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Comparative Aspects of the French and German Nuclear Energy Regimes-Working Toward an International Legal Framework

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I. Introduction

In the past decade, there has been a growing awareness of the alarming safety issues surrounding nuclear power facilities in former Communist countries. As political regimes collapsed throughout Central and Eastern Europe during the late 1980s, their nuclear energy legacy remained. Issues surrounding this legacy continue to influence nuclear development.[1] The prevailing notion is that continued operation of Soviet-designed nuclear reactors in former Communist States poses an unacceptable safety risk to Western Europe and to the world.[2]

In 1992, governments of the world's major economic powers initiated a program to address the most urgent of these perceived problems, providing training, administrative development, and technical measures for Eastern European nuclear programs.[3] Germany in particular engaged in a joint project with the Russian Federation establishing a measurement and information system to monitor environmental radioactivity near Russian nuclear stations.[4] Other international responses included the negotiation of a Convention on Nuclear Safety and plans for a Nuclear Waste Convention to be negotiated in the near future.[5] While these

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1. Commission Document on the Nuclear Industries in the European Union (An Illustrative Nuclear Programme According to Article 40 of the Euratom Treaty), 1997 O.J. (C 206) 8.

2. In a report to a special session of the United Nations General Assembly in 1997, the German Government expressed this concern, calling for immediate action through up-grading or decommissioning existing facilities. *Towards Sustainable Development in Germany: Report of the Federal Republic of Germany on the Occasion of the Special Session of the United Nations General Assembly on Environment and Development in 1997 in New York* (visited Nov. 9, 1997) <http://195.80.205.111/UNBericht/etitel.htm>.

3. *Id.*

4. *Id.*

5. *Id.*

responses indicate an international concern for the problems surrounding Central and Eastern European nuclear programs, they are merely a preliminary step in taking necessary action.

Regardless of the inherent dangers involved, the democratic republics which emerged from behind the Iron Curtain have been faced with financial difficulties and electricity shortages which prevent them from discontinuing operation of Soviet-designed reactors.[6] Even so, many of these facilities will begin to reach the end of their useful lives within the next ten to fifteen years.[7] It is therefore inevitable that Central and Eastern European countries will need to contend with the challenges and safety issues associated with decommissioning antiquated nuclear plants.[8] It is also likely that these same countries will face the decision of whether to commission new nuclear facilities. As the catastrophic incident at Chernobyl demonstrated in 1986, a single major accident can result in fallout being released across international borders, leading to major health and environmental concerns for many countries.[9] It follows that the international community, and particularly those countries located in regions adjacent to Central and Eastern Europe, have a tremendous interest in assuring that their neighbors maintain a safe nuclear energy establishment. Where a country lacks the requisite resources to maintain such an establishment, that country must be able to rely on the support of other countries.[10] Furthermore, the recipient of this support must be willing to abide by international agreements and standards.[11]

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6. Nathalie Horbach & Erik Hanenburg, *Legal Aspects of the Decommissioning of Nuclear Facilities: A Comparative View*, 58 NUCLEAR L. BULL. 29, 29-30 (1996).

7. *Id* at 29. This trend is not limited to facilities in Central and Eastern Europe. Nuclear facilities around the world will face the end of their useful lives, and the number of plants being decommissioned will peak around the year 2015. *Id.*

8. *Id.*

9. W. Schwarzer, *The Role of Nuclear Safety Standards, Procedures for Development and Possibilities for International Harmonization*, *in* 6 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 1, 11 (1987).

10. *Technical Criteria for a Nuclear Power Program*, *in* 2 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 119, 120 (1987). This is particularly true in the "sensitive" areas of operation such as reliability and safety. *Id.*

11. This is most crucial in the areas of incident notification, safeguards for fissile materials, mutual assistance, and safety inspections. *Id.*

Unfortunately, even when a country is willing to embrace this obligation, there remains the ambiguous task of ascertaining which standards and agreements must be followed. A number of international bodies have developed standards pursuant to nuclear energy and have developed close interorganizational relationships in creating these standards.[12] Even these convoluted standards and interrelationships are binding only to varying degrees.[13] While it has been suggested that national legal frameworks should follow the guidelines of international bodies,[14] and while there seems to be a consensus that European Union (EU) nuclear strategy should be developed along with international bodies,[15] only the standards of the European Atomic Energy Community (Euratom) are mandatory within the EU.[16] Standards issued by bodies such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD) are merely directory recommendations.[17] In particular, considerable efforts by the IAEA to harmonize nuclear regulations among the various countries have been plagued by the dilemma that the organization's standards can only be implemented in conjunction with national safety regulations.[18] And while it has been further suggested that such international standards should be binding,[19] it has also been noted that some components of these standards may be redundant in their application to the existing law of some countries.[20] As is the case with other international bodies, the international commun-

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12. In particular, the International Atomic Energy Agency (IAEA) has recognized interactions between the IAEA, Euratom, and the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD). Mohamed Elbaradei et al., *International Law and Nuclear Energy: Overview of the Legal Framework* (visited Nov. 12, 1997) <http:/www.iaea.or.at-/worldatom/inforesource/bulletin/bull373/rames.html> (expressing their organization's role in the formation of international nuclear policy).

13. *Id.*

14. Horbach & Hanenburg, *supra* note 6, at 46.

15. Nuclear Industries in the European Union, *supra* note 1.

16. Elbaradei, *supra* note 12.

17. *Id.* While not initially binding, IAEA standards may become binding in cases where the agency's assistance is sought. *Id.*

18. Schwarzer, *supra* note 9, at 11.

19. *Id.*

20. For example, the IAEA definition of decommissioning in the context of nuclear facilities includes references to the health and safety aspects of the activity. Application of this definition in Germany, which has no analogous decommissioning definition in its law, might be redundant since health and safety in radiological protection are covered elsewhere in the country's legislation. Horbach & Hanenburg, *supra* note 6, at 31.

ity is clearly not prepared to incorporate IAEA recommendations into internationally-binding standards.[21]

This absence of binding international standards is a problem confronting those countries that desire to adopt such standards and thereby benefit from an international interdependence among nuclear programs. Thus, a need exists for uniform and binding international nuclear legislation.[22] An adequate framework for such a body of legislation could be based upon a number of national models which have been successfully applied in Western countries.[23] However, given its proximity to the Central and Eastern European countries, it would appear that Western Europe maintains the greatest interest in assuring the safe operation of Soviet-designed nuclear installations. While it has been noted that the countries of the European Union are themselves moving quickly toward an integrated nuclear market,[24] it has also been noted that as a whole, the EU possesses the largest combined operational experience in the industrialized world.[25] As it encourages the harmonization of licensing, operation, and maintenance standards among its member states, the EU recognizes that a sound policy of nuclear safety must also include improvements in the safety of nuclear installations in Central and Eastern Europe.[26] For these reasons, it would seem that the most appropriate framework for a binding international model of nuclear legislation would reflect the challenges which already present themselves through the integration activities of the European Union.

With such a requirement in mind, this Comment will examine both national and international legal frameworks as they relate to the production of nuclear energy in France and Germany. Part II of this Comment will provide an overview of the two contrasting nuclear energy regimes as they relate to each country's traditional organizational structure. Part III will provide an analytic comparison of the legal frameworks associated with nuclear licensing and construction activities. Part IV will follow with a similar analysis focusing on activities related to the operation of nuclear facilities. In Part V, a brief comparison will outline the limited development

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21. Elbaradei, *supra* note 12.

22. This need is greatest in the decommissioning of existing plants, since legislation in this field is largely absent. Horbach & Hanenburg, *supra* note 6, at 29.

23. *Id.* at 47.

24. Nuclear Industries in the European Union, *supra* note 1.

25. *Id.*

26. *Id.*

of French and German decommissioning frameworks. Finally, Part VI will discuss prospects for continued harmonization of the French and German nuclear regimes, proposing measures for the development of a model legal framework for nuclear activities.

France and Germany are to be examined for a variety of reasons. Both are among the largest and most influential countries of the European Union. As founding members of the EU, their long affiliation implies a relatively advanced state of integration. The unitary style of French government presents a sharp contrast to the federal structure of Germany, presenting further aspects for examination. Finally, a model based on the harmonization of French and German programs may be the most crucial of all comparative models, as France and Germany are the two largest producers of nuclear energy within the European Union.[27] An examination of the harmonization prospects revealed in such a model requires an analysis that systematically compares the safety and licensing practices of the examined countries.[28] This examination begins with a comparison of the contrasting energy regimes of France and Germany.

II. Energy Regimes in France and Germany

Industrialized countries use nuclear energy to produce electricity for public consumption. Regimes that govern electricity production share two fundamental aspects: (1) they reflect the country's basic principles of politics, economics, and social organization; and (2) they represent an attempt to settle problems of law and administration which are inherent in all societies.[29] In nearly every country, a variety of laws govern energy production simultaneously.[30] Resulting energy regimes are therefore comprised of a composite of legislation.[31] For this reason, it is not surprising that the degree of territorial independence in a State's energy policy will have a considerable effect on an existing legal

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27. During 1996, France produced 378.20 TW(e).h from nuclear production, representing over 77% of its total civil electricity production. During the same year, Germany produced 152.8 TW(e).h which accounted for just over 30% of its total production. *Nuclear Power Status in 1996* (visited Nov. 7, 1997). <http://www.iaea.or.at/worldatom/inforesource/pressrelease/prn0697.html>.

