get in and then renegotiate.[72] If Bulgaria and Lithuania are part of a second wave of enlargement that takes place some time after 2010, and if Bulgaria adheres to its pledges to close Kozloduy 3 and 4 by 2006 and Lithuania meets EU demands that Ignalina 2 be decommissioned no later than 2009, then both countries will become members of the Union without "high risk" reactors on their territory. But even if Slovakia adheres to its commitments to close Bohunice 1 and 2 as scheduled (2006 and 2008), there is a good chance that it will enter the Union as part of a first wave of entrants operating one and perhaps two first generation reactors that the West had wanted closed by 2000 at the latest. Any slippage in the Bulgarian and Lithuanian decommissioning programs (or, less likely, if these countries were to become first wave applicants) would produce the same result. Once inside the Union, it is not clear what leverage the Commission, Court of Justice, and the member states would have in compelling these countries to fulfill their pledges.

This is not to say that such a scenario is likely or that the governments of these countries are planning to use membership to walk away from commitments. The warning is meant to point out a more general problem that affects the EU in many areas. The larger the Union becomes and the more policy areas that fall within its purview, the greater the tendencies toward uneven application and enforcement of the *acquis communautaire* as well as toward instances of "involuntary non-compliance." It is in fact revealing that as the EU enlarges and widens its policy scope, it is developing a form of what might be called "intra-Union" conditionality – political and legal instruments that fall somewhere between the strict application of uniform law (as in a strong federal system such as the United States) and the much weaker, purely *external* conditionality

used by the IMF, World Bank, and the EU itself in membership and other international negotiations. Examples include the provisions governing the Cohesion Fund, the Stability and Growth Pact, and the human rights provisions of the Amsterdam and Nice treaties.[73]

If the candidate countries fully adhere to the pledges they have made to decommission their oldest reactors, such intra-EU conditionality will not come into play in the nuclear sector. If they do not, however, such a scenario could unfold, opening yet another chapter in the ongoing effort to cope with the legacy of Soviet nuclear power in countries that economically, politically, and culturally are fast becoming a part of the West.

Notes

[1] Defined as "a mutual arrangement by which a government takes, or promises to take, certain policy actions" in exchange for which international institutions or foreign governments agree to provide specified amounts of assistance in support of those actions. See Jeffrey T. Checkel, "Compliance and Conditionality," ARENA Working Papers WP 00/18, http://www.arena.uio.no.

[2] Examples from the literature include Susan Schadler, *et al.*, "IMF Conditionality Review: Experience Under Stand-By and Extended Arrangements. Part I: Key Issues and Findings," *IMF Occasional Paper*, (128), (1995); Schadler, "IMF Conditionality Review: Experience Under Stand-By and Extended Arrangements. Part II: Background Papers," *IMF Occasional Paper*, (129), (1995); Christopher Gilbert, *et al.*, "The World Bank and Conditionality," *Journal of International Development*, 9 (1997): 507-516; and, Joan Nelson, "Promoting Policy Reforms: The Twilight of Conditionality?" *World Development*, 24 (1996): 1551-1559.

[3] "Reactor status and net power worldwide," November 30, 2000, Uranium Institute, www.uilondon.org.

[4] For background, see Lesley J. Fox, "Soviet Policy in the Development of Nuclear Power in Eastern Europe," U.S. Congress, Joint Economic Committee, *Soviet Economy in the 1980's: Problems and Prospects: Selected Papers Submitted to the Joint Economic Committee. Part 1* (Washington: USGPO, 1983): 457-507. For a succinct review of the strengths and deficiencies of all four models, see the website of the Argonne National Laboratory International Nuclear Safety Center http://insp.pnl.gov. VVER is a Russian acronym for "water-cooled, water-moderated reactor." RBMK is a Russian acronym for "large capacity channel reactor."

[5] See David Holloway, *Stalin and the Bomb* (New Haven: Yale University Press, 1994): 184-189, 346-348 for the origins of the Soviet civilian nuclear power program.

[6] The flawed design characteristic is known as the "positive void coefficient." If operated at below 20 percent of full power capacity, the reactor can become unstable as the result of an uncontrollable power release in the reactor core. (The Chernobyl accident occurred during an early morning powering down exercise.) The Russian nuclear industry disputes this view, arguing that with the right technical fixes the RBMK can be made as safe as any operating reactor. For Western assessments, see the relevant sections on the web site of the Uranium Institute www.uilondon.org. For Russian views, see "Chernobyl Nuclear Power Plant: Design and Construction," Kurchatov Institute http://polyn.net.kiae.su.

