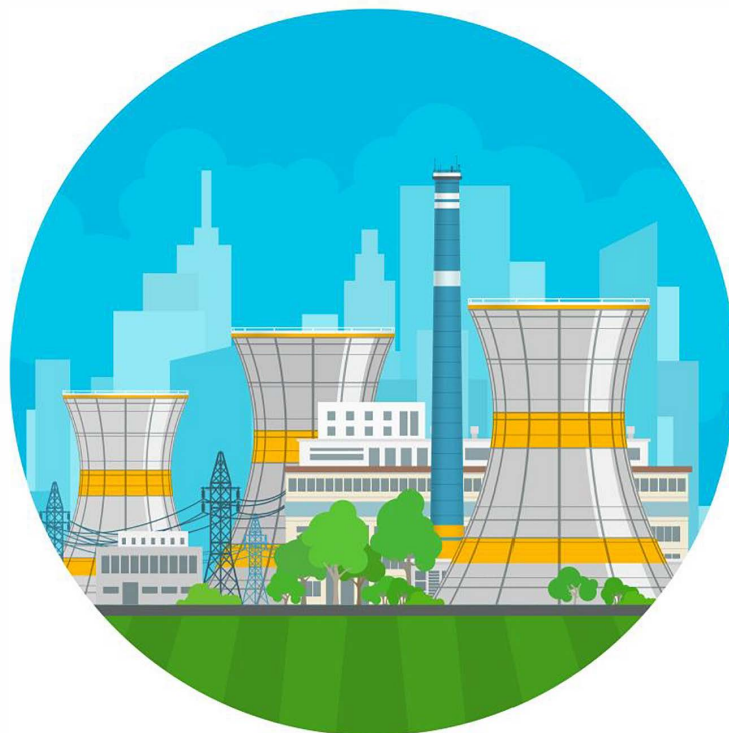


Cross-border nuclear safety, liability and cooperation in the European Union



Policy Department for Citizens' Rights and Constitutional
Affairs

Directorate General for Internal Policies of the Union
PE 608.860 - February 2019



Cross-border nuclear safety, liability and cooperation in the European Union

STUDY

Abstract

This study, commissioned by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the PETI Committee, aims at gaining deeper insights into the legal aspects of cross border nuclear safety and cooperation in the European Union. It analyses the legal framework of nuclear safety as well as the liability and insurance schemes for nuclear accidents. The study examines the current liability and insurance framework and formulates possibilities for a further involvement of the EU in the liability regime. Specific attention is paid to citizen and NGO involvement in decision-making concerning nuclear power plants. The study analyses the case law in that respect and formulates various recommendations to improve the regime concerning cross-border nuclear safety, liability and corporation in the EU.

ABOUT THE PUBLICATION

This research paper was requested by the European Parliament's Committee on Petitions and was commissioned, overseen and published by the Policy Department for Citizens' Rights and Constitutional Affairs.

Policy Departments provide independent expertise, both in-house and externally, to support European Parliament committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU external and internal policies.

To contact the Policy Department for Citizens' Rights and Constitutional Affairs or to subscribe to its newsletter please write to: poldep-citizens@europarl.europa.eu

RESPONSIBLE RESEARCH ADMINISTRATOR

Mr. Giorgio MUSSA
Policy Department for Citizens' Rights and Constitutional Affairs
European Parliament
B-1047 Brussels
E-mail: poldep-citizens@europarl.europa.eu

AUTHORS

Prof.Dr. Michael G. FAURE, Professor of comparative and international environmental law, at Maastricht University and Professor of comparative private law and economics, at Erasmus School of Law in Rotterdam (both the Netherlands)
Dr. Kévine KINDJI, research fellow at the Maastricht European Institute of Transnational Legal Research (METRO) at Maastricht University (the Netherlands)

LINGUISTIC VERSION

Original: EN

Manuscript completed in February 2019
© European Union, 2019

This document is available on the internet at:
<http://www.europarl.europa.eu/supporting-analyses>

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the author and do not necessarily represent the official position of the European Parliament.

Reproduction and translation for non-commercial purposes are authorised, provided the source is acknowledged and the publisher is given prior notice and sent a copy.

CONTENTS

LIST OF ABBREVIATIONS	7
LIST OF TABLES	9
EXECUTIVE SUMMARY	10
1. INTRODUCTION	13
1.1 Initiation of the study	13
1.2 Scope	14
1.3 Limits of the study	15
1.4 Approach/method	15
1.5 Structure	16
1.6 Word of thanks	16
2. PETITIONS	17
2.1 Petitions considered	17
2.2 A case of cross-border security: the Tihange power plant	18
2.3 Petitions in detail	19
2.3.1 Case 1: Petition No 0956/2016 on the Tihange 2 Nuclear Power Station	19
2.3.2 Case 2: Petition No 0156/2018 on the safety of the Tihange 2 Nuclear Power Station	21
2.3.3 Case 3: Petition No 0824/2017 on shutting down nuclear power plants throughout the EU	21
2.3.4 Case 4: Petition 0581/2013 concerning single European liability insurance against nuclear incidents	22
2.3.5 Case 5: Petition 1403/2011 on expansion of the Temelin nuclear power plant in the Czech Republic	22
2.4 Summary of the main issues	23
3. ANALYSIS OF THE LEGAL FRAMEWORK OF NUCLEAR SAFETY IN THE EUROPEAN UNION	25
3.1 Introducing Euratom	25
3.2 International framework for nuclear safety	26
3.2.1 The Convention on Nuclear Safety (CNS)	26
3.2.2 International Atomic Energy Agency (IAEA)	27
3.2.3 The OECD/NEA regime	27
3.3 Euratom basic safety standards	27
3.4 The Nuclear Safety Directive	28
3.5 General principles of EU environmental law and nuclear liability	29
3.6 Summary and analysis	30

4.	ANALYSIS OF CROSS-BORDER NUCLEAR RISK MANAGEMENT	33
4.1	Introduction	33
4.2	Risk management cycle	34
4.3	Disaster risk management tools	34
4.3.1	Risk Prevention	34
4.3.2	Emergency preparedness and response	35
4.3.3	Insurance	38
4.4	Risk management in Member States	38
4.5	Analysis	40
5.	LIABILITY AND INSURANCE SCHEMES FOR NUCLEAR ACCIDENTS	42
5.1	Introduction	42
5.2	International legal framework for nuclear liability	43
5.3	Nuclear liability principles	44
5.3.1	Strict liability of the nuclear operator	44
5.3.2	Exclusive liability of the operator of a nuclear installation	45
5.3.3	Limitation of liability in amount and in time	45
5.3.4	Mandatory financial coverage of the operator's liability	46
5.3.5	The exclusive jurisdiction clause	46
5.3.6	Public funding	47
5.4	Origins of the international nuclear liability framework	49
5.5	Critical analysis	51
5.5.1	Economic starting points	52
5.5.2	Distorting effects of the financial cap	53
5.5.3	Distortive effect of legal channelling	56
5.6	Concluding Remarks	57
6.	A EUROPEAN APPROACH TO LIABILITY AND COMPENSATION	59
6.1	Introduction	59
6.2	Liability and compensation for nuclear accidents in EU Member States	60
6.2.1	Belgium	61
6.2.2	France	63
6.2.3	Germany	64
6.2.4	The Netherlands	66
6.2.5	Comparison	67
6.3	The US Price-Anderson Act	68
6.4	Japan	69
6.5	Insights from other high risk sectors	69
6.6	Marine oil pollution	70

6.6.1	Liability of the tanker owner	70
6.6.2	The Fund Convention	72
6.6.3	The role of the EU	74
6.7	The role of the European Union	75
6.7.1	Starting point: reluctance by Member States	75
6.7.2	Relationship between the Euratom Treaty and the TFEU	76
6.7.3	Euratom and environmental protection	77
6.7.4	The role of the European Parliament	78
6.7.5	Legislative competences for nuclear liability	79
6.7.6	Current action at EU level	80
6.8	Concluding Remarks	81
7.	COMMON CRITERIA FOR SITING, DESIGNING AND CONSTRUCTING NUCLEAR POWER PLANTS	83
7.1	Introduction	83
7.2	Importance of the issue	83
7.3	The international regime	84
7.3.1	Environmental impact assessment	84
7.3.2	IAEA safety standards	86
7.3.3	Convention on Nuclear Safety	86
7.4	The European regime	87
7.4.1	General framework	87
7.4.2	Siting	89
7.4.3	Design and construction	90
7.4.4	Operation	91
7.4.5	Decommissioning	92
7.5	Concluding remarks	93
8.	THE ENFORCEMENT OF NUCLEAR SAFETY STANDARDS	95
8.1	Introduction	95
8.2	Public enforcement of nuclear safety regulation	95
8.2.1	Sovereignty, reporting and periodic review	95
8.2.2	Stress tests	97
8.2.3	Alternatives	98
8.3	Enforcement with regard to liability	99
8.4	Mass tort litigation	101
8.4.1	Silence of the international liability conventions	101
8.4.2	Discretion of the Member States	102
8.4.3	Examples	102
8.5	Practice in Member States: The Belgian example	103
8.5.1	Control of class I facilities	106

8.5.2	Enforcement policy and processes	106
8.5.3	International cooperation	107
8.6	Concluding Remarks	108
9.	CITIZEN AND NGO INVOLVEMENT IN THE DECISION-MAKING CONCERNING NUCLEAR POWER PLANTS	110
9.1	Introduction	110
9.2	Environmental impact assessment and the Espoo Convention	111
9.2.1	Environmental impact assessment	111
9.2.2	TheEspoo Convention	112
9.2.3	Implementation of environmental impact assessment: the Belgian case	113
9.3	Access to information; public participation and access to justice	115
9.3.1	The Aarhus Convention	115
9.3.2	The EU dimension	116
9.3.3	Litigation costs	120
9.3.4	Case law	120
9.4	The nuclear case	123
9.4.1	An Taisce	123
9.4.2	Borssele	124
9.4.3	FANC: A case on access to nuclear information	124
9.5	Concluding Remarks	127
10.	CONCLUDING REMARKS	130
10.1	Focus of the study	130
10.2	Legal framework for nuclear safety	130
10.3	Cross-border nuclear risk management	130
10.4	Legal framework of liability	130
10.5	Need to develop an EU framework for liability and insurance	131
10.6	Common criteria for siting, designing and constructing nuclear power plants	131
10.7	Enforcement of nuclear safety standards	131
10.8	Citizen and NGO involvement in decision-making concerning nuclear power plants	132
10.9	Recommendations	132
10.10	Final thoughts	133
	LIST OF REFERENCES	134
	APPENDIX 1: LAW OF 22 JULY 1985 ON THIRD PARTY LIABILITY IN THE FIELD OF NUCLEAR ENERGY (EXTRACTS) (M.B., AUGUST 31, 1985 (BELGIUM))	140