28. Schwarzer, *supra* note 9, at 11.

29. U.N. DEP'T OF ECONOMIC & SOCIAL AFFAIRS, LEGAL AND ADMINISTRATIVE FRAMEWORKS FOR ELECTRICITY ENTERPRISES at 11, U.N. Doc. ST/ECA/169, U.N. Sales No. E.73.II.A.1 (1973).

30. *Id.* at 4.

31. *Id.*

regime.[32] For this analysis, a line can be drawn between the highly centralized unitary structure in France and the federal structure of Germany.

A. France

In keeping with its tradition of unitary government, France maintains a highly centralized nuclear energy regime. Although the State itself does not operate the country's nuclear facilities, this responsibility is vested in the country's single utility company, Electricité de France (EDF).[33] While the French government maintains ownership of this corporate body, EDF is itself a distinct entity separate from the state. That EDF continues in this capacity reveals much about the tradition of centralization in the French State. Following the Second World War, French authorities entrusted EDF with temporary management responsibility over all production and distribution activities in France.[34]

Early plans were made to eventually vest regional distribution authority to independent administrative bodies.[35] However, these plans were apparently less compatible with the existing French tradition of centralization. The proposed regional administrations never developed, and by the early 1970s, EDF continued to operate as the sole French electric utility.[36]

This status allowed EDF to play a central role in dramatic policy shifts that were then forthcoming. In 1973, France initiated an ambitious program[37] under which the country began a radical shift toward the construction of nuclear power plants. Under this initiative, thirty-four new reactors were expected to be completed by the year 2000,[38] and by 1996, a total of fifty-seven units were in operation.[39] In embarking on a nuclear program of such

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32. *Id.* at 16.

33. Michel Lévy, *French Administrative Action for Nuclear Safety: Principles, Organization, Experience and Recent Developments*, *in* 6 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 14 (1987).

34. LEGAL AND ADMINISTRATIVE FRAMEWORKS, *supra* note 29, at 37.

35. *Id.*

36. *Id.*

37. Lévy, *supra* note 33, at 14.

38. M. Panossian & M. Bacher, *French Nuclear Power Plants: Reactor Design and Development*, *in* 2 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 27, 27-28 (1987).

39. *Nuclear Power Status in 1996* (visited Nov. 7, 1997) <http://www.iaea.or.at/-worldatom/inforesource/pressrelease/prn0697.html>.

enormous magnitude, a highly centralized administrative structure was crucial given the technical challenges of development, particularly in areas of nuclear safety.[40] Along with the French Atomic Energy Commission (CEA), which was the sole industrial group responsible for various stages of the nuclear fuel cycle, EDF was one of only two industrial concerns managing the French initiative.[41] This restriction thus enabled the French program to achieve its objective for centralization.[42]

This restrictive approach became a characteristic of the entire French nuclear program. French nuclear construction was itself highly standardized.[43] All new French reactors were to be of a single type, each limited to one of only three power levels.[44] The manufacturing of nuclear facilities was also restricted to only two companies: Framatome, which became the major nuclear component supplier,[45] and Alsthom-Atlantique, which became the primary manufacturer of conventional components.[46]

While administration would rest with a handful of corporate bodies, the policies behind the French program were to stem from the government itself. In 1973, the Central Nuclear Facility Safety Service (SCSIN) was established as an organ within the French Ministry for Industry.[47] Since its establishment, the SCSIN has assumed the roles of evaluating and implementing French nuclear safety policy, performing research and development, advising other entities such as the CEA with respect to the national energy program, and informing the public as to nuclear energy-related matters.[48] In partnership with the CEA and EDF, the SCSIN also participates in the nuclear administrative process.[49] As this relationship has developed, it has been observed that centralized action has come to be exercised through three complementary channels: (1) drafting of specific technical regulations; (2) supervision of the licensing process as applied to each individual nuclear facility through the stages of construction, operation, and decom-

40. Lévy, *supra* note 33, at 17.
41. *Id.*
42. *Id.*
43. Panossian, *supra* note 38, at 27.
44. *Id.* at 28.
45. *Id.*
46. *Id.*
47. Lévy, *supra* note 33, at 14.
48. *Decree on the Organization of the Central Administration of the Ministry for Industry (1993)*, 53 NUCLEAR L. BULL. 81 (1994).
49. Lévy, *supra* note 33, at 14-15.

mission; and (3) surveillance of existing facilities.[50] While these channels reflect the centralized nature of the French regime, they also reflect a limited decentralization which exists and which has been deemed somewhat desirable.[51] However, this decentralization is limited to minor services geographically close to the individual nuclear installations.[52] It follows that in governing France's mammoth nuclear establishment, the overwhelming bulk of policy and administrative action originates from the central authorities.

B. Germany

Unlike France, Germany's federal organization of government divides a substantial amount of executive and legislative authority between its federal (Bund) and state (Land) governments. Federal States provide more complicated energy regime models since technical and economic requirements for efficient energy production tend to conflict with division of power principles between central and local governments.[53] This predicament is explicit in the German Constitution, which stipulates that the peaceful utilization of nuclear energy, including the construction and operation of such nuclear facilities, shall be governed under the concurrent powers of the Länder and Bund.[54] The various Länder may exercise their legislative authority only to the extent that the Bund has not legislated.[55] Thus, the Bund maintains the option of preemption over Länder legislative activity in the field of nuclear energy. Still, the Constitution requires Länder involvement, stipulating that Bund-enacted laws pertaining to nuclear energy must be executed, with parliamentary consent, by the Länder acting as agents of the Bund.[56] It follows that regardless of the autonomy ultimately vested in regional authorities, Länder involvement becomes an inherent part of the German nuclear energy regime, reflecting the country's decentralized political system.

This decentralization characterizes the German nuclear establishment. Unlike the French model, in which all responsibility

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50. *Id.* at 15.
51. *Id.* at 17. Lévy notes that represented decentralization stems from the Ministry of Industry's regional directorates. *Id.* at 15. These regional directorates are given some limited responsibilities with respect to nuclear safety. *Id.* at 17.
52. Lévy, *supra* note 33, at 17.
53. LEGAL AND ADMINISTRATIVE FRAMEWORKS, *supra* note 29, at 18.
54. GRUNDGESETZ [Constitution] [GG] art. 74 (F.R.G.).
55. GG art. 72 (F.R.G.).
56. GG art. 87c (F.R.G.).

is vested in EDF, no single entity controls the production, transmission, and distribution of electricity throughout Germany. Instead, a number of large, private companies dominate the country's energy sector.[57] In spite of the Bund's efforts to the contrary, these utilities maintain monopolies which impede the development of competitive energy supplies.[58] Still, these monopolies are restricted to their respective regions throughout the country.[59] Only the nuclear manufacturing element of Germany's establishment appears to share the level of standardization enjoyed by its French counterpart. While most German nuclear reactors originate from a single vendor,[60] there has been at least one exception to this trend.[61]

As a consequence of this decentralization, German government authorities exercise less influence over their domestic nuclear programs than do their French counterparts.[62] However, both Bund and Länder governments assume a number of administrative responsibilities over the country's program as a whole. It is the responsibility of the Bund to coordinate national nuclear policy.[63] Unlike France, this task is delegated to a number of separate ministries, each having simultaneous administrative responsibilities.[64] The Federal Ministry for Economics (BMWi), carries the most direct role as the organ responsible for establishing national energy policy.[65] Decommissioning activities are supervised by the Federal Ministry of Finance (BMF). Administration of nuclear research and development is undertaken by the Federal Ministry for Education, Science, Research and Technology (BMBF).[66] However, it is the Federal Ministry of Environment,

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57. *Germany: Environmental Review* (last modified July 1995) <http://www.-eia.doe.gov/emeu/env/germany.html>.

58. *Report of the Federal Republic of Germany*, supra note 2.

59. *Id.*

60. A. Birkhofer et al., *French Nuclear Power Plants: Reactor Design and Development, in* 4 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 1, 2 (1987).

61. *Id.*

62. *Germany: Environmental Review*, *supra* note 57. However, the German Energy Information Administration maintains that the Federal Government has been influential in gaining the utilities' cooperation in pursuing objectives of national policy. *Id.*

63. *Germany—Fact Sheet* (last modified Sept. 30, 1995) <http://etd.pnl.gov:-2080/fac/germany/factsheet.html>.

64. *Id.*

65. *Id.*

66. *Id.*

Nature Conservation and Nuclear Safety (BMU) which takes the most comprehensive role, supervising both the licensing procedures of Länder governments and addressing various aspects of radiation protection.[67]

Länder responsibilities include the implementation of nuclear policies established by the Bund. This still allows for a great degree of variation in policy among the various Länder. For example, while licensing requirements are generally established by the Bund through the BMU, licensing is also a concurrent task of each of the Länder.[68]

Though smaller than the nuclear regime of France, Germany's nuclear program has enabled the country to operate a sizable collection of nineteen operational stations producing approximately thirty percent of the country's electricity.[69] Still, the program remains a model of decentralized authority and regional influences. As is the case in France, these influences reflect national traditions and form the basis of nuclear legislation as it relates to the conception, operation, and decommissioning of nuclear facilities.