[7] Design problems include the absence of a containment structure, limited emergency core cooling capacity, limited redundancy and separation of safety equipment, deficient instrumentation and control systems, and serious deficiencies in fire protection. IAEA, *International Assistance to Upgrade the Safety of Soviet-Designed Nuclear Power Plants: Selected Activities in Eastern and Central Europe and the Countries of the Former Soviet Union* (Vienna: IAEA, 1993): 8. For the current state of VVER-440/213s following upgrades, see the summary report of the IAEA International Conference on Strengthening Nuclear Safety in Eastern Europe, Vienna, June 14-18, 1999, on www.iaea.org.

[8] Background on IAEA missions is provided in Nuclear Energy Institute (NEI), *Source Book: Soviet-Designed Nuclear Power Plants in Russia, Ukraine, Lithuania, Armenia, the Czech Republic, the Slovak Republic, Hungary and Bulgaria*, 4th edition (Washington: NEI, 1996).

[9] The G-24 was comprised of the then twelve members of the European Community; Austria, Sweden, and Finland (subsequently admitted to the EU); Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland, Turkey and the United States. In July 1989, the G-7 agreed that the European Commission should serve as the coordinating mechanism for aid from all G-24 countries. "Declaration on East-West Relations" (July 15, 1989), *Department of State Bulletin* 89 (September 1989): 2, 15-16. PHARE is the acronym for *Pologne: Hongrie: Actions pour la Reconversion Economique.* For nuclear safety programs, see European Commission, *PHARE Compendium of Operational Programmes 1993* (Brussels: CEC, June

1994); and European Commission, *Tacis-Phare: Contract information: Nuclear safety programmes, Budget 1994* (Brussels: CEC, December 1994). For an overview of the U.S. activities, see U.S. General Accounting Office (GAO), *Nuclear Safety: International Assistance Efforts to Make Soviet-Designed Reactors Safer*, GAO/RCED-94-234 (September 1994): 9-12. For an overview, see Michael Hettrich, Rolf Janke, and Peter Helm, "International Co-operation to Promote Nuclear Reactor Safety in the Former USSR and Eastern Europe," in Helge Ole Bergeson and Georg Parmann, eds., *Green Globe Yearbook of International Co-operation on Environment and Development 1994* (Oxford: Oxford University Press, 1994).

[10] *NUSAC News*, Issue 1, December 1993.

[11] Paul Lewis, "Aid Plan Drafted for Atomic Safety in Europe," *New York Times* (May 21, 1992); and "Gemeinsamer Fonds zur Sicherung der Kernkraftwerke in Osteuropa," *Frankfurter Allgemeine Zeitung* (July 8, 1992).

[12] "Economic Summit Communiqué" (July 8, 1992), *Department of State Dispatch* (August 1992): 5.

[13] European Bank for Reconstruction and Development, *Annual Report 1993* (London: EBRD, 1994): 29.

[14] European Commission, *Commission support to nuclear safety in the Newly Independent States and Central and Eastern Europe: Communication from the Commission to the Council and the European Parliament*, COM(2000), (September 6, 2000).

[15] For the text of the convention, see Patricia W. Birnie and Alan Boyle, *Basic Documents on International Law and the Environment* (Oxford: Clarendon Press, 1995): 307-321.

[16] *Annual Report of the OECD, 1994* (Paris: OECD, 1995): 51-52.

[17] WANO was founded in Moscow on May 15, 1989 by representatives of 144 electric utility organizations worldwide. Modeled on the U.S. Institute of Nuclear Power Operations (INPO), it was an industry response to the Chernobyl accident.

[18] North Atlantic Assembly, Scientific and Technical Committee, Sub-Committee on Technology and the Environment, “Nuclear Weapons in the Former Soviet Union and Nuclear Power in Central and Eastern Europe,” in *Scientific and Technical Committee, 1993 Reports* (Brussels: NAS, 1993): 21.

[19]. Russia agreed that it would not restart the Kursk 1 (RBMK) reactor without an adequate safety assessment and that it would end operation of its first generation reactors.

[20] See George Stein, "Kozloduy: A Nuclear Time Bomb?" *RFE/RL Report on Eastern Europe* (November 15, 1991): 8.

[21] IAEA, *International Assistance to Upgrade the Safety of Soviet-Designed Nuclear Power Plants*, 64-71.