LIST OF ABBREVIATIONS

ALARA	As Low As Reasonably Achievable
CBRN	Chemical, Biological, Radiological and Nuclear
CFP	Common Fisheries Policy
CJEU	Court of Justice of the European Union
CNS	Convention on Nuclear Safety
DG	Directorate General
DG ECHO	Directorate General for European Civil Protection and Humanitarian Aid Operations
ECURIE	European Community Urgent Radiological Information Exchange
EIA	Environmental Impact Assessment
ENSREG	European Nuclear Safety Regulators Group
EP&R	European Preparedness and Response
EPZ	Emergency Planning Zone
ERCC	Emergency Response Coordination Centre
EU	European Union
EURDEP	European Radiological Data Exchange Platform
FANC	Federal Nuclear Supervision Agency
HERCA	Heads of the European Radiological Protection Competent Authorities
IAEA	International Atomic Energy Agency
INES	International Nuclear and Radiological Event Scale
IPPAS	International Physical Protection Advisory Service
IRRS	Integrated Regulatory Review Service
JRC	Joint Research Centre
LTO	Long Term Operation
MW	Megawatt
NEA	Nuclear Energy Agency
NGO	Non-Governmental Organisation
NPP	Nuclear Power Plant
NSD	Nuclear Safety Directive
OECD	Organisation for Economic Cooperation and Development
OSART	Operational Safety Review Team

PETI	Petitions of the European Parliament
PSR	Periodic Safety Review
RPV	Reactor Pressure Vessels
SALTO	Safety Aspects of Long Term Operation
SDR	Special Drawing Rights
TFEU	Treaty on the Functioning of the European Union
UCPM	Union Civil Protection Mechanism
USIE	Unified System of Information Exchange
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association

LIST OF TABLES

TABLE 1	
Petitions considered	18
TABLE 2	
Overview of the second generation international conventions	43
TABLE 3	
Available amounts of compensation under the international nuclear liability conventions	49
TABLE 4	
Overview of the different regimes in the European Union	61
TABLE 5	
Nuclear operator's third party liability amounts and financial security limits	67
TABLE 6	
Compensation for pollution damage under the international regime	74

EXECUTIVE SUMMARY

The objective of this study is, *inter alia*, to assess the legal framework on nuclear safety and liability in the EU, especially with a focus on cross-border issues. The objective was equally to develop a new (EU) scheme of liability and insurance and to examine possibilities to develop common criteria concerning the siting, design, construction and operation of nuclear power plants. Particular petitions that were launched were taken as a starting point. These petitions raised serious concerns with respect to the safety at particular power plants, expressing fears of transboundary impacts. The petitions also pointed at substantial differences between liability schemes in the Member States and therefore pleaded for a European approach. This study aims at providing an overview of the applicable regulation and looked broadly at the academic literature in order to indicate points which either merit further EU action or further research.

Safety standards are provided via various sources, such as the Convention on Nuclear Safety, the International Atomic Energy Agency (IAEA) and Euratom. At EU level the Nuclear Safety Directive provides the general framework. Notwithstanding the existence of a broad framework, nuclear safety regulation is criticised in the literature for still relying very largely on the sovereignty of the Member States. There is no possibility for the EU level to verify nuclear safety directly at the nuclear power plants within the Member States. Many of the safety features also depend on general principles such as ALARA which has also been criticised in the literature.

A variety of arrangements exist aiming at disaster risk management. On the one hand there are many tools aiming at emergency preparedness and response, also at EU level which do, however, not directly focus on the nuclear sector. Specifically for the nuclear particular features have been put in place, such as ECURIE, organising information exchange, aiming at a rapid and coordinated response. However, even though there are arrangements to deal with transboundary disaster risk management, also in this domain sovereignty of the Member States remains important as a result of which it are still the Member States that take the basic decisions. Legally binding arrangements at the European level are lacking.

An elaborate legal framework to deal with liability and insurance related to nuclear accidents has been worked out since the 1960s within the framework of on the one hand the NEA and on the other hand the IAEA. Nuclear liability is based on similar principles, such as strict liability, channelling of liability to the operator, limitation of liability in amount and in time and mandatory financial coverage. In addition to the liability of the operator public funding also largely intervenes. The international conventions have been criticised in the literature, more particularly for the financial limits on liability as well as for the exclusive legal channelling. Those features can have devastating effects. They cannot only lead to a limited compensation for the victims of a nuclear accident; they can potentially also reduce the incentives to take preventive measures of operators. The Fukushima case underscored the seriousness of those distortive effects.

There are possibilities to improve the currently existing international framework. Four examples were provided of liability and compensation mechanisms in Member States to show that there are currently substantial differences which may justify a need for harmonisation. Examples were provided from the US Price-Anderson Act, the legislation in Japan and the regulation concerning the compensation for natural catastrophes to show that it is possible to improve the compensation for victims of nuclear accidents. The case of marine oil pollution showed a proactive stance of the EU whereby the threat of unilateral EU action (to create a supplementary compensation fund) led to a change at the international level. It was equally shown that the EU does have competence to regulate liability and compensation

for nuclear accidents. The initiatives that are currently already on their way in this domain can therefore be fully supported from this analysis.

The European regime concerning siting, designing and constructing nuclear power plants can be found in the Convention of nuclear safety, IAEA safety standards and the Nuclear Safety Directive. They provide relatively vague and broad principles, providing a large leeway to the Member States with respect to the implementation. There is at this moment therefore certainly not a mandatory legally binding regime concerning the siting or design and construction of nuclear power plants.

As far as the public enforcement of nuclear safety regulation is concerned, EU law largely relies on the implementation and enforcement by the Member States. There are no powers awarded to the EU level to directly inspect or monitor nuclear power plants. There are, however, reporting obligations, but those are not supported by sanctions in case of non-compliance. Moreover, there are stress tests, but those are considered ad hoc and one time, and therefore not comparable to structural and systematic inspections. A comparison is made with other domains in EU law where either (rather exceptional) inspection powers are awarded directly to the EU level or where specific indications are provided for the way in which inspection and monitoring should take place. Also with respect to civil liability, there may still be problems as far as the enforcement is concerned. There are still considerable gaps and discrepancies concerning judicial cooperation in nuclear liability cases and mass tort litigation with respect to nuclear accidents has simply been deferred by most legislators to the moment that a nuclear accident would occur.

Citizen and NGO involvement in decision-making concerning nuclear power plants is especially regulated via environmental impact assessment and, in the transboundary context, the Espoo Convention. Problems arise especially in case of plant lifetime extension whereby the question arises whether an environmental impact assessment should be applied. A recent opinion of Advocate-General Kokott holds that the exemption from the obligation to undertake an EIA can only be permitted in very limited circumstances.

Access to information, public participation and access to justice is regulated through the Aarhus Convention and the implementing European directives and is applicable to the nuclear case as well. However, attempts of civil society to exercise their Aarhus rights within the nuclear sector have so far not been very successful, neither in the An Taisce case nor in the Borssele case. However, there seems to be a tendency towards more transparency and public accountability, also in the nuclear area. Even though this should as a matter of principle certainly be welcomed, undoubtedly a balancing of interests need to be taken into account as information with respect to nuclear safety can be very sensitive and could equally be abused by persons with wrong intentions (like terrorists).

The study concludes with the following recommendations:

1. It could be considered to create an independent agency with specific powers to regulate in the nuclear domain. Euratom may be less suited to fulfil this task as the historical overview made clear that Euratom was created with the goal of promoting nuclear power, whereas, also to gain public confidence, an agency should have the necessary independence.
2. More precise common rules should be designed concerning the siting, construction and operation of nuclear power plants. These should go beyond the currently applicable (rather vague) standards and contain legally binding rules.
3. The EU level should gain competence to directly inspect and monitor compliance with nuclear safety rules at the level of the power plants within the Member States.

4. Specific rules concerning the risk-based inspections should be worked out, mandating how and when inspections at nuclear facilities should take place.
5. To the extent that no other interests are harmed by this (to be judged by the independent agency) inspection reports should be made available to the public.
6. The EU should take an initiative (with a view towards harmonisation) with respect to liability and insurance for nuclear accidents. The model should have the following features:
 - Unlimited liability;
 - A limitation of the duty to seek financial cover for an insurable amount;
 - Additional state guarantee should be provided by the state as reinsurer of last resort against payment by the nuclear operators.
7. The EU initiative can be an independent action (aiming at harmonisation at EU level) or could promote a fundamental revision of the international legal framework with respect to liability. However, revisions of the international legal framework may not slow down initiatives at EU level.
8. Further rules should be issued aiming at the promulgation of legally binding rules concerning the siting, construction and operation of nuclear power plants at the EU level.
9. Measures should be taken to harmonise judicial cooperation in civil matters with respect to nuclear liability.
10. Measures should be taken to work out scenarios under which compensation to victims of a nuclear accident will be provided whereby adequate compensation should be provided via a fast and low-cost procedure.

1. INTRODUCTION

1.1 Initiation of the study

The European Parliament received several petitions from citizens concerned about risk of cross border nuclear accidents and their implication on health and safety of people who live in the surrounding of nuclear power plants.¹

The consequences of nuclear and radiological accidents do not stop at national or regional borders (“an accident anywhere is an accident everywhere”). The 2011 Fukushima nuclear accident has recalled the need for effective insurance and compensation of damages in case of a nuclear accident.

It is important that in the case of accidents which are likely to have a cross border effect liability, insurance and compensation for damages schemes are such that costs are covered both in the Member States of the accident as well as in Member States effected. Coordination between national schemes is important as well as a European approach for accidents with cross-border effect.

While nuclear power plants still play a major role in the continent of Europe, concerns remain about their environmental impact and running costs.

An example is Belgium’s Tihange Nuclear Power Plant containing three second-generation pressurised water reactors, which have a combined capacity of 3,008MW.

The plant is located in Huy in the Walloon region and began operation in 1975. It provides around 15% of Belgium’s total energy.

The nuclear power station has been widely criticised over safety. In June 2017, experts found that the ageing Tihange plant had 3,219 points of damage. Following the findings, 50,000 people from Belgium, Germany, and the Netherlands formed a cross-border 90km-long human chain to protest against the plant.

The likelihood of a serious nuclear accident is small, but if a nuclear accident were to occur, it is important that countries coordinate their crisis management approach. Not all nuclear crisis plans properly reflect the cross-border nature of a nuclear accident; furthermore, the plans have been exercised only to a limited extent.

In most of the world, including Europe, the nuclear power industry has traditionally operated under specific liability regimes based on international conventions. These regimes provide for exclusive operator liability, financial caps, mandatory financial security, and other specific features. Financial liability caps and the amounts of mandatory financial security vary from country to country.