III. Processes of Nuclear Licensing and Construction

In most industrial countries, electricity producers must obtain a legal entitlement prior to the commencement of a major electrical undertaking.[70] In the case of nuclear energy, most countries also require that strict control be vested in public authorities, which must impose strict regulations and legal provisions before any proposed nuclear undertaking may proceed.[71] While nuclear energy regimes employ strikingly different legal mechanisms in exercising this control,[72] most regimes share similar policy objectives in granting entitlements, such as construction and

67. *Id.*
68. *Germany—Fact Sheet*, *supra* note 63.
69. *Report of the Federal Republic of Germany*, *supra* note 2.
70. LEGAL AND ADMINISTRATIVE FRAMEWORKS, *supra* note 29, at 26.
71. *Id.* at 22.
72. *Id.* at 26.

operating licenses, to producers.[73] This is true in both France and Germany.

A. France

In France, strict administrative control over matters of nuclear safety developed parallel to the underlying goals of efficiency and credibility, which came to characterize the country's ambitious nuclear program.[74] The French Government assumed its nuclear administrative authority relatively early, first passing an ordinance in 1945 creating the establishment of protective measures and later subjecting all basic nuclear installations (INBs), to government authorization after 1963.[75]

The initial phase of the French authorization process is the grant of a construction license decree, which specifies the general requirements for licensing a proposed nuclear facility.[76] Before the construction of any new facility may begin, an application for authorization must be sent directly to the Ministry of Industry.[77] As the government body most directly involved in the licensing and construction process,[78] the Ministry of Industry retains the direct power to issue nuclear licenses.[79] Within the ministry, the SCSIN exercises ministerial procedures relating to nuclear safety.[80]

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73. In a paper presented at the Regional Seminar in Nuclear Law for Latin American Countries held in Rio de Janeiro in June, 1973, Ha-Vinh Phuong of the International Atomic Energy Agency's Legal Division contrasted the regimes of established nuclear energy countries with those of up-and-coming nuclear states which had not yet established broad legal frameworks for the administration of nuclear energy. Phuong suggested two nuclear licensing objectives for all energy regimes: (1) nuclear licensing standards should reasonably assure safe operation without unduly compromising public safety; and (2) standards should allow for both technical feasibility and minimal public and environmental exposure without compromising the economic advantages of nuclear facilities. Ha-Vinh Phuong, *Legislative Framework and Regulatory Requirements for the Introduction of Nuclear Power, in* LICENSING AND REGULATORY CONTROL OF NUCLEAR INSTALLATIONS 3, 4 (1975).

74. Lévy, *supra* note 33, at 15.

75. *Id.* at 14.

76. *Id.* at 23.

77. MICHAEL DESPAX & WILLIAM COULET, DIRECTORATE-GENERAL; ENVIRONMENT, CONSUMER PROTECTION, AND NUCLEAR SAFETY, COMMISSION FOR THE EUROPEAN COMMUNITIES, THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE 113 (2d. ed. 1982).

78. Lévy, *supra* note 33, at 15.

79. *See Decree Concerning the Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995)*, 56 NUCLEAR L. BULL. 77, 78 (1995). The ministry currently derives its authority under the decree of May 5, 1995, No. 95-540. *Id.*

80. Lévy, *supra* note 33, at 15.

Authorization for a proposed facility is granted through a *draft decree* process in which the SCSIN submits the proposed facility to a group of technical experts specializing in the facility's proposed design.[81] Upon approval by this expert group, a preliminary copy of the license decree is drafted and submitted to an interminsterial commission, comprised of representatives from various bodies of the French Government.[82] The draft decree is then amended prior to its submission to the Prime Minister for signature.[83]

Throughout this process, all parties involved in evaluating the proposed facility rely on a preliminary safety report which must be included with the initial application.[84] This report must contain an updated file of the applicant's proposed means for compliance relating to existing nuclear legislation[85] with respect to design, construction, and initial reactor testing.[86] Compliance must extend from the design phase until decommissioning,[87] and the applicant must also keep the file updated throughout the authorization process.[88] In meeting this obligation, the applicant also reserves the right to exact any pertinent information from his suppliers.[89]

In considering the initial safety report, the Ministry of Industry is obliged to consider the opinions of the department where the proposed facility is to be located.[90] While the authorization process centers on the central government authorities, applications are subject to local inquiries as part of the draft decree process.[91] These public consultations are also provided to surrounding and adjacent localities where it is deemed that the effects of the proposed facility will extend beyond the borders of the local department or commune.[92] However, the practical impact of these

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81. *Id.* at 16.
82. *Id.*
83. *Id.*
84. *Id.*
85. *Order of 10th August 1984 on Design, Quality, Construction, and Operation of Large Nuclear Installations (1984)*, 35 NUCLEAR L. BULL. 60, 62 (1985).
86. *Trade Circular of 10th August 1984 Relative to Enforcement of the Large Nuclear Installation Design, Construction, and Operating Quality Regulations (1984)*, 35 NUCLEAR L. BULL. 68, 72 (1985).
87. *Order of 10th August 1984 on Design, Quality, Construction, and Operation of Large Nuclear Installations (1984)*, 35 NUCLEAR L. BULL. 60, 61 (1985).
88. *Id.* at 62.
89. *Trade Circular of 10th August 1984*, *supra* note 85.
90. Lévy, *supra* note 33, at 16.
91. *Id.*
92. *See Decree Concerning the Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995)*, 56 NUCLEAR L. BULL. 77, 80 (1995).

inquiries may be limited, since public inquiries are only one part of the licensing procedure and are optional under certain conditions.[93] Still, even where a public inquiry is not part of the authorization process, licensing decrees must still contain provisions for providing the public with information about the new facility.[94]

In addition to construction licensing decrees, the French authorization process is also subject to both orders and directives from the Ministry of Industry. Ministerial orders relate to generalized issues of technical refinements and safety.[95] In contrast, directives issued through the Ministry of Industry relate more closely to fundamental concepts associated with the construction of nuclear reactors.[96]

While a number of channels exist for enacting regulations governing the licensing and construction of nuclear installations, the French regime also allows for great flexibility in applying those regulations. Whether set forth by licensing decree, ministerial directive or order, French nuclear regulations are ultimately subordinate to the judgment of the Ministry of Industry, which retains an enormous amount of discretion in the regulatory procedure.[97] Under the French regime, the applicable standards of quality for a given nuclear undertaking must reflect the specific

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93. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 113. For example, applications are not subject to public inquiry where the application conforms to an earlier inquiry and is made prior to a "declaration of public benefit." *Id.* Another example arises in cases where the effects of proposed facilities extend beyond department borders. In these cases, the decision of whether to hold a public inquiry in another department is under the discretion of the local department administrator or "Préfet." *See Decree Concerning the Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995)*, 56 NUCLEAR L. BULL. 77, 80 (1995).

94. *Decree Concerning the Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995)*, 56 NUCLEAR L. BULL. 77, 80 (1995).

95. Lévy, *supra* note 33, at 23. For example, one United Nations Technical Report refers to issues of reactor circuit design and construction quality as areas befitting regulation through ministerial order. *Id.*

96. *Id.* An example of an area suited to ministerial directive would be the safety "obligations and features" associated with particular power levels of standardized reactor units. *Id.* This distinction is crucial in the context of the French nuclear regime given its high level of standardization.

97. Two principles have been identified which characterize this relative status: (1) French regulations have evolved so that their purpose is to set forth "a number of fundamental guidelines" which are deemed essential for operation, though not necessarily sufficient in themselves to assure acceptable safety levels; and (2) French regulations represent the regime's fixed goals, though not necessarily prescribing the means to achieve those goals. Lévy, *supra* note 33, at 23.

safety needs of the individual project.[98] Ultimately, the decision for granting an operating license rests with the SCSIN.[99] Such authorization may not be granted until the operator first submits an additional final safety report, including proposals for regulating the facility's permanent operation.[100] Even where a new facility adheres to existing regulations and meets all necessary technical requirements, the SCSIN may, at its discretion, require that the facility meet additional technical requirements before the Ministry of Industry authorizes operation.[101] The SCSIN also retains the authority to supplant existing fundamental safety regulations in favor of alternative measures wherever it deems that such alternative measures are necessary for safety.[102]

The French judicial process has apparently taken the regime's flexibility to heart. Appeals to French administrative courts have been based on challenges to the legality of the construction licensing decrees themselves.[103] Such appeals have been unsuccessful where arguments have centered on narrow interpretation of international law.[104] These challenges have also been refused where construction license decrees have been argued to be contrary to the public interest.[105] In considering these challenges, the French courts have found that the country's need for a secure energy supply clearly outweighs other contrary public interest arguments.[106] The courts have extended this notion even where the requested authorization relates primarily to future nuclear development. In one such appeal, groups from Switzerland challenged the French government's authorization of the largely experimental *Superphénix* fast breeder reactor located near the Franco-Swiss

98. *See Trade Circular of 10th August 1984*, *supra* note 85, at 69.

99. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 117.

100. Lévy, *supra* note 33, at 16.

101. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 117.

102. Lévy, *supra* note 33, at 24. The French Government intends to achieve two policy goals in vesting this broad authority to the SCSIN: (1) to avoid hampering the development of technology; and (2) to further the development of standardization within the country's nuclear program. *Id.* Thus, the SCSIN's broad authority relates directly to the overall objectives of France's ambitious nuclear development strategy.

103. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 115.