[22] Yanaki Ganchev, quoted in *Pari* (October 16, 1995), in *Foreign Broadcast Information Service: East Europe Report (FBIS-EEU)* (October 19, 1995).

[23] Yanko Yanev, interviewed in *Kontinent* (September 27, 1995), in *FBIS-EEU* (October 4, 1995).

[24] "European Commission Statement on Kozloduy," undated, in *FBIS-EEU* (October 30, 1995).

[25] Gesellschaft für Reaktorsicherheit; Institut de Sûreté et Protection Nucléaire.

[26] Press briefing by head of the EU delegation in Bulgaria, Thomas O'Sullivan, Sofia BTA, (May 16, 1996), in *FBIS-EEU* (May 20, 1996).

[27] Sabin Sabinov, *NEK NPP "Kozloduy:" Safety Upgrading Process of Units 1-4 in KNPP, Preliminary Safety Assessment Results*, May 1998. Sabinov is the Chief Engineer, Units 1-4. The author is grateful to Christo Marinov of the Library of Congress for obtaining this document in Sofia.

[28] Ivan Shilyashki, Chairman, State Energy Committee, quoted in *Financial Times* (March 30, 1998).

[29] Commission of the European Communities, *Agenda 2000: Commission opinion on Bulgaria's application for membership of the European Union*, in *Bulletin of the European Union*, Supplement 13/97.

[30] European Commission, *Regular Report from the Commission on Bulgaria's Progress Towards Accession* (Brussels: CEC, November 1998): 32-33.

[31] "Presidency Conclusions: Cologne European Council, 3 and 4 June 1999," SN 150/99, 22.

[32] Simon Taylor, "Sofia seeks more time for closure," *European Voice* (April 8-14, 1999).

[33] "Big Upgrade Program Proceeds for Oldest Kozloduy 440s," *Nucleonics Week* (May 6, 1999).

[34] European Commission, *Regular Report from the Commission on Bulgaria's Progress Towards Accession* (Brussels: CEC, November 2000): 35-36 (quoting the 1999 report).

[35] "EU Commission welcomes decision of Bulgaria on early closure of units 1-4 of Kozloduy nuclear plant," Commission press release IP/99/916, (November 30, 1999).

[36] Ingrid Brocková, "Nuclear Diplomacy: Progress in Nuclear Safety in Slovakia," unpublished paper (Paul H. Nitze School of Advanced International Studies, Johns Hopkins University, April 1999); and *National Report of the Slovak Republic: Compiled according to the terms of the Convention on Nuclear Safety* (Bratislava, 1998), presented at the Convention on Nuclear Safety: First Review Meeting of the Contracting Parties, Vienna, April 12-23, 1999, www.ujd.gov.sk.

[37] SE reports that it invested Sk 2 billion ($67 million) of its own funds in the Small Reconstruction project; Sk 6 billion ($180 million) in the Gradual Reconstruction. The Gradual Reconstruction was named after the manner in which improvements were implemented gradually during extended outages for refueling and general overhauls. SE invested another Sk 8.2 billion ($240 million) on safety measures at Mochovce. *National Report*, 4.2.1

[38] Interview with Jiri Huebner in Bratislava *Pravda* (September 16, 1995), in *FBIS-EEU* (September 20, 1995). Huebner was director of the EBRD department for the Czech and Slovak affairs and conducted the discussions with the Slovak government over the summer of 1995.

[39] Personal interviews, EBRD, London, (June 7, 1995); Vincent Boland, "Slovaks waver over EBRD N-plant loan," *Financial Times* (March 31, 1995); and Jane Martinson, "EBRD at centre of N-power row," *Financial Times* (February 16, 1995).

[40] Martin Benko, "Financing Mochovce Probably Without the EBRD and EdF," *Pravda* (Bratislava) (September 7, 1995), in *FBIS-EEU* (September 13, 1995).

[41] Framatome, *Corporate Activities, 1996* (Paris: Framatome, 1997): 4.

[42] "Slovak Country Report," produced for NUSAC by the Nuclear Regulatory Authority of the Slovak Republic, March 26-27, 1998, *NUSAC News*, 13 (May 1998).

[43] "Slovakia warned over N-plant," *Financial Times* (May 20, 1998); and Robert Anderson and Eric Frey, "Vienna anger grows over nuclear plant," *Financial Times* (May 25, 1998).