The European Commission launched in 2013 a public consultation on the possible harmonisation of national liability regimes for nuclear damages. The primary focus is on caps and insurance, but the Commission could go beyond these aspects to include the channelling of liability and other issues. If the liability regime changes for the approximately 132 nuclear reactors currently operative in the EU,

¹ For example the recent concerns that have arisen in relation to the safety of the Belgian nuclear power plant of Tihange, located not far from the Dutch and German borders.

this may have a spill over effect on the international conventions and nuclear liability regimes in other countries that are also parties to these international conventions.

In the event of a nuclear accident, measures must be taken to protect the people living near the nuclear power plant against radiation. The preparation of these measures differs between the countries though, creating a risk of residents on one side of the border receiving instructions that differ from those received on the other side of the border. This could lead to confusion and unrest amongst the population.

Objectives

The objectives of the study, inter alia, are the following:

- Assessing a selection of the relevant petitions on the topic;
- Assessing the legal framework on nuclear safety and liability in the EU;
- Assessing the situation with respect to cross-border safety of nuclear plants in the EU;
- Assessing the question whether differences between national liability regime in the EU would be of such a nature that further EU action would be desirable;
- Assessing cross-border nuclear risk management as a reaction to a nuclear emergency;
- Assessing the possibilities to improve the coordination in that respect between Member States and
- Considering the possibility for cross-border inspections of nuclear power plants, including the potential role of Euratom.

1.2 Scope

In line with the objectives of the study, the study will more particularly focus on the possible recommendations that could follow from the analysis. The study will therefore have as main goal to analyse the current regime with respect to cross-border nuclear safety and cooperation in view of the academic literature, thus providing elements which could stimulate a debate on possible reforms. Reforms and proposals will, for example, focus on the following questions:

- The need to improve cross-border cooperation in the EU with respect to nuclear safety;
- The need to develop a new (EU?) scheme of liability and insurance for nuclear accidents;
- The need to set up common rules at EU-level with respect to insurance and compensation for nuclear accidents in the EU;
- The need to develop common criteria concerning the siting, design, construction and operation of nuclear power plants;
- The need to increase the independence of national regulators granting nuclear licenses and controlling nuclear facilities;
- Generally: the desirability of having further EU action with respect to cross-border nuclear safety, including nuclear liability and compensation of victims of a nuclear accident.

The study aims at developing ideas which could lead to recommendations and policy proposals with respect to the above mentioned topics, thus stimulating the agenda setting with respect to this important topic.

1.3 Limits of the study

Cross-border nuclear safety is obviously not only a very complex, but also a highly politically sensitive topic. The nature of this study is an academic one and it is mainly legal in nature. That has a few consequences:

It implies that the study will not focus on the technical aspects of nuclear safety. The objective of the study is therefore obviously not for example to assess the safety of specific nuclear power plants. The study therefore also does not aim at analysing the validity of the arguments presented in the petitions. However, the petitions do include a lot of interesting arguments which will therefore certainly be reviewed and which will also to a large extent constitute the basis for the further legal analysis. Many of the arguments presented in the petitions are, moreover, largely in-line with arguments which can also be found in legal literature with respect to nuclear safety and nuclear liability.

Cross-border nuclear safety and cooperation are topics of a very high complexity. Analysing those in a detailed manner would require a very lengthy and detailed study, for example with respect to nuclear safety levels in different European Member States. Again, that is (also given time limits) far beyond the scope of the current study. Some of those interesting and challenging questions will be touched upon. But the goal in that respect is rather one of agenda-setting: the study will indicate which are the various elements that are of importance in examining cross-border nuclear safety in the EU, without attempting to analyse the precise levels of nuclear safety in particular nuclear installations. That would obviously be far beyond the scope of this study and beyond the competences of the legal researchers.

The study will, given the agenda-setting goal, attempt to identify the various points that play a role in cross-border nuclear safety. One problem that may obviously arise is that more particularly given the current scope of Article 194(2) of the Treaty on the Functioning of the European Union (TFEU) the possibilities for the EU level to decide on the use of nuclear energy in a particular Member State may be limited, given the sovereignty of Member States to decide on the energy mix. This study will formulate the issues which are crucial in relation to cross-border nuclear safety and equally indicate where further centralisation or harmonisation may be indicated, even if that may not be possible within the current allocation of competences. That is therefore an issue which will at some moment be touched upon (for example when it comes to the question of whether the EU would be competent in taking further action with respect to nuclear liability), but it is a point which will again merely be indicated, but not worked out in detail.

1.4 Approach/method

As already indicated this study will largely rely on a legal analysis and will therefore study the current *acquis* of EU law and EU intervention generally with respect to cross-border nuclear safety. To some extent, domestic Member State law is of importance as well. In those cases it will be indicated that particular issues (such as control of nuclear facilities) may be within the scope of Member State law, but Member State law itself will not be discussed in detail.

Cross-border nuclear safety, but also access to justice, questions of nuclear liability and insurance has been dealt with extensively in the literature. Critical analyses have been performed of the current international nuclear liability regime and the question whether further action at EU level would be indicated has equally been addressed. Of course this critical literature will be used in this study, particularly since those topics are also dealt with in some of the petitions. Moreover, some of this literature is not only based on legal doctrine, but uses economic analysis as well. The law and economics

literature has paid, inter alia, attention to the importance of liability rules in providing incentives to operators for prevention. In addition, the economics of federalism and other literature related to the division of labour between Member States and the EU will also be called upon in addressing the question whether further action at EU level with respect to cross-border nuclear safety would be indicated. One of the approaches in the study is therefore that some of the arguments presented in the petitions will also be confronted with the mentioned literature.

1.5 Structure

After this introduction first some of the petitions will be reviewed (2), followed by an analysis of the legal framework of nuclear safety in the EU (3) and an analysis of cross-border nuclear risk management (4). Then the focus will shift to liability and insurance schemes for nuclear accidents (5) and the question will be addressed whether a further European approach to liability and compensation were desirable (6). Common criteria for siting, designing and constructing nuclear power plants will be analysed under 7 and the enforcement of nuclear safety standards will be addressed in 8. The possibilities for citizens and NGOs to be involved in decisions concerning nuclear power plants will be addressed in 9. Chapter 10 summarizes and formulates policy recommendations.

1.6 Word of thanks

We are grateful to Daisy Ivanova, research fellow at METRO for valuable research assistance, to Mathias Müller for useful insights concerning the Aarhus Convention and to Ludo Veuchelen, former contract officer at the Study Center for Nuclear Research at Mol (Belgium) for providing us useful documentation as well as to Marjo Mullers (METRO, Maastricht) for editorial assistance.

2. PETITIONS

KEY FINDINGS

- Several petitions concerning cross-border nuclear safety have been addressed to the Committee on Petitions of the European Parliament (PETI).
- Some petitions deal with specific threats posed by a particular power plant (Tihange 2 or Temelin).
- Other petitions deal with more general issues, such as shutting down nuclear power plants throughout the EU or the creation of a single European liability Insurance.
- The Commission has provided detailed answers explaining the legislative framework concerning nuclear safety.
- Other points mentioned in the petitions will be subject of this study.

2.1 Petitions considered

Several petitions concerning cross-border nuclear safety have been addressed to the committee on petitions of the European Parliament (PETI). Together with the policy department on citizens' rights and constitutional affairs of the European Parliament, the researchers have selected a number of representative petitions, all dealing with issues of cross-border nuclear safety.

Petitions have been selected dealing with the Tihange 2 nuclear power station in Belgium, as this is one case which is in the news on almost a daily basis. However, interesting petitions have also been formulated with respect to nuclear safety of a more general nature. A German petition asks for the general shutting down of all nuclear power plants throughout the EU and a petition coming from Austria deals with a single European liability insurance against nuclear accidents. Another petition deals with the nuclear facility of Temelin in the Czech Republic.

Petitions therefore are of a various nature in the sense that some deal with particular power plants (such as Tihange or Temelin) whereas others deal with more general policy issues (such as shutting down nuclear power plants or a single European liability insurance). The petitions are also spread in the time between 2011 and 2018.

For each of the petitions the summary of the petition will be provided as well as, to the extent available, the reply by the Commission. Following a description of the petition, a brief summary of the main issues addressed in the petitions will be provided (in section 2.3).

The following petitions are considered in this study:

Case No.	Petition reference number	Title of the petition	Member State
1	0156/2018	Safety of the Tihange 2 Nuclear Power Station	Germany
2	0956/2016	Tihange 2 Nuclear Power Station	Germany (Action group "DreiländerRegion gegen Tihange" (Three Countries Region against Tihange))
3	0824/2017	Shutting down nuclear power plants throughout the EU	Germany
4	0581/2013	Single European liability insurance against nuclear incidents	Austria
5	1403/2011	Expansion of the Temelin nuclear power plant	Germany

Table 1: Petitions considered

As follows from the table 1 with the overview of the petitions, cases 1 and 2 both deal with Tihange 2; cases 3 and 4 deal with more general issues concerning nuclear power and liability and case 5 deals with the Temelin nuclear power plant.

2.2 A case of cross-border security: the Tihange power plant

Given the importance of the Tihange power plant (not only given the many petitions, but also the large media attention to this plant) first the problems with respect to the Tihange nuclear power plant as summarized by the petitioners will be described:

Nuclear security and safety have been under the spotlight since 2012. Inspections of the reactor pressure vessels (RPV) of the Belgian nuclear power plants Doel 3 and Tihange 2 revealed thousands of cracks that led to the temporary closure of the plants in 2012 and 2014. The power plant in Tihange was restarted in November 2015 with the approval of the Belgian Federal Agency for Nuclear Control (FANC). However, this power plant has been the scene of repetitive accidents, and one reactor even caught fire and exploded at the end of 2016. Sixteen thousand cracks were detected in the reactors, which have already exceeded their lifecycle of 30 years.

The incidents in the power plants in general have raised major concerns and led to popular resistance due to the fear of another Chernobyl disaster. The situation of Tihange 2 is particularly decried due to the proximity of this plant to German and Dutch borders. Consequently, the safety concerns in Tihange prompted transnational activism. Citizens, political parties and even municipalities in the neighboring countries have undertaken various initiatives to demand among others the closure of Tihange 2, a sound contingency plan, international nuclear disaster drills, a trans-boundary environmental impact assessment under the EU's EIA Directive and the UN's Espoo Convention for all Belgian reactors.

In such a context, petitions have also been addressed to the European Parliament.²

2.3 Petitions in detail

2.3.1 Case 1: Petition No 0956/2016 on the Tihange 2 Nuclear Power Station

Summary of the petition

This petition was the result of common actions of many stakeholders, including the representatives of Aachen city and region (Germany) and numerous districts, towns and local authorities in the Netherlands, Luxembourg, Germany and Belgium.