104. *Id.*

105. *Id.*

106. *Id.*

border.[107] The court's subsequent dismissal was based on the fact that the reactor's operation was a necessary part of France's twenty-first century energy preparation.[108]

This notion of flexibility complements a gradual trend toward legal simplification, which has come to increasingly characterize the French nuclear regime. In one such effort, the French Government introduced a highly flexible "special regime" governing the installation of smaller INBs.[109] Under this "special regime," an applicant whose proposed facility meets prescribed requirements may be excluded from certain interministerial controls.[110] The application also becomes exempt from the normal local inquiry requirement.[111] In a more recent development, the government abolished an earlier provision that required a preliminary study as part of the authorization procedure.[112] This procedural simplification in fact removed a cumbersome obstacle to new licensing applications.[113] In pursuing this course of legal simplification within an already highly centralized regime, the French Government has enabled prospective applications to move through the authorization process with great expediency. As a result, the country's ambitious nuclear program has been able to proceed even further toward its ultimate goal of harmonization and efficiency.

B. Germany

While Germany's federal structure does not vest executive responsibilities in any one central body,[114] nuclear activities within the country are governed under the federal Atomgesetz (German

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107. *Council of State's Judgment of 28 February 1997 on Superphenix*, 59 NUCLEAR L. BULL. 33, 33 (1997).

108. *Id.*

109. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 114.

110. *Id.*

111. *Id.*

112. *Decree Concerning the Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995)*, 56 NUCLEAR L. BULL. 77, 79 (1995).

113. *Id.*

114. OECD/NEA SECRETARIAT, *A Survey of Different Regulatory Practices*, *in* LICENSING AND REGULATORY CONTROL OF NUCLEAR INSTALLATIONS 255, 271 (1975).

Atomic Energy Act) of 1959[115] as amended in 1985[116] and 1994.[117] As in France, the German statute requires that authorization be obtained prior to the construction or operation of any installation utilizing fissionable fuels.[118] Under the Atomgesetz, both Bund and Länder governments participate in the licensing procedure for new nuclear facilities.[119] However, the authorizations themselves are ultimately granted by Länder authorities.[120] These authorizations are themselves divided into partial licenses, covering separate aspects of the construction process, and are granted separately as construction proceeds.[121]

German Federal Law requires that an applicant submit his license application directly to the local licensing authority.[122] It is then up to the authority, which must be of the Land where the installation is to be constructed,[123] to conduct the first phase of the licensing process. At this stage, the Land conducts many of the activities which would be conducted by the central authorities in France. These activities include providing for public discussions and consultations with expert groups and other local authorities.[124] However, before rendering a partial license, the Land first consults with the authorities of the Bund.[125] Within the Bund, the task of supervising the Land's licensing procedure is delegated to the Ministry for Education, Science, Research and

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115. Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren (Atomgesetz), v. 23.12.1959 (BGB1. I S.814).

116. Fassung der Bekanntmachung, v. 15.7.1985 (BGBl. I S.1565).

117. Siebentes Änderungsgesetz, v. 19.7.1994 (BGBl. I S.1618, 1622)

118. Sec. 7 Nr. 1 Atomgesetz. Facilities located in the former German Democratic Republic which received authorization prior to 1990 are now also subject to the Federal Republic's licensing regime. The 1994 Atomgesetz revision provides that licenses granted prior to 1990 were to expire as of June 30, 1995. *Id.* § 57a Nr. 1.

119. *Id.* § 7 Nr. 4.

120. L.F. Franzen, *Safety Criteria and Procedural Steps Connected with the Licensing of Nuclear Power Plants in the Federal Republic of Germany*, *in* LICENSING AND REGULATORY CONTROL OF NUCLEAR INSTALLATIONS 39, 51 (1975). The Länder bodies responsible for actually granting licenses varies by Land, but the power is most often vested in the local ministry of commerce, acting in conjunction with other state ministries. *Id.*

121. *Id.* at 53.

122. *Consolidated Text of the 1977 Ordinance on the Procedure for Licensing Nuclear Installations, Dated 31st March 1982*, 30 NUCLEAR L. BULL. (Supp. 3) 4 (1982).

123. Franzen, *supra* note 120, at 52.

124. *Id.*

125. *Id.*

Technology (BMU).[126] In examining the application, the BMU draws on the expert opinions of its own advisory groups.[127] The ministry must then submit its licensing decision based on the requirements of the Atomgesetz and all other relevant legislation.[128] Upon the grant of any license, the facility remains under the supervision of the local licensing authority throughout its operational life.[129]

As in France, all parties involved in the German authorization process rely on a preliminary safety report which must be included in the application materials upon their submission to the local authorities.[130] The report must include the proposed facility's design and safety characteristics,[131] as well as a description of the expected health and environmental effects associated with the facility's installation and operation.[132] Further, the applicant must provide the licensing authority with additional information whenever the authority determines that such information is needed.[133]

Under German law, the specific purpose of the preliminary safety report is to benefit third parties so that such parties may themselves determine whether their rights would be adversely affected.[134] Upon receipt of a completed application, the local licensing authority must announce the proposal to the general public.[135] Rather than conduct a public inquiry, the licensing authority must accept any written objections to the proposed facility and provide for a private hearing.[136] Every party submitting a written complaint is entitled to present its objection at this

126. *Germany—Fact Sheet*, *supra* note 63.
127. Franzen, *supra* note 120, at 56.
128. *Consolidated Text of the 1977 Ordinance on the Procedure for Licensing Nuclear Installations, Dated 31st March 1982*, 30 NUCLEAR L. BULL. 10 (Supp. 3 1982).
129. Franzen, *supra* note 120, at 55.
130. *Consolidated Text of the 1977 Ordinance on the Procedure for Licensing Nuclear Installations, Dated 31st March 1982*, 30 NUCLEAR L. BULL. 4 (Supp. 3 1982).
131. *Id.*
132. *Id.* at 5. This description must also include any expected effects of possible accidents. *Id.* at 4.
133. *Id.* at 5.
134. *Consolidated Text of the 1977 Ordinance on the Procedure for Licensing Nuclear Installations, Dated 31st March 1982*, 30 NUCLEAR L. BULL. 4 (Supp. 3 1982).
135. *Id.* at 5.
136. *Id.* at 7.

hearing.[137] While the French nuclear regime limits the practical impact of such consultation, all proposals in Germany are subject to such public scrutiny, which ultimately affects the procedural outcome.[138]

In considering the public's criticisms, the licensing authorities must evaluate the proposed license according to applicable regulations and standards. As is the case in France, nuclear regulations in Germany are issued directly from central authorities and in most cases originate from the Bund itself.[139] In comparison, safety standards may be issued either by the Bund or by another body acting in conjunction with the Bund and are intended to embody interpretations of Atomgesetz provisions.[140] However, the fact that standards, unlike regulations, do not originate solely from the Bund complicates their implementation. For example, Regulatory Guides, which include safety criteria and guidelines for adherence to radiation protection ordinances, are issued by the BMU only after a process of outside consultation.[141] Guidelines established by the Nuclear Reactor Safety Commission (RSK) originate from intergovernmental consultation and are eventually replaced with Safety Standards issued by the Nuclear Safety Standards Commission (KTA).[142] These KTA Safety Standards are also subject to additional procedural rules related to their enactment.[143]

Surprisingly, the judicial process in Germany provides the local authorities with a high level of flexibility in applying these standards and regulations. Given the Länder responsibility of implementing federal laws on behalf of the Bund, it has been suggested that the Bund must draft standards such that Länder authorities will be willing to carry out their enforcement.[144] The regime also shields existing standards and regulations from judicial challenges. Pre-enforcement review is not provided until the

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137. *Id.* at 9.
138. *See id.* at 10.
139. *See* § 54 Nr. 1 Atomgesetz. Even those regulations not issued directly by the legislature are to be issued by the federal ministry responsible for nuclear safety and radiation protection. *Id.* These ministerial regulations are subject to approval by the Federal Council. *Id.* at Nr. 2.
140. Schwarzer, *supra* note 9, at 9.
141. *Id.*
142. *Id.*
143. *Id.*
144. SUSAN ROSE-AACKERMAN, CONTROLLING ENVIRONMENTAL POLICY: THE LIMITS OF PUBLIC LAW IN GERMANY AND THE UNITED STATES 67 (1995).

standard or regulation has been subject to actual litigation.[145] Once a challenge is permitted, individuals and organizations may only pursue their claim upon showing a violation of their rights.[146] For example, in 1996, the Administrative Court of Appeal of Lüneburg, the highest administrative court in Lower-Saxony, dismissed an appeal by residents living in the vicinity of a nuclear installation who challenged a partial license.[147] The appeal centered on the residents' claim that the license had been granted in violation of procedural rules, had been granted without consideration of available health and environmental information and was not based on existing regulations.[148] The court dismissed the appeal, holding that the residents' claim had not sufficiently established that their rights had been breached during the defective licensing procedure.[149] The court could not substitute its own judgment for that of the licensing authority and was limited to verifying that the authority had sufficiently justified its decision.[150]

In spite of this apparent flexibility, recent legislative developments have placed a severe limitation on the granting of future nuclear licenses. As amended in 1994, the Atomgesetz now requires that applicants for new licenses provide proof regarding the inherent safety characteristics of their proposed facility.[151] Under the new provision, the applicant must prove that upon the occurrence of a catastrophic event such as a reactor core meltdown, the proposed reactor would not allow for the release of ionizing radiation.[152] The applicant must also prove that such an event would not require a mass evacuation of areas surrounding the proposed installation.[153] While the development of such a reactor is currently well under way, future authorizations in Germany will need to wait for the introduction of the next generation of nuclear plants.[154] In this respect, Germany's existing nuclear legal frame-

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145. *Id.* at 72.
146. *Id.*
147. *The Highest Administrative Court of Lower-Saxony Rejects an Appeal Against the Licensing of the Storage of Nuclear Waste and of Irradiated Fuel Elements*, 58 NUCLEAR L. BULL. 71 (1996).
148. *Id.*
149. *Id.*
150. *Id.*
151. Sec. 2a Atomgesetz.
152. *Id.*
153. *See id.* This provision, however, does not apply to facilities in operation prior to 1993. *Id.*
154. *Report of the Federal Republic of Germany, supra* note 2. One design that would meet this requirement is the European Pressurized Reactor (EPR), which

work has clearly surpassed the country's current technological capacity.