[44] *Agenda 2000: Commission opinion on Slovakia's application for membership of the European Union*, in *Bulletin of the European Union*, Supplement 9/97.

[45] European Commission, *Regular Report from the Commission on Slovakia's Progress Towards Accession* (Brussels: CEC, November 1998): 31.

[46] European Commission, *Regular Report from the Commission on Slovakia's Progress Towards Accession* (Brussels: CEC, November 2000): 56-57.

[47] The Austrians were unhappy both with the completion of Mochovce and the proposed closure dates for Bohunice 1 and 2. In September, they argued that these units should be closed in 2000. Some of these statements were for domestic political consumption in Austrian, and in the end, Vienna did not block the decision by the European Council in December 1999 to approve the start of accession talks with Slovakia. "Austria threatens to block Slovakia's entry to EU," *Financial Times* (September 24, 1999).

[48] IAEA data. Lithuania also exports power to Belarus, Latvia, and the Kaliningrad region of Russia.

[49] Jane I. Dawson, *Eco-nationalism: Anti-nuclear Activism and National Identity in Russia, Lithuania and Ukraine* (Durham: Duke University Press, 1996). The Ignalina reactors are also the largest nuclear units ever built – 50 percent larger than the 1000 MW units installed in Russia and Ukraine.

[50] D.J. Peterson, *Troubled Lands: The Legacy of Soviet Environmental Destruction* (Boulder: Westview, 1993): 243.

[51] Lithuanian State Nuclear Power Safety Inspectorate, "Lithuanian Country Report," *NUSAC News*, 13 (May 1998); G. Negrivoda, “The enhancement of Ignalina NPP in design and operational safety,” paper presented at the IAEA International Conference on Strengthening Nuclear Safety in Eastern Europe, Vienna, June 14-18, 1999.

[52] EBRD, *Annual Report, 1993*, p. 29.

[53] Ignalina Safety Panel, *Ignalina Safety Panel Recommendations on the Ignalina NPP Units 1 & 2: In-Depth Safety Assessment* (London: EBRD, February 1997), www.ebrd.org; for a Lithuanian assessment, Lithuania, Department of Energy Development, Division of Nuclear Energy, *Nuclear Safety Report: Implementation of the Obligations of the Convention on Nuclear Safety in Lithuania: First Lithuanian Report in Accordance with Article 5 of the Convention* (Vilnius, 1998), presented at the Convention on Nuclear Safety: First Review Meeting of the Contracting Parties, Vienna, April 12-23, 1999, www.ekm.lt.

[54] *Agenda 2000: Commission opinion on Lithuania's application for membership of the European Union*, in *Bulletin of the European Union*, Supplement 12/97.

[55] “Bjerregaard Says Ignalina Closure Is Lithuania’s Ticket Into EU,” *Nucleonics Week* (March 19, 1998).

[56] European Commission, *Regular Report from the Commission on Lithuania's Progress Towards Accession* (Brussels: CEC, November 1999): 32.

[57] Lithuania used a system of annual permissions, under which each year after planned outages for refueling and maintenance, VATESI had to give permission to restart the plant. Permission was granted for one year. Much the of political jockeying between Lithuania and the West (and within Lithuania) was over whether, and if so, when VATESI would grant a long-term operating license to the plant. These annual re-licensing exercises gave VATESI, and through it the Western safety agencies authority in pressing the plant to make

necessary safety upgrades. It also tended to politicize the issue of plant safety in Lithuania, as annual shutdowns were seen by proponents of the plant as preludes to the shutdown. Before VATESI's decision to delay granting another licence beyond May 17, for example, dozens of plant workers protested in Vilnius. "Lack of License Decision Sidelines Ignalina-1 For at Least a Month," *Nucleonics Week* (May 20, 1999).

[58] "Lithuania to close first of two reactors by 2005," *Financial Times* (September 9, 1999).

[59] European Commission, *Regular Report from the Commission on Lithuania's Progress Towards Accession* (Brussels: CEC, November 2000): 65-66. The Vilnius conference led to the establishment of the Ignalina Decommissioning Support Fund, to which the European Commission, eight EU member states, Norway and Poland contributed. See "Nuclear safety update, September 2000," www.ebrd.org.

[60] *RFE/RL Baltic States Report* (January 10, 2001): 6-7.

[61] *UI News Briefing*, (47), (2000); (6), (2001).