The petitioners voice concerns about the safety of the Belgian Tihange 2 nuclear power station and the transboundary impact in the event of an incident.

The petitioners called on the Commission to provide them with all information it holds on the Tihange 2 nuclear power station, to demand all the information to which it is entitled from the Kingdom of Belgium and others, and to examine whether the Kingdom of Belgium, in its conduct in connection with the nuclear reactor, has contravened or is contravening rules of the European Treaties. The petition urges the European Parliament to support the action group's demands in every way possible.

The Petition 0956/2016 was declared admissible on 10 January 2017, and information was requested from the Commission under Rule 216(6). The Commission replied on 30 August 2017.

Commission's reply

The Commission ensured that the Belgian regulator Federal Nuclear Supervision Agency (FANC) had carried out an assessment of the causes and consequences of the reported defects before the restart of the reactor, which was subsequently reopened upon a satisfactory outcome. This was in line with the obligation stemming from EU nuclear safety legislation pursuant to which the nuclear safety of nuclear installations remains under the responsibility of national regulatory authorities. The latter must ensure that licence holders regularly assess and improve reactor's safety.

The Commission stressed that, as the petitioners rightly stated, in accordance with Article 191(2) of the Treaty on the Functioning of the European Union (TFEU) environmental policy shall aim at a high level of protection and shall, inter alia, be based on the precautionary and prevention principles. However, since the focus of the petition is the protection of populations and the environment against ionising radiations, the more specific Euratom Treaty and Euratom law constitute the relevant legal context for the assessment of the petition.

The sharing of information

On 25 July 2016, numerous documents were disclosed to a delegation of 80 municipalities from Germany, Luxembourg and the Netherlands about the restart of the Tihange 2 nuclear power plant. Subsequently, on 18 October 2016, 2 experts reports from the Joint Research Centre (JRC) and a library of public documents issued by the FANC were shared with German representatives from the Ministry of Environment, Energy, Food and Forests of the Bundesland Rheinland-Pfalz. Moreover, following the

² It is also important to stress that it is not only Tihange 2 which is the subject of a lot of attention and criticism; recently media attention was also addressed towards Tihange 1. See, inter alia 1; A German expert warns: "Tihange 1 nuclear power plant is outdated and dangerous"; Expert demands shutdown of oldest Belgian nuclear reactor Tihange 1.

Commission's request, technical documents of the FANC were sent to the above mentioned municipalities on 15 March 2017.

FANC has been working in a transparent manner, with the support of international experts according to the 19 December 2016 joint nuclear safety inspections agreement reached between Belgian and German authorities. Similar agreements were reached with Dutch and French regulators as well.

The Commission further requested from EngieElectrabel on 25 April 2017 the authorisation to share their documents. This is necessitated by the obligation to comply with Article 4(4) of Regulation (EC) No 1049/2001³ on third-party information.

The alleged breach of primary and secondary law

As regards the alleged breach of Articles 30 and 33 of the Euratom Treaty, the Commission holds that there is no evidence substantiating this claim. Belgium has fulfilled with its obligations and communicated the relevant national provisions to the Commission.

The Commission further confirmed that all Member States transposed the provisions of Council Directive 2009/71/Euratom (the "Nuclear Safety Directive") and of Council Directive 96/29/Euratom ("Basic Safety Standards Directive") into their national law.

The Nuclear Safety Directive and the Basic Safety Standards Directive have been amended and further strengthened respectively by Council Directive 2014/87/Euratom of 8 July 2014 and by Council Directive 2013/59/Euratom. The revised Nuclear Safety Directive had to be transposed into national law by 15 August 2017 while the revised Basic Safety Standards Directive was due to be transposed by 6 February 2018. Once the deadline expires, the Commission is expected to thoroughly monitor the transposition and implementation of the provisions of both Directives, including the compliance with reference levels for existing and emergency exposure situations as provided for in the revised Basic Safety Standards Directive of 2013 and also the effective independence of the competent regulatory authority from undue influence as laid down in the amended Nuclear Safety Directive, and referred to by the petitioners.

Anticipatory application of the revised Basic Safety Directive

The Commission established that contrary to the claim of the petitioners, the case-law did not require the Basic Safety Directive to be applied in an anticipatory manner, but merely requires Member States to refrain, during the transposition period, from adopting measures liable seriously to compromise the result prescribed by the Directive. Such an obligation does not entail anticipatory action by the Commission.

Disposal of radioactive waste

According to the Commission, Belgium fully complies with the obligation emanating from Article 37 of the Euratom Treaty and the related secondary law. It has indeed provided the Commission on 3 September 1981 with general data relating to the original plan for the disposal of radioactive waste from Unit 2 of the Tihange nuclear power station. In the absence of an increase in the limits of the numerical values of the regulatory discharge limits for airborne and liquid radioactive effluents imposed on the Tihange 2 reactor, the obligation for Belgium to submit general data for a modified plan, as per

³ Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents.

section 5(a) of the Commission Recommendation 2010/635/Euratom on the application of Article 37, is not applicable. The same applies for the potential consequences of unplanned releases of radioactive effluents. Besides, granting a license to resume the operations of Tihange 2 is unrelated to the above, and cannot, in this particular case, be considered a new plan or a modification to an existing plan pursuant to Article 37.

2.3.2 Case 2: Petition No 0156/2018 on the safety of the Tihange 2 Nuclear Power Station

Three main concerns were expressed by the petitioner:

- Concerns about the safety of the Tihange 2 Nuclear Power Station;
- Concerns at the fact that only the relevant country decides about shutting down a Nuclear Power Station despite the existence of a European Nuclear Energy Agency;
- Concerns with regard to the transboundary radiation in the event of an incident.

The petition was declared admissible on 12 April 2018, and information was requested from the Commission under Rule 216(6). The Commission sent a joint reply on 30 July 2018 and 30 November 2018 for both petitions 0956/2016 and 0156/2018.

The Commission underlined that despite the fact that the decision to operate a nuclear power plant and its safety is the responsibility of Member States, its services carefully monitor the nuclear safety related matters regarding nuclear power plants in the EU, including Tihange 2. Specifically, the Commission and the European Nuclear Safety Regulators Group (ENSREG) organised in May 2018, the first topical peer review exercise under the amended Nuclear Safety Directive on the topic of “Ageing management of Nuclear Power Plants” in which Belgium fully participated. In this regard, national reports were examined by experts from other Member States to identify good practices and areas for improvement.

It is worth mentioning that the ENSREG published in October 2018 that “the main conclusion of the peer review is that Ageing Management Programmes exist in all countries for Nuclear Power Plants and no major deficiencies were identified in European approaches to regulate and implement Ageing Management Programmes at Nuclear Power Plants. However, the review identified areas where further work in participating countries would enhance their ageing management at the Nuclear Power Plants.”⁴

2.3.3 Case 3: Petition No 0824/2017 on shutting down nuclear power plants throughout the EU

The petition expresses security concerns about nuclear power plants as well as the inevitable remedies and costs associated with a nuclear accident. Pointing out that there are numerous alternatives for energy production, the petition calls upon the European Parliament to shut down nuclear power plants throughout the EU.

The petition was declared admissible on 23 January 2018, and information was requested from the Commission under Rule 216(6). The Commission replied on 29 June 2018.

The Commission emphasized that it is not empowered to require Member States to shut down their nuclear power plants since according to Article 194(2) of the TFEU, Members could freely decide on

⁴ ENSREG, Completion of the 1st Topical Peer review on “Ageing management of nuclear power plants and research reactors” under the EU's amended Nuclear Safety Directive, Press release, October 2018, available at : http://www.ensreg.eu/sites/default/files/attachments/ensreg_press_release_tpr_final_0.pdf, visited on 31/10/2018.

their energy mix. The decision to licence, operate, extend the lifetime of or shut down a nuclear power plant is a national decision. The Commission monitors the transposition and implementation of the safety directive and can take legal actions against Members failing to comply.

2.3.4 Case 4: Petition 0581/2013 concerning single European liability insurance against nuclear incidents

The petition brings forward three main points:

- There are concerns at the consequences of nuclear accidents, which cannot be contained by geographical boundaries and borders ;
- The costs of nuclear accidents are enormous, and substantial differences exist in liability schemes between Member States;
- In the event of insurance risks materialising and nuclear power plant operators going bankrupt, the costs are passed on to the public.

The petitioner calls on the European Parliament to urge the Commission to adopt suitable legislation, stipulating liability insurance of at least EUR 400 billion per nuclear plant to cover accidents.

The petition was declared admissible. Recommendations were made to forward the petition to the Commission DG for Energy and inform the petitioner of the initiative taken by this DG and the results thereof. In this respect, the Commission reiterated that great importance was attached to improving the safety of nuclear technology and nuclear power plant in particular. Binding provisions were adopted to this aim in Directive 2009/71/Euratom and amendments to this Directive were under consideration.

2.3.5 Case 5: Petition 1403/2011 on expansion of the Temelin nuclear power plant in the Czech Republic

Summary of the petition

The petitioner objects to the addition of the two new reactors (Units 3 and 4) to the Temelin nuclear power plant in the Czech Republic. All the reactors of this power plant discharge their cooling water into the river Moldau, which flows into the Elbe river. The petitioner fears that serious environmental damage will be inflicted on the environment when Units 3 and 4 become operational. He also fears that the objectives of the Framework Water Directive will not be achieved. The petitioner therefore requests an investigation.

Although the original petition from a German citizen dates from 31 December 2011, a variety of additional documentation have been formulated as a follow-up, all related to the Temelin nuclear power plant, but also raising different issues.

Commission's reply

The Commission declared the petition admissible on 24 April 2012.

The Commission refers, inter alia, to the Environmental Impact Assessment (EIA) Directive, which requires that projects concerning nuclear power stations have to be subject to an Environmental Impact Assessment before they can be carried out. The assessment shall contain, inter alia, a description of the measures envisaged in order to avoid, reduce and if possible remedy significant adverse effects.

This analysis should also include the likely effects of the project on the achievement of the Water Framework Directive's objectives.

Moreover, the Commission also refers to the Framework Water Directive, which requires that Member States prevent the deterioration of the status of all their water bodies. Likewise, according to Article 37 of the Euratom Treaty, a Member State has to provide the Commission with general data relating to any plan for the disposal of radioactive waste in whatever form. In addition, in accordance with Article 41 of the Euratom Treaty, investment projects in the nuclear industry have to be communicated to the Commission. The Commission, after examining all aspects of investment projects relating to the objectives of the Treaty, shall issue a point of view in accordance with Article 43 of the Treaty.