IV. Frameworks for the Operation of Nuclear Facilities

The legal frameworks surrounding the operation of nuclear facilities are highly interconnected with those surrounding nuclear construction and licensing. Even so, a number of additional legal issues relate directly to the operational aspects of nuclear facilities. Due to the scale and potential hazards associated with the utilization of nuclear energy, a country that commits itself to nuclear development must also assume an irreversible obligation for many decades.[155] For this reason, it is essential that a State utilizing nuclear energy establish and maintain an effective administration for monitoring its nuclear program.[156] It is also essential that the State adopt a system to protect the public from the financial consequences of nuclear-related damages.[157] Efforts on the part of both France and Germany have increasingly sought further harmonization in both nuclear safety and third party liability, though both countries continue to maintain contrasting individual legal frameworks in both fields.

A. France

As in construction and licensing, centralized authorities maintain ultimate legal control in the operation of French nuclear installations. As reorganized in 1993, the Ministry of Industry, acting with the Ministry of the Environment, is vested with the legal authority to undertake measures aimed at minimizing harmful effects related to nuclear energy production.[158] Actual monitoring of operator discharges is carried out by the Office for Protection Against Ionizing Radiation (OPRI), which is also responsible for exercising technical control related to radioactive pollution.[159]

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is currently undergoing a joint French-German development effort. *Id.*

155. *Technical Requirements for a Nuclear Power Programme*, *in* 2 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 118 (1987).

156. *Id.*

157. Phuong, *supra* note 73, at 7.

158. *Decree on the Organization of the Central Administration of the Ministry for Industry (1993)*, 53 NUCLEAR L. BULL. 81 (1994). The Ministry of Industry exercises this authority through its subunit, the DGEMP, which in turn operates the Directorate for the Safety of Nuclear Installations. *Id.*

159. The OPRI assumes this responsibility as successor to the Central Service for Protection Against Ionizing Radiation (SCPRI). *Decree Concerning the*

Under French Law, the monitoring activities are themselves exercised by the nuclear operator who must account to the government authority to ensure that the activities conform to the government's applicable authorization decrees.[160] As part of the monitoring routine, the operator himself must report directly to the SCSIN all incidents which may affect the level of safety at the facility.[161] The government's monitoring is then carried out by inspectors, and sanctions may be imposed where the inspections reveal noncompliance with provisions of the facility's authorization decree.[162] These sanctions are intended to return the installation to a safe operating level and may include suspension of the facility's operation.[163] Where an incident has occurred during operation, a follow-up report of the incident must be sent to the SCSIN within two months after the occurrence.[164] Such a report must also be submitted after periodic shut-downs and reactor modifications.[165]

A fundamental feature of the French nuclear regime involves the notion that in performing surveillance activities, government authorities should not replace the operator as the party ultimately responsible for monitoring safety.[166] In keeping with this concept, owners of nuclear facilities are explicitly responsible for enforcing legal provisions relating to "quality-relevant" issues under French law.[167] For this reason, it has been suggested that in France, government surveillance should be limited to verification of a facility's conformity through periodic spot-checks conducted through a systematic process.[168] However, government efforts aimed at maintaining this surveillance framework have in fact led to a gradual and uncharacteristically French pattern of decentralization among regional industry and research directorates.[169] Still,

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Release of Liquid and Gaseous Effluents from, and the Use of Water by Large Nuclear Installations (1995), 56 NUCLEAR L. BULL. 77, 78-9 (1995).

160. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 119.

161. *Id.*

162. *Id.* at 120.

163. *Id.*

164. Lévy, *supra* note 33, at 20.

165. *Id.*

166. *Id.* at 21.

167. *Order of 10th August 1984 on Design, Quality, Construction, and Operation of Large Nuclear Installations (1984)*, 35 NUCLEAR L. BULL. 60, 62 (1985).

168. Lévy, *supra* note 33, at 23.

169. *Id.* at 22. Lévy attributes this to an increase in inspection resources which became available to safety authorities in the late 1970s and 1980s. *Id.*

in providing increased efficiency for the overall inspection process,[170] this pattern of decentralization has actually contributed to a fundamental objective of the French nuclear regime.

The regime's existing framework in the field of operational monitoring has also been complemented with international legislative measures. In 1994, France signed the Convention on Nuclear Safety[171] which the country approved on September 13, 1995 and which entered into force on October 24, 1996.[172] The convention, which has been ratified by over twenty-two countries, includes international provisions for verifications of safety,[173] quality assurance,[174] radiation protection,[175] responsibilities to be vested in holders of nuclear licenses,[176] and provisions for the establishment of legislative and regulatory frameworks for signatories' nuclear programs.[177] As a member of the European Atomic Energy Community, France's monitoring activities are also bound by the radiation protection provisions of the Euratom Treaty.[178] These provisions mandate, *inter alia,* the establishment of legislative and regulatory provisions to uphold basic community radiation standards[179] and require member states to engage in the continuous monitoring of environmental radioactivity.[180]

France's commitment to greater international frameworks also extends to the country's third party liability regime. France is a signatory of the Paris Convention on Third Party Liability,[181] which contains internationally-binding provisions covering, *inter alia*, liability of nuclear facility operators,[182] compensation for

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170. *Id.* Lévy attributes this added efficiency to "geographical proximity of the facilities." *Id.*

171. Convention on Nuclear Safety, Sept. 20, 1994 (visited Nov. 11, 1997)<http://www.varam.gov.lv/English/Radiation/Legal/ConvNucSaf.htm>.

172. *Entry into Force of the Convention of Nuclear Safety (1996),* 58 NUCLEAR L. BULL. 136 (1996). Germany is also a signatory of the convention. *Id.* at 137.

173. Convention on Nuclear Safety, *supra* note 171, art. 14.

174. *Id.* at art. 13.

175. *Id.* at art. 15.

176. *Id.* at art. 9.

177. *Id.* at art. 7.

178. EURATOM TREATY arts. 30-39, 161.

179. *Id.* at art. 33.

180. *Id.* at art. 35.

181. Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as Amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 (visited Nov. 12, 1997) <http://www.nea.fr/-html/law/nlparis_conv.html> [hereinafter *Paris Convention*].

182. *Id.* at arts. 3-4.

nuclear-related damages,[183] and limitations to liability.[184] Additional provisions related to those of the Paris Convention have been added under the Brussels Supplementary Convention,[185] and together, provisions of the two treaties have been incorporated directly into subsequent French legislation, particularly the Act of October 30, 1968, as amended by the Act of June 16, 1990.[186] This legislation exists specifically for the purpose of implementing measures pursuant to the Paris and Brussels Conventions,[187] losing effect upon the Paris Convention's termination.[188] As a result of this legislation, the existing French liability regime now holds nuclear facility operators strictly liable for damages even in the absence of a major accident and even where the operator has complied with all technical requirements of the facility's license.[189] Maximum liability for an operator is set at 600 million francs per incident.[190] In accordance with provisions of the Brussels Convention, the government is responsible for paying sums in excess of the convention's limits[191] where such limits are deemed insufficient to compensate victims.[192] In allocating these sums, compensation for bodily injury receives priority over damages to property.[193] A strict statute of limitations also applies. In claiming damages, victims must bring their claims within three years of a nuclear incident.[194] In order to guard against such claims, opera-

183. *Id.* at arts. 6-7.

184. *Id.* at arts. 5, 7-9.

185. Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as Amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982, (last updated Aug. 30, 1988) <http://www.nea.fr/html/law/nlbrussels.htm> [hereinafter *Brussels Convention*].

186. *Act No. 68-943 of 30th October 1968 on Third Party Liability in the Field of Nuclear Energy, as Amended by Act No. 90-488 of 16th June 1990*, 46 NUCLEAR L. BULL. (Supp. 3) 3 (1990).

187. *Id.*

188. *Id.* at 9.

189. THE LAW AND PRACTICE RELATING TO POLLUTION CONTROL IN FRANCE, *supra* note 77, at 121.

190. *Act No. 68-943 of 30th October 1968 on Third Party Liability in the Field of Nuclear Energy, as Amended by Act No. 90-488 of 16th June 1990*, 46 NUCLEAR L. BULL. 3 (Supp. 3 1990). This maximum liability figure may be substantially raised or lowered depending on the design or purpose of the facility. *See Id.* at 4.