[62]. "ISPN-GRS Joint Statement of 31 March 1996," *NUSAC News*, 9 (June 1996). The occasion for the statement was the April 1996 G-8 nuclear safety summit in Moscow, which in itself reflected the drift away from conditionality. The G-8 confirmed their commitment to "the highest internationally recognized safety level" in the siting, design, and operation of nuclear power stations but they did not endorse earlier G-7 demands that particular categories of reactors be phased out. Nuclear safety was presented as a shared problem, on which Russia was working as a member of the new G-8. See Bruce Clark and Chrystia Freeland, "Safety tops leaders' nuclear priorities," *Financial Times* (April 22, 1996); and the highly critical editorial, "G-7 Concessions Mark Triumph for Minatom's Strategic Aims," *Nucleonics Week* (April 25, 1996), focusing mainly on fuel issues.

[63]. In a separate report on RBMK reactors, GRS concluded that the worst features of the RBMK design had been modified at all operating units, thus making a repeat of a Chernobyl-type accident "virtually impossible." However, GRS still concluded that the plants were safety deficient in many ways. *UI News Briefing*, 96.09-13.

[64]. "NUSAC Work Programme: A New Approach," *NUSAC News*, 13 (May 1998).

[65] For the most comprehensive critique of policy implementation, see EU Court of Auditors, "Special Report No. 25/98 concerning operations undertaken by the European Union in the field of nuclear safety in Central and Eastern Europe (CEEC) and the Newly Independent States (NIS) (1990 to 1997 period) together with the Commission's replies," *Official Journal of the European Communities*, C 35/1.

[66] Checkel, "Compliance and Conditionality," 3.

[67] As the decade progressed, moreover, a sort of counter-politicization took hold, as anti-nuclear parties in the governments of Germany, Sweden, Austria and elsewhere strengthened the hand of the Commission and other technocratic bodies in imposing renewed conditions, this time in connection with applications for EU membership. Interestingly, Sweden, which pursues a domestic anti-nuclear policy, reportedly argued at the December 1998 Vienna summit that Lithuania should be permitted to start membership talks before shutting down the Ignalina plant. *UI News Briefing*, No. 50, 1998.

[68] This was Western policy until 1995-1996, after which there was a shift to a more nuanced approach. The Ukrainian parliament voted in August 1990 to close the two operating reactors at Chernobyl by 1995. It suspended this decision in October 1993. After long and bitter negotiations, the G-7 and Ukraine agreed in December 1995 to a protocol on closure by 2000. In 1996, the EU and the U.S. Department of Energy began providing short-term safety upgrade help to the plant. The West generally ignored Armenia's pleas for help with its severe energy problems until late 1994-early 1995, when it became clear that it was prepared to restart Metsamor 2 with Russian help.

[69] Despite their own financial problems, the Russians had a fair amount to offer, including: low-cost loans; long-term, low-cost fuel supply contracts; pledges to take back spent nuclear fuel for reprocessing; and participation in future Russian nuclear reactor projects.

[70] Heather Grabbe, "A Partnership for Accession? The Implications of EU Conditionality for the Central and East European Applicants," Robert Schuman Centre Working Paper 99/12 (Florence: European University Institute, July 1999).

[71] Under a Council directive adopted in December 1996 (Directive 96/92/EC), electricity deregulation in the EU is to occur in stages between 1999 and 2003. On interconnection, see Peter Kerr, "Electricity Interconnection Projects in Central Europe and the Mediterranean Region," *Energy in Europe*, (24) (December 1994): 88-90.

[72] Margaret Thatcher, *The Downing Street Years* (New York: Harper Collins, 1993): 546.

[73] The Cohesion Fund was established under the Maastricht Treaty to make grants to Greece, Ireland, Portugal, and Spain, provided they were making progress toward meeting the Economic and Monetary Union convergence criteria. The Stability and Growth Pact specifies procedures for sanctioning EU members running excess budget deficits. Article 7 of the Treaty on European Union (as amended by Amsterdam and Nice) provides for suspension of voting rights in the event of "a serious and persistent breach" of democratic principles by a member state. Sanctions and conditionality are different, but in these cases the removal of a sanction is achieved through conditionality. An early example of intra-EU conditionality was the imposition, in January 2000, of sanctions against Austria for inclusion in the governing coalition of members of the right-wing Austrian Freedom Party. This was carried out by 14 member states outside the legal structures of the treaty. Removal of the sanctions was made conditional upon Austria's making certain changes in its behavior.