The Commission concluded that since the EIA process was ongoing, the Commission was at that stage not in a position to draw any conclusion.

Further informations were submitted with respect to the nuclear plant in Temelin. The Commission replied, inter alia, on 31 March 2014 that the process of authorising the project was not yet finalised and that therefore the Commission was at that stage not in a position to draw any conclusion in relation to the application of the relevant environmental acquis.

In a further communication the petitioner repeated his concern that the objectives of the Water Framework Directive would not be achieved in the Czech Republic, due to the plant enlargement of the Temelin nuclear power plant Units 3 and 4. On 28 February 2017 the Commission further replied that the process for the approval of the project was still ongoing and, in the absence of clear and substantial evidence of a manifest error with the environmental assessments carried out so far by the competent Czech authorities, the Commission could not, at that stage, identify any specific breach of EU environmental law and therefore decided not to take any action.

Finally, the Commission also replied with respect to this project on 22 September 2017 and wrote that the implementation of the relevant provisions of the EIA Directive with respect to the project concerned is the responsibility of the Czech authorities so as to insure the compliance with the EIA Directive. At that stage the Commission did not have any relevant information which would justify its intervention.

An additional communication was handed in by the petitioner concerning the Temelin nuclear plant on 23 January 2018 in which 15 different questions were asked, inter alia, also relating to the general nuclear safety of the installation at Temelin. The petitioner also asks how the Temelin nuclear power plant is protected against potential nuclear attacks or against cyber-attacks.

2.4 Summary of the main issues

The petitions show that cross-border nuclear safety does raise a variety of important questions; yet, the petitions also provided an opportunity to the Commission to show the extent to which the EU legal framework has dealt with particular issues related to nuclear safety. At the same time particular petitioners also plead in favour of a further going intervention by the EU level.

Case 1 with respect to Tihange 2 revealed the following points:

- All Member States, including Belgium, transposed the provisions of Council Directive 2009/71/Euratom (the Nuclear Safety Directive) and of Council Directive 96/29/Euratom (the Basic Safety Standards Directive).

- The Belgian Federal Nuclear Supervision Agency (FANC) has been working in a transparent manner with the support of international experts on a joint nuclear safety inspection agreement between Belgian and German authorities; similar agreements were reached between the Dutch and French regulators as well.
- Belgium fully complies with the obligation emanating from Article 37 of the Euratom Treaty and the related secondary law.

The analysis of Case 2 (also related to Tihange 2) revealed the following:

- The Commission and the European Nuclear Safety Regulators Group (ENSREG) organized a first topical peer review under the amended Nuclear Safety Directive in which Belgium fully participated.
- No major deficiencies were found in the European approaches to regulate and implement aging management programmes at nuclear power plants.

The analysis of these petitions with respect to Tihange therefore shows that there are serious concerns with the petitioners, but that the Commission argues that a legislative framework exists (which will be further outlined in section 3) concerning nuclear safety and that also mechanisms exist to verify compliance with the nuclear acquis. An interesting point from case 1 with respect to Tihange is also that the Commission stressed that the environmental acquis (for example incorporated in Article 191(2) of the TFEU) is not applicable to nuclear safety as the latter is subject to the specific Euratom Treaty and Euratom law.

Case 5 with respect to the Temelin plant shows again that potentially many concerns can come from cross-border nuclear safety. Yet the Commission refers to the applicability of, inter alia, the EIA Directive and the importance of verifying the extent to which the procedures embedded in that (and other) Directives are correctly implemented and applied in the Member States.

The two other Cases (3 and 4) dealt with more general interesting questions:

- Case 3 requested a general shutdown of nuclear power in all Member States which was turned down for the simple reason that the energy mix belongs to the competence of the Member States according to Article 194(2) of the TFEU.
- Case 4 pointed first of all at substantial differences between liability schemes in the Member States and therefore pleaded for a European approach.
- It also proposed a liability insurance amount of at least € 400 billion per power plant, pointing at the insufficiency of the current liability and insurance regime.

The last two points mentioned in case 4 will be explicitly addressed in sections 5 and 6.

3. ANALYSIS OF THE LEGAL FRAMEWORK OF NUCLEAR SAFETY IN THE EUROPEAN UNION

KEY FINDINGS

- The Euratom Treaty provides the framework for nuclear safety by laying down safeguard obligations on operators.
- The EU also largely relies on the Convention on Nuclear Safety and
- Safety standards determined by the International Atomic Energy Agency (IAEA).
- At EU level the IAEA system is transformed into a legally binding regime through the Nuclear Safety Directive.
- Following Fukushima stress tests took place on the 143 nuclear power plants within the EU.
- The nuclear safety regime has been subject to criticism in the literature: compliance is too much dependent upon the Member States and nuclear safety largely depends upon vague principles such as ALARA.

3.1 Introducing Euratom

The Treaty establishing the European Atomic Energy Community (hereinafter the Euratom Treaty) is the founding treaty of the European Nuclear Community. The Euratom Treaty was created to foster the establishment and growth of nuclear industries. Since its signature in 1957, it has remained basically unchanged.⁵ The Euratom Treaty covers all sources of ionising radiation in normal and emergency situations. Euratom competences include nuclear safety, radiation protection, waste management, nuclear safeguards, emergency preparedness and response, fuel supply policy, international relations, and insurance and third-party liability.

As such, the Euratom Treaty settles a broad-spectrum framework that does not clarify the desirable level of nuclear safety or establish concrete obligations. However, general requirements are laid down for many actors in the nuclear sector. In this regard, Member States are, for instance, required in Article 33 to lay down the appropriate provisions, whether by legislation, regulation or administrative action, to ensure compliance with the basic standards. The Euratom Treaty equally laid down safeguard obligations with regard to operators, such as the declaration of the basic technical characteristics of their installations, or the keeping and producing of operating records to account for ores (Articles 78-79). Investors must also communicate to the Commission their projects relating to new installations as well as replacements or conversions (Articles 41-44).

The Euratom Treaty gives competence to the Community to, inter alia, “*establish uniform safety standards to protect the health of workers and of the general public and ensure that they are applied.*”⁶ The competences to regulate nuclear safety were clarified in 2002 by the European Court of Justice in its

⁵ The Euratom Treaty received the label of “dinosaur treaty” due to the fact that it did not have any substantial amendments through the years (see True 2003, p. 15.). Heldt (2015) equally pointed out that the Treaty has not been responsive to changes despite the accidents that revealed the shortcomings in the current regime. See also Cenesvska 2016.

⁶ Article 2(b) of the Euratom Treaty.

judgment with regard to case C-29/99.⁷ This judgment established an intrinsic link between the two areas that are the focus of nuclear regulation, namely radiation protection and nuclear safety.⁸ Nuclear safety is primarily concerned with maintaining control over sources, whereas radiation protection is focused on controlling exposure to radiation and its effects.⁹ The community's competences cover the establishment of a legislative and regulatory framework to govern the safety of nuclear installations, measures relating to the assessment and verification of safety, emergency preparedness, the siting of nuclear installations and the design, construction and operation of nuclear installations.¹⁰ While Member States retain exclusive competence over the technological aspects of nuclear safety, the Community may adopt legislation which establishes certain safety requirements, authorisation requirements, inspection and assessment requirements or enforcement mechanisms.¹¹

Over the years, a substantial corpus of legislation related to radiation and protection was developed and updated. The most important of this legislation is Directive 96/29/Euratom, commonly referred to as the Basic Safety Standards Directive.

This chapter intends to highlight the main provisions governing nuclear safety in the European Union. The first section provides an overview of the international framework given the influence of the latter on nuclear regulation in the EU. The second section underlines the basic safety standards, while the third section sketches the provisions of the nuclear safety directives. In the fourth, the general principles of EU environmental law and nuclear liability are briefly examined. Section 6 provides a summary.

3.2 International framework for nuclear safety

Two main international systems influence nuclear regulation at national level. The first system is established under the auspices of the Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD), consisting of the 1960 Paris and 1963 Brussels Conventions and its following amendments and protocols. The second system is under the aegis of the International Atomic Energy Agency (IAEA), which includes the 1963 Vienna Convention as amended by the 1997 Protocol.

3.2.1 The Convention on Nuclear Safety (CNS)

Nuclear safety within the EU relies essentially on the Convention on Nuclear Safety which is an international instrument adopted in 1994. The CNS owes greatly to the IAEA safety standards. Its objective is, as established in its first Article, *"to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation", "to establish and maintain effective defences in nuclear installations against potential radiological hazards in order to protect individuals, society and the environment", and "to prevent accidents with radiological consequences and to mitigate such consequences should they occur"*. The CNS has been labelled as an *"incentive instrument"*¹² established on a soft law system that leaves great freedom to the Contracting Parties for

⁷ Judgment of 10 December 2002 in the Case C-29/99 (*Commission of the European Communities v. Council of the European Union*), ECR (2002) I-11221.

⁸ Judgment C-29/99, para. 82. It stated *"it is not appropriate, in order to define the Community's competences, to draw an artificial distinction between the protection of the health of the general public and the safety of sources of ionising radiation"*.

⁹ Garribba, Chirte and Nauduzaitė 2009, p. 26.

¹⁰ Judgment C-29/99, paras. 87-107.

¹¹ Opinion of Advocate General Jacobs of 13 December 2001, Case C-29/99, para. 167.

¹² Stanič 2010, p. 148.

its implementation. Moreover, its enforcement mechanism is based on a peer review system. Such a system does not result in any sanctions in case of infringements and leads mainly to peer pressure.

3.2.2 International Atomic Energy Agency (IAEA)

The IAEA seeks to promote international cooperation to establish or adopt safety standards for the protection of health and to minimise the danger to life and property. It intends to contribute to a harmonized high level of safety worldwide. Consisting of the Safety Fundamentals,¹³ the Safety Requirements and the Safety Guides, the Safety Standards of the IAEA provide the fundamental principles, requirements and recommendations to ensure nuclear safety. The IAEA mainly sets out non-mandatory recommendations. The effective implementation of these recommendations is left to the discretion of the Contracting Parties.

3.2.3 The OECD/NEA regime

Complementing the IAEA, the OECD/NEA regime seeks “to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally sound and economical use of nuclear energy for peaceful purposes.”¹⁴ The NEA focuses more on processes and procedures than standards. Through its committees, it issues guidance documents on nuclear safety and radioactive waste management.

3.3 Euratom basic safety standards

Article 30 of the Euratom Treaty states that “Basic standards shall be laid down within the Community for the protection of the health of workers and the general public against the dangers arising from ionising radiations.

The expression “basic standards” means:

- (a) maximum permissible doses compatible with adequate safety;
- (b) maximum permissible levels of exposure and contamination;
- (c) the fundamental principles governing the health surveillance of workers.