191. *Id.* at 4.

192. *Id.* at 6.

193. *Id.* at 6.

194. *Act No. 68-943 of 30th October 1968 on Third Party Liability in the Field of Nuclear Energy, as Amended by Act No. 90-488 of 16th June 1990*, 46 NUCLEAR L. BULL. 7 (Supp. 3 1990). An exception to this requirement allows for claims to be submitted after the statutory period where the victim becomes aware of the

tors must maintain insurance for their maximum liability.[195] Failure to meet this requirement may subject the operator to both criminal liability and suspension of the facility's operation.[196]

Incorporating the legal provisions of international nuclear agreements into its own domestic legislation clearly brings much of France's legislative framework in line with those of other countries. While some legal aspects of France's nuclear monitoring continue to reflect the individualized goals of the country's nuclear regime, many operational aspects of the regime also demonstrate French efforts that are clearly aimed at furthering international harmonization.

B. Germany

The Atomgesetz similarly provides for government supervision over most aspects of German nuclear operation.[197] At the Federal level, the BMU has the responsibility of implementing preventive measures to ensure reactor safety and adequate radiation protection.[198] Germany's Preventive Radiation Protection Act also stipulates that implementation of these measures is the responsibility of the Länder.[199] However, the Bund still maintains the right to issue statutory ordinances as well as administrative regulations and to issue directives relating to matters of legal importance and efficiency.[200]

Such ordinances cover numerous areas of radiation protection and are often comprised of simple lists of maximums providing allowable levels of radioactive emissions and exposures to the public and environment.[201]

As it relates to the monitoring of nuclear activities, the German regime is more highly subject to international frameworks than is the regime in France. In Germany, enacted limits on radioactive exposure are automatically subject to European Union directives and the recommendations of the International Commis-

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damage or injury only after the period has expired. However, in no case may a claim be brought after fifteen years. *Id.*

195. *Id.* at 4.

196. *Id.* at 8.

197. Sec. 19 Nr. 1 Atomgesetz.

198. *Act of 19th December 1986 to Provide for the Preventive Protection of the Population Against Radiation*, 39 NUCLEAR L. BULL. 43, 48 (1987) [hereinafter *Preventive Radiation Protection Act*].

199. *Id.*

200. Franzen, *supra* note 120, at 40.

201. *Id.* at 43.

sion on Radiation Protection.[202] This provides a general supervisory basis for all German nuclear energy production.[203] The recommendations of international bodies are also highly influential to the German monitoring process. For example, recommendations made by the International Commission on Radiological Protection (ICRP) are given great weight by supervisory authorities due to their factual basis.[204] While not legally binding on German legislative practices, it has been noted that in time, the country's legal framework ultimately conforms to such recommendations.[205]

The Atomgesetz serves as a predominant source of legislation related to nuclear monitoring.[206] Under its provisions, the possession of nuclear fuels by non-government bodies requires a license,[207] which may be revoked upon repeated violations of Atomgesetz provisions or its associated regulations.[208] Agents of the supervisory authorities may conduct inspections to assure compliance and are entitled to unlimited access to all equipment, places of material storage, and radioactive sources within a given nuclear facility.[209] As in France, all nuclear plants are subjected to recurrent inspections upon commissioning.[210] The supervisory authority may revoke an operating license where an inspection reveals a substantial risk to the public or environment and where an imposed remedy cannot remove the risk within a reasonable time.[211] Both manufacturers and operators are responsible for ensuring that their facilities are properly configured and accessible to the supervisory authority for carrying out these inspections.[212]

The Atomgesetz also provides a legislative framework for third party liability in the operation of German facilities. By design, the Atomgesetz incorporates specific elements of the Paris and Brussels Conventions into its own legislative framework.[213] Under German law, provisions of the Paris Convention are binding within Germany regardless of whether they continue to be binding under

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202. *Report of the Federal Republic of Germany, supra* note 2.
203. *Id.*
204. Franzen, *supra* note 120, at 43.
205. *Id.*
206. *Report of the Federal Republic of Germany, supra* note 2.
207. Sec. 6 Nr. 1 Atomgesetz.
208. *Id.* § 19 Nr. 1.
209. *Id.* § 19 Nr. 2
210. Franzen, *supra* note 120, at 51.
211. *See* § 17 Nr. 5 Atomgesetz.
212. Franzen, *supra* note 120, at 51.
213. *See* § 25 Nr. 1 Atomgesetz.

international law.[214] Thus, the resulting legal framework is based on the combined provisions of the Paris Convention and Atomgesetz.

In many ways this framework mirrors that of France, while retaining a number of classic German policy elements. Under the German regime, Atomgesetz liability provisions supplement Paris Convention provisions in cases where a German court has jurisdiction over an operator in another Paris Convention State.[215] The Paris Convention's Article 3 operator liability provisions are also extended under the German statute, which removes the convention's war, natural disaster, and territorial exceptions from German application.[216] The Atomgesetz explicitly preserves the Paris Convention's Article 5(d) provisions for joint and several liability,[217] and also provides for claims based on contributory fault.[218] A statute of limitations requires victims to submit all claims within three years of learning of their nuclear-related injuries, and in any case within thirty years of the damaging incident.[219] As in France, German operators must insure their facilities up to the amount of their maximum liability[220] or face revocation of their operating licenses.[221] However, the German framework also employs a unique indemnification provision for cases in which nuclear-related damages exceed an operator's maximum liability. In such cases, the Bund and Länder share the costs of indemnification, the Bund providing seventy-five percent of the required funds and the Länder paying the remaining twenty-five percent.[222]

In spite of such differences, the ultimate effect which the Paris Convention has had on the German regime is clear. Though limited by certain fundamental policy concepts inherent in the contrasting regimes, a pattern of harmonization exists in which aspects of the German nuclear framework have come in line with

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214. *Id.*
215. *Id.* § 40 Nr. 1.
216. *Id.* § 25 Nrs. 3-5.
217. *Id.* § 35 Nr. 1.
218. Sec. 27 Nr. 1. Atomgesetz.
219. *Id.* § 32 Nr. 1. For claims brought under Article 8(b) of the Paris Convention, the thirty-year limitation is reduced to within twenty years of the nuclear-related incident. *Id.* § 32 Nr. 2.
220. This is a fixed liability limited to 500 million DM. *Id.* § 13 Nr. 3.
221. *Id.* § 17 Nr. 4.
222. Sec. 36 Atomgesetz.

those of the international community. In many ways, efforts toward this end have been even greater than in France.

V. Nuclear Decommissioning

The imminent closure of Central and Eastern European nuclear facilities suggests that there is a greater need for an international framework in decommissioning than for any other aspect of nuclear energy production. Unfortunately, few legislative measures have dealt with this issue and an international framework relating to decommissioning has yet to be conceived.[223] Decommissioning involves actions taken at the end of a nuclear facility's operational life which enable the facility to be safely retired from service.[224] While both France and Germany have engaged in sophisticated activities to achieve this end, a sharp contrast separates each country's approach.

A. France

The large scale and relative homogeneity of France's nuclear program has given the country a broad basis for developing a national decommissioning doctrine.[225] Under this doctrine, the facility operator makes an early decision whether to dismantle the facility immediately or perform the dismantling in successive stages over a longer period.[226] The remainder of the decommissioning process stems from this initial decision, and is based on a national waste management policy under the supervision of the National Agency for Radioactive Waste Management (ANDRA),[227] a

223. Horbach & Hanenburg, *supra* note 6, at 32.

224. *Id.* at 30. It has been observed that the definition of decommissioning varies enormously between countries and international agencies and that the lack of a uniform definition has contributed to the lack of an international framework in this field. *Id.*

225. André Cregut, *Decommissioning and Dismantling of Nuclear Facilities*, *in* 5 UNITED NATIONS CONFERENCE FOR THE PROMOTION OF INTERNATIONAL CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY TECHNICAL REPORTS 95, 97 (1987).

226. *Id.* The operator generally makes this decision based on the size of the plant and the advantages, due to radioactive decay, which the operator will gain by waiting. Thus, it is generally to the operator's advantage to dismantle smaller plants immediately and avoid the costs of a long term decommissioning process. In contrast, the decommissioning process for a larger plant normally occurs over the course of several decades. *Id.*

227. *Id.*

separate regulatory body within the Ministry of Industry.[228] Responsibility for the decommissioning activities is then vested in the Atomic Energy Commission (CEA), which sets forth individual decommissioning plans and then enters contracts for the work's completion.[229]

In spite of France's extensive background giving rise to this uniform doctrine, it has been suggested that this vast experience remains insufficient for developing a proper regulatory basis for the regime's decommissioning framework.[230] Even so, the fact that a national decommissioning doctrine has taken form suggests that at least some of the doctrine's aspects could contribute to the development of an international model.

B. Germany

In Germany, the current nuclear regime developed without employing a formal notion of decommissioning.[231] Instead, objectives that would otherwise be achieved through a decommissioning routine are carried out through independent and non-consecutive processes, each descriptive of an interval between events leading to the facility's ultimate dismantling.[232] Under the Atomgesetz, all of these processes require that the operator of the installation acquire a license prior to engaging in the activity.[233] There are no other nationally prescribed frameworks for decommissioning activities, and as a result, the actual process may vary greatly among the various Länder.[234] Given the current lack of a uniform process in its decommissioning routines, the German regime, as it stands, has much less to offer in the development of an international model.