¹³ The Fundamental Safety Principles were adopted by the IAEA in 2006. It is a set of ten fundamental safety principles as follows: 1. The prime responsibility for safety must rest with the person or organisation responsible for facilities and activities that give rise to radiation risks; 2. An effective legal and governmental framework for safety, including an independent regulatory body, must be established and sustained; 3. Effective leadership and management for safety must be established and sustained in organisations concerned with, and facilities and activities that give rise to, radiation risks; 4. Facilities and activities that give rise to radiation risks must yield an overall benefit; 5. Protection must be optimised to provide the highest level of safety that can reasonably be achieved; 6. Measures for controlling radiation risks must ensure that no individual bears an unacceptable risk of harm; 7. People and the environment, present and future, must be protected against radiation risks; 8. All practical efforts must be made to prevent and mitigate nuclear or radiation accidents; Arrangements must be made for emergency preparation and response to nuclear or radiation incidents; 10. Protective actions to reduce existing or unregulated radiation risks must be justified and optimised.

¹⁴ OECD/NEA, *The Strategic Plan of the Nuclear Energy Agency: 2017-2022*, 2016, p. 15.

The current basic safety standards are laid down in a revised directive, Council Directive 2013/59/Euratom.¹⁵ This Directive establishes uniform basic safety standards for the protection of the health of workers, members of the public and patients. It defines precise parameters, leaves little discretionary margin. The Directive applies under normal conditions, but it also refers to planned and emergency exposure situations. The requirements for emergency preparedness and response were strengthened to take into account the lessons learnt from the Fukushima accident.

The Basic Safety Standards Directive acknowledged that a system of radiation protection for practices should continue to be based on three major principles, namely justification of exposure, optimisation of protection, and dose limitations. Under the justification principle, Member States are required to ensure "that all new classes or types of practice resulting in exposure to ionising radiation are justified in advance of being first adopted or first approved by their economic, social or other benefits in relation to the health detriment they may cause."¹⁶ The justification principle is based on the recommendations of the International Commission on Radiological Protection (ICRP) and means that no practice involving exposure to ionising radiation should be adopted unless it produces sufficient benefits to the exposed individuals or to society in general to offset the health detriment it may cause.

The optimisation principle requires that all exposures are kept As Low As Reasonably Achievable (ALARA) taking social and economic factors into account. The Directive further sets the provisions for dose limitations with regard to the maximum radiation dose under normal conditions, so as to minimise harmful effects.

3.4 The Nuclear Safety Directive

The Nuclear Safety Directive builds on the main nuclear safety international instruments, namely the CNS and the Safety Fundamentals¹⁷ established by the IAEA. The Nuclear Safety Directive transforms the IAEA system in a legally binding Community system, thereby establishing legal certainty.¹⁸ It has a broader scope than the CNS as it covers more types of plants, including research facilities.¹⁹ Moreover, unlike the CNS, this Directive also covers the decommissioning of nuclear installations and gives a definition of "nuclear safety". Nuclear safety thus "means the achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers and the general public from dangers arising from ionising radiations from nuclear installations;

The first safety Directive, Council Directive 2009/71/Euratom²⁰ aims at the overall continuous improvement of nuclear safety and its regulation. Moreover, it intends to ensure that Member States provide for appropriate national arrangements for a high level of nuclear safety to protect workers and the general public against the dangers arising from ionising radiations from nuclear installations.

¹⁵ Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for the protection against the dangers arising from exposure to ionising radiation and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.

¹⁶ Article 6 of Council Directive 96/29/Euratom.

¹⁷ IAEA Safety Fundamentals: Fundamental safety principles, IAEA Safety Standard Series No SF-1 (2006).

¹⁸ The Directive Establishing a Community Framework for the Nuclear Safety of Nuclear Installations: The EU Approach to Nuclear Safety, p. 31.

¹⁹ *Id.*, p. 31.

²⁰ Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172, 2.7.2009, p. 18-22.

The main obligations stemming from this Directive rest on Member States which must “establish and maintain a national legislative, regulatory and organisational framework for nuclear safety of nuclear installations.” The Safety provisions rest on a functional separation of the competent regulatory authority to ensure effective independence (Article 5.2). Member States are also required to ensure that the prime responsibility for nuclear safety of a nuclear installation rests with the licence holder (Article 6.1). The latter must under the supervision of the competent regulatory authority regularly assess and verify, and continuously improve, as far as reasonably achievable, the nuclear safety of their nuclear installations (Article 6.2).

Following the Fukushima nuclear accident in 2011, voluntary tests were carried out to verify the safety of the 143 European nuclear power plants within the EU. These so-called “stress tests” were comprehensive and transparent assessments aiming at establishing whether the nuclear power plants could withstand the effects of natural disasters, human failures or malevolent acts. In view of the lessons learnt from these stress tests and the technical progress achieved through the provisions of the IAEA and by the Western European Nuclear Regulators Association (“WENRA”), Directive 2009/71/Euratom had to be amended to include a high level Community nuclear safety objective covering all stages of the lifecycle of nuclear installations (siting, design, construction, commissioning, operation, decommissioning). In particular, the safety objective calls for safety assessments before the construction of new nuclear power plants and significant safety enhancements for old reactors. The amendment became effective in 2014.

The amended Nuclear safety Directive, Council Directive 2014/87/Euratom,²¹ introduces the concept of defence-in-depth²² and a nuclear safety culture as the basis for implementing high level nuclear safety objectives. The 2014 amendment strengthened transparency and public involvement, promotes an independent regulatory authority, topical peer reviews and an organisational structure for on-site emergency preparedness and response.

3.5 General principles of EU environmental law and nuclear liability

As was already mentioned when discussing the petitions, Article 191(2) of the TFEU, referring to the precautionary and prevention principles only applies to environmental law. The Commission in one of its replies (in the Tihange 2 petition 956/2016) explicitly mentions that nuclear energy is regulated by the Euratom Treaty and Euratom law. Yet, although that may be the situation *de legelata* in the literature it has been suggested that some of the environmental principles, such as the precautionary and the polluter-pays-principle have such an important message and impact that they should be applied to nuclear law as well.²³

²¹ Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations, OJ L 219, 25.7.2014, p. 42-52.

²² The 17th alinea of the Directive 2014/87 emphasized the importance of the application of the defence-in-depth principles, as recognised in international standards and guidance and by WENRA. This concept evolves around independent layers of provisions to prevent accidents and mitigate the consequences should they occur. It reads: “Defence-in-depth is generally structured in five levels. Should one level fail, the subsequent level comes into play. The objective of the first level of protection is the prevention of abnormal operation and system failures. If the first level fails, abnormal operation is controlled or failures are detected by the second level of protection. Should the second level fail, the third level ensures that safety functions are further performed by activating specific safety systems and other safety features. Should the third level fail, the fourth level limits accident progression through accident management, so as to prevent or mitigate severe accident conditions with external releases of radioactive materials. The last objective (the fifth level of protection) is the mitigation of the radiological consequences of significant external releases through the off-site emergency response.”

²³ See generally Heldt 2015, p. 77.

Article 191.2 of the TFEU states that regulatory policies on the environment shall aim at a high level of protection and “be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.” This article establishes two underlying general principles for environmental policies, namely the precautionary principle and the polluter pays principle.

The precautionary principle first appeared in German law in the 1970's (*Vorsorgeprinzip*), and gradually found its way to international law, starting from the 1980's. The 1992 Rio declaration stated that “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” Applying the precautionary principle can help correct market failures, avoid lengthy compensation proceedings, and avoid hazards in highly complex and uncertain situations, while providing an opportunity to review strategies, methodologies and ways to communicate on risks.²⁴ Nevertheless, its application gives rise to controversy, as it is very difficult to achieve scientific certainty. Besides, the precautionary principle would undermine progress and complicate international regulatory cooperation.²⁵ Considered *strictosensu*, the Precautionary principle intends to fill the gaps where there is scientific uncertainty in the decision-making process. This pre-requisite makes an application of the Precautionary Principle in the nuclear sector questionable, because this sector is more concerned about the probability of the occurrence of an accident than with scientific uncertainty.²⁶ However, the Precautionary Principle is not void of interest as it could reveal very useful, for example in the field of liability claims. Be that as it may, it might be more accurate to refer to a precautionary approach towards nuclear risk mitigation due to the potential disastrous effects in the occurrence of an accident. While the precautionary principle and the precautionary approach are mostly appraised as similar concepts by scholars, a differentiation between the two notions is essential for the application in the nuclear sector.²⁷

The applicability of the polluter pays principle to the nuclear sector is no longer questionable.²⁸ The question arises however who should bear the costs of the pollution in this field. Provisions in international as well as EU laws lay the primary responsibility on the nuclear operator, exonerating other actors such as suppliers and designers. This aims mainly to avoid duplication of costs and lengthy procedures with regard to liability and compensation systems. While the mechanisms in this regard could be discussed, the preventive function of the polluter pays principle plays a key role for the restoration of the environment and compensation in the event of an accident.

3.6 Summary and analysis

Community regulation in the nuclear sector is focused on two different but closely connected areas, namely the safety of nuclear installations and radiation protection. While the basic Euratom Treaty remained practically unchanged over the years, the safety Directives were updated to take account of the evolution at the international level and the lessons learnt from nuclear accidents. In this regard, the EU cannot be seen as the main driver of changes in the nuclear sector. In the oil sector, the EU has taken a more active role in lobbying, for example, for higher compensation amounts. By contrast, the nuclear

²⁴ European Parliament, *The Precautionary Principle: Definitions, applications and governance*, 2016, p. 18.

²⁵ *Id.*, p. 12.

²⁶ Heldt 2015, p. 77.

²⁷ *Id.*, p. 76.