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228. *Decree on the Organization of the Central Administration of the Ministry for Industry*, *supra* note 158, at 81.

229. Cregut, *supra* note 225, at 96.

230. *Id.*

231. Horbach & Hanenburg, *supra* note 6, at 30.

232. *Id.* These processes include *Stillegung*, referring to the period between operation and the destruction of the plant or safe enclosure, *Sichere Einschluß*, referring to the period following the definitive end of operation in which a facility's radioactive contents are sealed off, and *Beseitigung*, in which all of the facility's components are removed from the installation site. *Id.*

233. Sec. 7 Nr. 3. Atomgesetz.

234. Horbach and Hanenburg, *supra* note 6, at 41.

VI. Prospects for Developing an International Framework

As it has in the past, future efforts aimed at developing international nuclear frameworks will need to begin through cooperative measures among nuclear countries. The frameworks themselves will be based on experiences and existing frameworks from individual States. It follows that if international harmonization is to be successful, efforts to this end must be able to draw on earlier successes. Therefore, international cooperation must include exchanging information with respect to regulatory materials, safety measures, and operating experiences as they relate to as many facilities as possible.[235] It must also include a willingness by States with existing nuclear regimes to implement an international framework into their own. As examined above, France and Germany have already taken a number of legislative measures by further integrating their regimes along international frameworks. However, this process of integration is by any measure far from complete. Both France and Germany have established a number of preconditions to further integration in certain areas. In other areas, further measures are needed if the regimes are to have any bearing in the development of an international framework.

A. Harmonization in Construction and Licensing

The fundamental differences between the French and German nuclear regimes have in many respects placed the two systems at odds. While this would appear to suggest that at least one of the two countries would first need to enact drastic measures prior to further integration, this does not seem to be the case. In fact, while further integration in the area of licensing and construction is needed, it may already be forthcoming.

As it stands, centralized environmental policies, such as those surrounding nuclear energy, cannot be freely exercised in Germany since it is the Länder which must implement such laws.[236] Even with this limitation, increased internationalization of nuclear energy has required the Bund to take a more direct role in enacting nuclear policies. Under the Atomgesetz, the Bund may now directly implement regulatory actions from the Euratom Steering Committee pursuant to the provisions of the Paris Convention,[237]

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235. Lévy, *supra* note 33, at 25.
236. *See generally* Rose-Ackerman, *supra* note 144, at 66-7.
237. Sec. 12a Atomgesetz.

suggesting that subsequent international enactments will be imposed directly from Berlin.

Other German legislative developments will also require future licensing and construction activities to conform to international technological developments. As examined earlier, the Atomgesetz, as amended in 1994, now requires that all new reactors conform to a design standard in which the worst conceivable accident would not allow for the release of ionizing radiation nor require large scale evacuations of surrounding areas.[238] This measure will require the implementation of a new generation of nuclear facilities, namely those of the European Pressurized Reactor (EPR) design, which are currently under development through a joint Franco-German effort.[239] The EPR is, by its nature, to be developed as a "European industry" aimed at incorporating the latest requirements of various EU safety authorities.[240] One other design, the Fast Neutron Reactor (FNR), is similarly aimed at meeting the more recent design requirements.[241] While further away from implementation, this design is being developed by the combined efforts of the EU and other nuclear countries, such as the United States, Japan, and Russia.[242] It follows that in keeping with recent legislative provisions, international technological developments will be intrinsic to German licensing and construction activities throughout the foreseeable future.

In both Germany and France, aspects of construction and licensing which lie outside of these new technologies will not escape international influence. In undertaking its own Research and Development Framework Program, the European Atomic Energy Community (Euratom) has emphasized the need for a community-wide consolidation of existing nuclear programs, asserting the necessity for community control over all aspects of the nuclear process within the European Union.[243] The EU itself has recently adopted this position, submitting a resolution for convergence of the EU's energy policies, and in particular, recognizing the need for common safety standards throughout the union.[244]

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238. *Id.* § 7 Nr. 2a.
239. *Report of the Federal Republic of Germany, supra* note 2.
240. Commission Document on the Nuclear Industries in the European Union, *supra* note 1.
241. *Id.*
242. *Id.*
243. *Id.*
244. *Resolution of the European Parliament on the European Union Energy Policy (1995)*, 57 NUCLEAR L. BULL. 84 (1996).

Enactment of such a convergence policy has automatic ramifications for existing regimes within the EU. For example, as noted earlier, in Germany, nuclear-related legislative practices ultimately conform to recommendations of international regulatory bodies.[245] However, as binding measures, EU-issued standards have a farther reaching effect than the regulatory body recommendations and could conceivably remove their legal effect.[246] Since these recommendations are non-binding to begin with, this effective removal, where it occurs, is technically without legal consequence to the overall regime.[247] Even so, this removal reflects the ease in which such measures supplant those of other competent authorities. For this reason, future standards, whether issued by regulatory bodies or by the EU directly, should account for those of other competent authorities. Respect for such pre-existing standards would enhance nuclear harmonization among countries separated by geography or political affiliations, enabling those standards to embody a growing international framework.

A licensing and construction framework is also developing through international agreement. The Convention on Nuclear Safety contains provisions relating to siting,[248] design and construction,[249] license holder responsibility,[250] and safety,[251] which are for the first time binding under international law.[252] The convention itself represents efforts by international authorities to further nuclear harmonization, and by design, creates an international legal framework incorporating various aspects of government supervision and nuclear standards.[253] Both France and Germany were among the initial signatories of the convention, which entered into force on July 26, 1996.[254] Since then, over twenty-two countries, including France, have approved the convention.[255] German ratification, however, has yet to oc-

245. Franzen, *supra* note 120, at 43-4.
246. *Id.*
247. *See generally id.* at 43.
248. Convention on Nuclear Safety, *supra* note 171, art. 17.
249. *Id.* at art. 18.
250. *Id.* at art. 9.
251. *Id.* at arts. 6, 10-11, 14.
252. *Report of the Federal Republic of Germany, supra* note 2.
253. *Id.*
254. *Entry into Force of the Convention of Nuclear Safety, supra* note 172, at 136.
255. *Id.* These include a number of Central and Eastern European Countries, including Croatia, Hungary, Poland, Romania, Russian Federation, Czech Republic, and Slovakia. *Id.*

cur.[256] While the framework set forth by the convention represents only an initial step in formulating a comprehensive and international model, ratification clearly indicates a country's commitment to bringing its nuclear licensing and construction activities in line with a greater international regime. To this end, Germany should also undertake to ratify the convention.

While such ratification would itself only bring Germany in line with provisions to which many Central and Eastern European States have already committed themselves, focus should be on the greater implications. Such ratification would provide an additional basis for greater French and German nuclear integration, enabling Germany to incorporate the treaty's provisions into its own statutory framework. As a result, this additional, shared statutory framework would supplement the countries' Euratom Treaty obligations as a harmonizing force, bridging the gap toward the development of a viable model regime.

However, as a signatory to the convention, Germany is clearly in position to undertake ratification in the near future. As in other areas related to licensing and construction activities, greater French and German harmonization is clearly forthcoming. In the meantime, as existing integrating forces develop, both countries need only continue along their present courses.

B. Harmonization in the Operation of Nuclear Facilities

As examined earlier, various aspects of nuclear operation in both the French and German regimes have already come into line with emerging international frameworks. In this respect, much of the harmonization process has already taken place. Fundamental differences, where they exist, can be attributed to differences in the legal systems of each country.[257] Differing legal systems also relate to differences in the material contents of safety standards.[258] However, these differences do not necessarily reflect a lack of harmonization in activities related to nuclear monitoring and liability.

As members of the European Union, both France and Germany are already subject to an EU regulatory framework aimed at ensuring uniform operator monitoring. The EU Council

256. *Id.*
257. *See* Schwarzer, *supra* note 9, at 10.
258. *Id.*

Directive of July 15, 1980,[259] as amended by the Directive of September 3, 1984,[260] sets forth specific, binding safety standards relating to allowable levels of ionizing radiation on workers and members of the general public. More recently, the EU has required member States to ensure that each nuclear operator explicitly define its accident prevention policy.[261] Under this requirement, all operators must also include details of the operator's plan for handling major accidents.[262] These enactments reflect the EU's intention to subject all of its internal nuclear regimes to a single uniform framework for nuclear monitoring. This further suggests that such an internal framework will continue to develop.

Even amidst this additional binding framework, existing French and German operating standards demonstrate certain levels of correspondence. In both countries, operating standards originated from early industrial considerations of theoretical safety needs.[263] These were originally created on a case-by-case basis and evolved into set requirements only after sufficient operating experience could justify the implementation of the requirements.[264] As a result, operating standards came to reflect the specific needs of each regime. However, while the resulting frameworks have also come to reflect the administrative structures of each country, the overall differences have not been great.[265] It has been observed that ultimately, it is the nuclear industry, and not the administrative process, that develops operating standards related to nuclear safety, and that the best nuclear standards are those that are a product of both government and industry.[266] In this context, it has also been observed that due to the varying requirements of individual nuclear regimes, the most specific requirements related to nuclear operation in one regime should not be imposed on another.[267]

Since operating standards have developed so that they reflect the individual characteristics of a particular regime, those characteristics should be preserved to the extent that they reflect those needs. Current efforts aimed at harmonizing nuclear operations,

259. Council Directive 80/836, 1980, O.J. (L-246) 1 (Euratom).
260. Council Directive 80/467, 1984, O.J. (L-265) 4 (Euratom).
261. *The Seveso Directive II (1996)*, 59 NUCLEAR L. BULL. 64, 65 (1997).
262. *Id.*
263. Schwarzer, *supra* note 9, at 3.
264. *Id.*
265. Franzen, *supra* note 120, at 57.
266. Schwarzer, *supra* note 9, at 7.
267. Franzen, *supra* note 120, at 57.

such as those represented in the provisions of the Nuclear Safety Convention and the aforementioned legislative measures of the EU, prescribe binding measures which may not always reflect such needs. For example, Germany has expressed its concern that the Nuclear Safety Convention may require some of its existing nuclear facilities to cease operations under certain conditions.[268] This may partly explain the country's reluctance to ratify the convention, and presents an additional issue to other nuclear countries that are considering ratification. At minimum, provisions should be provided in future international legislation allowing for regimes to operate under their existing standards. The most recent standards should apply only to facilities that have not yet come into operation. United Nations Technical Reports have suggested that even where operating standards conflict, similar safety levels may exist even though the strict details differ.[269] Thus, such allowances could enable existing facilities to operate without necessarily compromising levels of safety. Providing for such allowances would also lead to a more viable model for harmonization. Central and Eastern European Countries operating Soviet-designed facilities would still be able to apply the model, which would remain in place as those countries gradually switched to nuclear facilities of Western design.

Forces have also been set in motion to further harmonize third party liability regimes. While France and Germany's primary motivations toward this end have been their participation in the Paris Convention, the scope of their participation has been extended. The 1963 Vienna Convention on Civil Liability for Nuclear Damage,[270] which is virtually identical to the Paris Convention in its basic features, governs third party liability among its fourteen signatory States.[271] Unlike the Paris Convention, the Vienna Convention has an unlimited regional scope, and its signatories include countries around the world.[272] Under a 1988 Joint Protocol, the provisions of the Paris and Vienna Conventions were combined,[273] creating an all-encompassing liability frame-

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268. *Report of the Federal Republic of Germany, supra* note 2.

269. Schwarzer, *supra* note 9, at 12.

270. Vienna Convention on Civil Liability for Nuclear Damage, (visited Nov. 11,1997) <http://www.varam.gov.lv/English/Radiation/Legal/Liability.htm> [hereinafter *Vienna Convention*].

271. *See* Elbaradei, *supra* note 12.

272. *Id.*

273. Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, (visited Nov. 11, 1997) <http://www.nea.fr/html/law/-

work governed under the provisions of the combined treaties and involving all signatories to the individual conventions.[274] This additional measure is highly indicative of the existing harmonization trend in the field of third party liability. As examined earlier, the incorporation of Paris Convention provisions into the French and German statutory frameworks is clearly deepening the level of integration in this field. With the addition of the Joint Protocol, the evolving international framework is clearly widening as well.

As with licensing and construction, an international framework relating to the operational aspects of nuclear energy is clearly taking form, and both France and Germany can expect further harmonization to occur if they continue to proceed in their current tracks. It remains, however, a matter for the international authorities to design future legislative measures so that existing national frameworks may initially comply without adverse effects to the operation of existing facilities. Such precautions will be necessary if the resulting international framework is to provide a viable model for other regimes to follow.

C. Harmonization in Decommissioning

In forming prospects for harmonization, the field of decommissioning poses an added challenge since few legislative measures deal with it explicitly.[275] Those that do often do so only by analogy. For example, one international body, the steering committee of the Nuclear Energy Administration (NEA), maintained that even in cases where a nuclear installation has ceased operation, the provisions of the Paris Convention continue to apply.[276] The NEA issued this opinion in spite of the convention's lack of any explicit reference to the decommissioning process.[277] Similar analogies have been made with regard to the Vienna Convention.[278]

One international agreement which has explicitly dealt with decommissioning is the Convention on Nuclear Safety. Under the convention, a facility loses its status as a *nuclear installation* upon removal of its nuclear fuel elements and upon the applicant's

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nljoint_prot.html> [hereinafter *Joint Protocol*].

274. *See generally* Elbaradei, *supra* note 12.

275. Horbach & Hanenburg, *supra* note 6, at 35.

276. *Id.* at 39.

277. *Id.*

278. *See generally id.*

initiation of a program for decommissioning.[279] While the scope of the treaty's application is limited after the initiation of such a program,[280] the treaty still mandates that a decommissioning program will commence upon a finding that an existing installation is unsafe and cannot be made safe through practical measures.[281] In spite of the treaty's limited scope with respect to decommissioning, the fact that the treaty addresses the issue opens the door to further international agreement.

For this reason, States that are parties to the Paris and Vienna Conventions should undertake to extend the agreements' provisions to include activities related to decommissioning. Doing so would clearly establish an internationally recognized decommissioning framework and pick up where the Convention on Nuclear Safety left off. The addition of such provisions to the existing Paris /Vienna Convention framework would be a relatively moderate amendment, as it would merely codify existing interpretations of the conventions' language.[282] With decommissioning requiring fewer resources than other aspects of the nuclear process, the enactment of such provisions would also require a smaller commitment from each signatory party.[283] Further, such an amendment could easily be achieved through a minor, supplementary agreement, similar to the Brussels Convention or Joint Protocol.

Both France and Germany appear to be in a position to embrace such an agreement. It has been suggested that in France, the national decommissioning doctrine, developed as it is, lacks a future regulatory basis.[284] Adding explicit decommissioning provisions to the Paris Convention would prompt France to codify those amendments into its own statutory framework, just as it did with the Paris Convention's existing provisions. Germany, though lacking a developed decommissioning doctrine, has clearly poised itself for developing a decommissioning framework of its own. The German Government has specifically included decommissioning as an objective in improving nuclear safety in Eastern Europe.[285] At the same time, the Bund has reiterated its belief that internally, the further development of nuclear energy is necessary due to the

279. Convention on Nuclear Safety, *supra* note 171, art. 2(i).
280. Horbach & Hanenburg, *supra* note 6, at 37.
281. Convention on Nuclear Safety, *supra* note 171, art. 6.
282. *See generally* Horbach & Hanenburg, *supra* note 6, at 39.
283. *See generally id* at 32.
284. Cregut, *supra* note 225, at 96.
285. *Report of the Federal Republic of Germany, supra* note 2.

technology's increasing international importance.[286] Subsequently, the German regime has also undertaken a number of efforts toward internal nuclear standardization.[287] It would seem that incorporating a decommissioning framework into Germany's existing statutory regime would be a logical step in achieving these objectives.

Another advantage to supplementary convention provisions would be their means of implementation. As is the case in nuclear operation, a successful decommissioning framework must account for the inherent differences between regimes so that each regime may apply the new provisions without adversely affecting its existing nuclear installations. This is particularly important where a sharp contrast exists among regimes, such as in the case of France and Germany. Additional convention provisions, unlike a unilaterally-imposed act, would leave actual implementation to each country. Further, such provisions would allow for a broader scope of application. The new requirements could extend to all countries party to the Paris or Vienna conventions, rather than being restricted to a particular geographic area, such as within the European Union.

Additional provisions to the Paris Convention would enable both France and Germany to adhere to an international decommissioning framework in a manner reflective of their individual needs. In spite of their fundamental differences, each country would be free to incorporate the new provisions into its existing legal framework without upsetting the current operational arrangement of its nuclear regime. France and Germany would thus set an example under which Central and Eastern European countries could easily follow suit.

VII. Conclusion

The development of an international legal framework relating to nuclear energy is imminent. In France and Germany, the domestic nuclear regimes represent two opposing extremes of centralized and decentralized organization. In spite of this fundamental difference, efforts to foster international nuclear harmonization have successfully incorporated common legislative elements into the two contrasting regimes. As a result, the

286. *Id.*
287. Birkhofer, *supra* note 60, at 2.

foundation has been set for developing a viable international model.

In the fields of nuclear licensing and construction, internationally-binding legislation and recent technical developments have forced both France and Germany to conform to international nuclear standards. An opportunity for greater conformity has also emerged through international agreement. While Germany, in particular, has been reluctant to adopt this latter measure, it is likely that country will in fact choose to conform in the near future. To move toward greater harmonization in this area, France and Germany need only follow their current paths. The concern rests with international bodies, which must ensure that existing standards receive due respect.

In nuclear operations, harmonization has also occurred through international legislation and agreements. These measures have complemented each country's existing operational framework, setting those frameworks onto a path of convergence. Future measures related to harmonizing nuclear operations need only account for the individualized needs of each regime.

The successful development of an international model requires that action be taken in the field of nuclear decommissioning. While this aspect of an international framework is the most urgently needed, it is also by far the least developed. Both France and Germany remain poised to incorporate decommissioning provisions into their current statutory framework. A modest addition to the framework provided by the Paris and Vienna Conventions would enable both countries to incorporate these provisions.

Given the impending development of an international legal framework for the production of nuclear energy, it is imperative that the process of nuclear decommissioning be included. This inclusion depends upon the combined initiatives of individual nuclear regimes. If successful efforts toward including the decommissioning process transpire, the successful harmonization of the regimes in France and Germany could very well serve as the model for this development.

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