²⁸ The Principle was already mentioned in 1975 in Council Recommendation 75/436/Euratom, ECSC, EEC on cost allocation and action by public authorities on environmental matters. Its applicability to the nuclear sector was again confirmed with regard to decommissioning in Recommendation 2006/851/Euratom on the management of financial resources for the decommissioning of nuclear installations, spent fuel and radioactive waste.

sector is less responsive to new challenges, and amendments in the face of catastrophes are very slow or even inexistent.²⁹

Nuclear safety in the EU remains the responsibility of each Member State, while Community institutions must ensure the adoption of uniform Community-wide safety standards and the compliance of Member States to its provisions. At the national level, there is a strong reliance on voluntary initiatives. In this regard, it is important to underline that self-regulation can be effective only when the nuclear sector is completely transparent on norms and standards, and when these norms and standards are controllable and enforceable.³⁰ Yet, while some countries can rely on a nuclear regulation, many others just have a cross-reference to the international soft law system.³¹

The European nuclear safety regime has been subject to various types of criticism in the literature. Some have formulated criticism, not so much on the Nuclear Safety Directive itself, but on the fact that verification with its compliance remains within the competence of the Member States. Thus it has been argued that the Nuclear Safety Directive might contribute little to enhancing nuclear safety in the EU due to the lack of surprise inspections of nuclear power plants since independent verifications remain the responsibility of national regulators rather than from Community institutions. As was mentioned, the recent adaptations of the Nuclear Safety Directive (more particularly in 2014) have stressed the importance of an independent regulatory authority, but basically it still remain Member States authorities that verify nuclear safety; there is no possibility for Euratom or other EU institutions to directly verify safety of nuclear installations within the Member States. In addition, there has been criticism on the fact that the nuclear *acquis* consists mainly of reporting obligations, which require Member States to submit an implementation report to the Commission every three years. The Commission, in turn, must subsequently submit a report to the EU Council and Parliament on the progress made to implement the Safety Directive. Thus it seems as if the nuclear safety *acquis* largely consists of various reporting obligations (from Member States to the Commission and from the Commission to the Council and Parliament) without possibilities to directly impact on the safety of nuclear installations within the Member States. These provisions are not likely to contribute to increasing public confidence in nuclear energy.³²

Furthermore, in terms of risk regulation, the nuclear sector is still lagging behind due to the fact that nuclear law relies mainly on international soft law principles and standards, which find neither full implementation nor control and transparent enforcement mechanisms.³³ The mixture of hard and soft law is difficult to manage and control by governments and nuclear authorities. Besides, there is a lack of legal mechanisms to ensure that certain general principles become legally binding. In the practice, principles such as ALARA or justification are difficult to implement due to the lack of a solid legal basis with regard to the principles themselves and the methods to control their implementation. The shift from soft international recommendations to European and national hard law requirements is a far too lengthy process (10-20 years) that hinders the effectiveness of the ALARA principle. The literature criticises the fact that nuclear experts and operators are meanwhile already using the soft law recommendations. That implies that in such an important area as nuclear safety some argue that soft law is in practice more important than formal statutes. It has been argued that this reverses the

²⁹ Heldt 2015, p. 59.

³⁰ Veuchelen 2009, p. 228

³¹ *Id.*, p. 228.

³² Stanič 2010, p. 158.

³³ Veuchelen 2009, p. 228.

hierarchical pyramid of law “while only law can give democratic legitimacy to such important rules as Justification and ALARA Processes”.³⁴

³⁴ Veuchelen 2012, p. 20.

4. ANALYSIS OF CROSS-BORDER NUCLEAR RISK MANAGEMENT

KEY FINDINGS

- Many general risk management tools aim at emergency preparedness and response.
- At the EU level emergency measures have been provided for in the Basic Safety Standards Directive for nuclear risks.
- The convention on early notification of a nuclear accident requires information exchange.
- Information exchange is also the basis of the European Community Urgent Radiological Information Exchange (ECURIE) system.
- In addition, many risk management and emergency systems are set up in Member States.
- Multilateral arrangements have been worked out to regulate cooperation between Member States.

4.1 Introduction

Adequate preparation and proper response in case of nuclear emergencies is crucial for various reasons. First of all, a nuclear emergency can incur the risk of the release of radioactive materials with potentially devastating consequences for the population, but also for feed stock and therefore for the food chain. Adequate preparation and proper response to nuclear emergencies is also important because of the potential transboundary impact, especially of large nuclear emergencies. A nuclear emergency can involve a large amount of actors and be dependent upon various elements. For that reason it has been stressed in the literature that it is of crucial importance to have a harmonized response to cope with potential discrepancies in protective measures.³⁵ The measures taken to prepare for nuclear emergencies and the decisions concerning the proper response are in principle taken by sovereign countries, there is to say either the country of the location of the nuclear power plant where the emergency occurs or the country where harm is suffered. In principle those sovereign countries will weigh different alternatives to decide on the best suited measures which will subsequently be implemented. However, precisely because, as indicated, the country where the harm is felt (and where therefore also response measures need to be taken) may be different than the country of the location of the nuclear power plant where the emergency occurred. For that reason decision-making concerning nuclear risk management unavoidably needs a coordinated approach between those sovereign countries in order to deal with the often transboundary character of the impacts of a nuclear incident.

This chapter intends to give an overview of nuclear risk management arrangements within the EU. The second section gives an overview of the risk management cycle (4.2). The third section outlines the disaster risk management tools (4.3). In the fourth section the risk management scheme in Member States is discussed (4.4). The fifth section will provide an analysis of the different tools and instruments available (4.5).

³⁵ Lazo and Kaufer 2003.

4.2 Risk management cycle

Generally, the risk management cycle involves four steps. First, the risk framing phase enables to establish the context for risk-based decisions. Secondly, risk assessment aims to inform disaster risk management and the planning process in order to allocate financial resources. The last steps are respectively *risk response* once the risk is determined, and *risk monitoring that is carried out* on an ongoing basis. In the nuclear sector, such a process is centred on safety. Nuclear safety risk management developed through a threefold process including risk-informed regulation and nuclear safety management, assessing and managing radiation exposure, and nuclear emergency planning, preparedness and management. In practice, coordinating potential protection approaches among responsible officials before an accident occurs, and achieving a well harmonised response afterwards is essential. Regulatory authorities must therefore endeavour to build public trust, even in cases of absence of physical transboundary effects, because there still remain concerns with regard to the import and export of food and goods and the international mobility of people passing through or near any affected areas.³⁶

Moreover, there is a need for pre-established lines and means of communication to quickly and effectively communicate within government decision-making structures, from government to the public, from national government to other national governments, and from government to relevant international organisations.³⁷ In the nuclear community, international conventions and treaties have been established to describe when and how such emergency communications should be made, as well as what essential information should be included in the initial notification. A structure for communications, through the International Atomic Energy Agency (IAEA), was established under the international Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency in 1986 to minimise the consequences of radiological emergencies and protect life, property and the environment from the effects of radioactive releases.³⁸ In the same vein, the Early Notification Convention was adopted in 1986 to strengthen international co-operation.³⁹

4.3 Disaster risk management tools

There is a large variety of possible tools related to disaster risk management. We first focus on the tools related to risk prevention (4.3.1) and then explain the system of emergency preparedness and response (4.3.2). Finally we briefly mention the role of insurance as well (4.3.3).

4.3.1 Risk Prevention

The overarching objective of any nuclear risk management remains the prevention of accidents. Preventing accidents is an integral part of the defence-in-depth strategy as laid down in the 17th alinea of the Nuclear Safety Directive.⁴⁰ Defence-in-depth is based on an *idea of multiple levels of protection in which* the failure of one system triggers other independent, diverse lines of defence to limit an

³⁶ *Id*, p. 7.

³⁷ *Id*, p. 7.

³⁸ *Id*, p. 7.

³⁹ The Early Notification Convention entered into force just one month after its adoption. It was adopted by the General Conference at a special session on 14-26 September 1986 and entered into force on 27 October 1986. The states parties to this Convention undertake to notify, directly or through the IAEA, states that are or may be physically affected, and provide them with information as soon as possible on any event occurring on their territory that has resulted or may result in an international transboundary release that could be of radiological safety significance for another state. See Lamm 2017.

⁴⁰ The Nuclear Safety Directive was discussed in more detail *supra* in section 3.4.

accident's potential consequences as much as possible and prevents any escalation to more serious conditions, *should prevention fail*. Preventive measures cover three main phases: the alert phase where there is a grave and imminent danger of a nuclear accident, the accidental phase and the post-accidental phase.

4.3.2 Emergency preparedness and response

4.3.2.1 Legal requirements

A nuclear incident or accident could lead to a nuclear or radiological emergency or to the release of radioactive material within the facility or into the atmosphere. It is therefore important that emergency arrangements exist to ensure a timely, controlled, coordinated and effective response so as to mitigate the consequences of exposure situations, taking into account both immediate actions required and long-term consequences.

In chapter 3 we already discussed the Basic Safety Standards Directive.⁴¹ Article 4 of the Basic Safety Standards Directive defines in (26) an emergency as *"a non-routine situation or event involving a radiation source that necessitates prompt action to mitigate serious adverse consequences for human health and safety, quality of life, property or the environment, or a hazard that could give rise to such serious adverse consequences."* As a general rule, Article 97 requires Members to ensure that account is taken of the fact that emergencies may occur on their territory and that they may be affected by emergencies occurring outside their territory. In this regard, Member States must establish an emergency management system and adequate administrative provisions to maintain such a system. An emergency management system is *"a legal or administrative framework establishing responsibilities for emergency preparedness and response, and arrangements for decision making in the event of an emergency exposure situation."*⁴²

The emergency management system shall include various elements such as the assessment of potential emergency exposure situations, clear allocation of the responsibilities of persons and organisations having a role in preparedness and response arrangements, reliable communications and efficient and effective arrangements for cooperation and coordination at the installation and at appropriate national and international levels, public information arrangements and the establishment of emergency response plans. Adequate preparations include, for example, early-warning systems, plans for evacuation of the local population, the maintenance of stocks of essential supplies, arrangements for decontamination of people and the environment, and infrastructure for the treatment of casualties.

To ensure its responsiveness, the emergency plan must be *"tested, reviewed and, as appropriate, revised at regular intervals, taking into account lessons learned from past emergency exposure situations and taking into account the results of the participation in emergency exercises at national and international level."*⁴³ Emergency responses cover national emergency plans, off-site and on-site emergency plans. In the event of potential transboundary impact, Member States must cooperate with other Member States and with third countries in addressing possible emergencies. Countries that do not operate nuclear power plants must also have emergency arrangements.

In practice, it is for the undertaking to notify the competent authority immediately of any emergency and to take all appropriate action to reduce the consequences. Members shall ensure that the

⁴¹ Council Directive 2013/59/Euratom of 5 December 2013, OJ L 13/1 of 17 January 2014. See *supra* section 3.4.

⁴² Article 4(28) of the Basic Safety Standards Directive.

⁴³ Article 98.4 of the Basic Safety Standards Directive.

undertaking makes such a notification, as well as an initial provisional assessment of the circumstances and consequences of the emergency, and assists with protective measures.⁴⁴

4.3.2.2 Emergency arrangements at EU level

The Fukushima accident prompted risk and safety assessment in all EU nuclear power plants. Called "stress tests", these assessments had as a goal to verify the existence of high safety standards across EU Member States. The stress tests pointed out weaknesses in frameworks and procedures, as well as gaps in the legal arrangements, and identified significant and tangible plant improvements that are being implemented or planned. They also built first bridges between authorities dealing with safety and those dealing with security.⁴⁵ The implementation of the recommendations is left to the Member States and is ensured by operators and national regulators. The latter set up national action plans which were peer-reviewed by experts of EU Countries and the Commission. The scope and modalities of the stress tests were defined by the Commission and the European Nuclear Safety Regulators Group (ENSREG),⁴⁶ following proposals of the Western European Nuclear Regulators' Association (WENRA).

In the aftermath of the Fukushima nuclear accident, measures were also taken at the EU level to comply with the arrangements for emergency preparedness and response. The European Commission transmitted the alert message received from the IAEA on the Fukushima emergency on 11 March 2011, and established an emergency team on 12 March 2011. The team was active 24 hours a day and 7 days a week for a period of three weeks. Within this framework, numerous documents were adopted covering among others regulation regarding special import conditions of food and feed, measures with regard to food, feed and cosmetics, measures with regard to containers, conveyances and goods (other than food and feed and cosmetics). Moreover, information was provided on ships and containers from Japan, on the monitoring of radioactivity in fish and fishery products from the Pacific Region and diverse reports and guidance documents were released on the implementation of regulations adopted with regard to the emergency.

A less severe case was handled in autumn 2017. Small amounts of Ruthenium-106⁴⁷ were widely detected in samples of airborne and deposited radioactivity in several countries in Europe. The low levels of radioactivity did not pose a health hazard to the population and were not the result of an accident at a nuclear power plant. Thanks to the joint efforts of several regulators and technical safety organisations, simulations were carried out to locate the release zone, to assess the quantity of ruthenium released as well as the period and the duration of the release. However, only an approximate

⁴⁴ Article 69 of the Basic Safety Standards Directive.

⁴⁵ Communication from the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities {SWD(2012) 287 final}, COM(2012) 571 final, 2012, p. 16.

⁴⁶ ENSREG is Independent, authoritative expert body created in 2007 following a decision of the European Commission. It is composed of the national nuclear safety, radioactive waste safety or radiation protection regulatory authorities from all EU Member States as well as representatives of the European Commission. ENSREG helps to establish the conditions for continuous improvement and to reach a common understanding in the areas of nuclear safety and radioactive waste management.

⁴⁷ Ruthenium-106 (Ru-106) is used as a radiation source in cancer therapy for the treatment of ocular tumours. Ruthenium can also occur during the reprocessing of nuclear fuel elements. In addition, it is used in radioisotope thermoelectric generators (RTG), which serve for the power supply of satellites ([see http://www.bfs.de/SharedDocs/Kurzmeldungen/BfS/EN/2017/1003-ruthenium-106.html](http://www.bfs.de/SharedDocs/Kurzmeldungen/BfS/EN/2017/1003-ruthenium-106.html)).

location of the point of release could be established. Member States' participations in the actions subsequent to this event were coordinated by the ENSREG.⁴⁸

After the Fukushima accident a variety of studies were executed, also by the European Commission, whereby the current off-site nuclear emergency preparedness and response arrangements in EU Member States and neighbouring countries were reviewed.⁴⁹ The result of that review was that the the European-level actions to improve off-site nuclear emergency preparedness and response showed that current arrangements and capabilities for off-site nuclear emergency preparedness and response (EP&R) were, on paper, broadly compliant with current EU legislative requirements and international guidance. There are differences in emphasis and in the approaches adopted in practice by countries in achieving the agreed objectives. These discrepancies appear because Members' regulatory frameworks are designed to fit their particular administrative, organisational, legislative and political, and societal situation.⁵⁰ A general lack of strategies and arrangements for longer term protective measures and for the return to normality following an emergency seem the most significant gap in EP&R arrangements.⁵¹

With regard to cross border arrangements, most countries have mechanisms for notification of emergencies to neighbouring countries over and above obligations under the already mentioned Convention on Early Notification of a Nuclear Accident and the European Community Urgent Radiological Information Exchange (ECURIE) system. There are detailed bi- and multi-lateral arrangements.⁵² However, implementation disparities exist "both in the nature of arrangements in practice and in the extent to which they are governed by any binding legal basis or more substantive political accord."⁵³

In addition to those conventions and agreements, which are all specific to nuclear emergencies, there are also strategies which are part of a broader framework. That means that they do not only apply specifically to nuclear emergencies. Through the Union Civil Protection Mechanism (UCPM), for instance, civil protection assistance in the form of governmental aid is provided in the immediate aftermath of a disaster whenever the scale of an emergency overwhelms the response capabilities of a country. Preparedness and prevention measures also address risk assessment, risk management capabilities and planning. The response to disasters extends to disaster prevention and preparedness.⁵⁴

⁴⁸ The function of ENSREG, the European Nuclear Safety Regulators Group was further explained *supra* in chapter 3.

⁴⁹ European Atomic Energy Community 2014.

⁵⁰ The gaps and inconsistencies identified called for a EU-level response to provide greater assurance to the EU public, harmonise implementation criteria of international standards and guidance in Member States, establish formal guidance or a Code of Practice at European level with regard to cross-border arrangements, promote an effective use of resources and cost savings, embed preparedness and response arrangements for nuclear emergencies within those for all other emergencies, establish a more inclusive governance of off-site nuclear EP&R to better reflect the cross-governmental nature of any emergency response and better represent the civil protection organisations, and establish longer term protective measures.

⁵¹ European Atomic Energy Community 2014.

⁵² European Commission 2014, p. 66. The report underlines that "arrangements are in place, or under development, in all cases where the territory of a country falls within the EPZ of a NPP in a neighbouring country. Multi-lateral arrangements have also been established, notably between the Nordic countries and in the "Greater Region" which comprises several Belgian, Dutch, French, Luxembourg and German regions."

⁵³ European Commission 2014, p. 66.

⁵⁴ Upon the official request of the country concerned or other organisations, the Emergency Response Coordination Centre (ERCC), operating from within the Directorate General for European Civil Protection and Humanitarian Aid Operations (DG ECHO) in Brussels, acts as an operational hub, to give coordinated assistance to victims of natural, technological and man-made disasters in Europe and elsewhere. Within this framework operate the Emergency Response Coordination Centre European Emergency Response Capacity (EERC, also called "Voluntary pool"). See for further information Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism Text with EEA relevance, OJ L 347, 20.12.2013, p. 924-947.

Similarly, the Resilience Programme in civil protection of the Chemical, Biological, Radiological and Nuclear (CBRN)⁵⁵ security in the European Union supports preparedness and enhances effective coordination in response to CBRN incidents.

At the international level, the Commission signed a Memorandum of Understanding with the IAEA⁵⁶ to further cooperation, including expert peer reviews and strengthening emergency preparedness and response with a view of strengthening nuclear safety worldwide. The Commission takes part in triennial review meetings and extraordinary meetings on the Convention on Nuclear Safety and produces reports.

4.3.3 Insurance

Insurance can have various beneficial effects as far as dealing with disasters is concerned. First of all insurance may, through the control of moral hazard by the insurer, provide incentives for disaster risk mitigation.⁵⁷ In addition insurance may intervene to provide ex post relieve after an emergency has occurred or ex post compensation and recovery to victims.⁵⁸ In other words: insurance helps reduce the economic impact and facilitates recovery after disasters. Well-designed insurance policies can also help discourage risky behaviour and promote risk awareness.⁵⁹ Even where costs of major disasters are locally concentrated, an inadequate coverage of disaster costs by insurance may lead to large fiscal burdens carried by individual Member States, which could cause internal and external imbalances.⁶⁰

The function of (liability) insurance with respect to nuclear risks will be further discussed in more detail in the next chapter (5).

4.4 Risk management in Member States

Emergency intervention systems are managed by the State, and subsequent countermeasures to protect the public are decided upon by the national authorities. Considering national contingencies, intervention levels differ from one country to another, and discrepancies emerge with regard to the risk management decision-making across countries. Depending on the type of decisions, the authorities in the same countries might also be different. For example, preventive measures can be decided by national authorities, while countermeasures such as prohibition of harvesting and selling foodstuffs or other products are decided by local authorities.

All EU countries operate national radiation-monitoring networks and forecasting systems which provide real-time data for use in the event of an emergency to enable rapid and coordinated responses. Data from these networks are shared among Members using systems of the European Community Urgent Radiological Information Exchange (ECURIE).⁶¹ ECURIE was set up shortly after the Chernobyl accident in 1986 to facilitate early notification information exchange on radiological emergencies. It is a technical implementation of the Council Decision 87/600/Euratom which requires from Members that

⁵⁵ The EU CBRN Action Plan aims at reducing the threat and possible consequences of CBRN incidents of accidental, natural or intentional origin, including acts of terrorism.

⁵⁶ Commission Decision of 5.9.2013 on the conclusion of a Memorandum of Understanding for a partnership between the European Atomic Energy Community and the International Atomic Energy Agency on nuclear safety cooperation, C(2013) 5641 final.

⁵⁷ Faure 2016, p. 95-178.

⁵⁸ Dari-Mattiacci and Faure 2015, p. 180-208.

⁵⁹ International Monetary Fund 2006, p. 6.

⁶⁰ European Commission 2013, p. 2.

⁶¹ See <https://ecurie.jrc.ec.europa.eu/About.aspx>.

they promptly notify the European Commission and all the Member States of any radiological emergency for which they intend to take countermeasures. The Commission must then make this notification available to all other members. ECURIE is not intended for the exchange of large amounts of radiological monitoring data. This is done through the EURDEP-system. All EU countries plus Switzerland, Norway, Montenegro and the former Yugoslav Republic of Macedonia take part in the ECURIE platform. Another mechanism to share data is the European Radiological Data Exchange Platform (EURDEP). EURDEP is both a standard format for radiological data and a network for the exchange of automatic monitoring data. The EURDEP network is currently used by 31 European countries (including the FANC in Belgium) for the continuous exchange of data from their national radiological monitoring networks in almost real-time. All EU Countries plus Iceland, Norway, Russia, Switzerland, Turkey, the former Yugoslav Republic of Macedonia, Ukraine, Azerbaijan, Serbia and Belarus participate in EURDEP. During routine monitoring data is made available by the participating organisations at least once a day. During an emergency each organisation makes data available at least every two hours. In practice more and more organisations make their national data available on an hourly basis both during routine and during emergency conditions.⁶² EURDEP and ECURIE systems are complementary to the IAEA's EMERCON notification arrangements for radiological or nuclear emergencies and its Unified System of Information Exchange in Incidents and Emergencies (USIE)⁶³ information sharing system. Furthermore, the ENSEMBLE⁶⁴ system enables the harmonisation and coherence of emergency management and decision-making in relation to long range atmospheric dispersion modelling.⁶⁵

In relation to the co-ordination of measures to be taken, certain countries, like Luxembourg, have not formally enacted any provisions to regulate the consultation procedure with neighbouring states. Disparities appear also with regard to the cost for the preventive measures. A distinction should be made between two different types of cost: those which result directly from the preventive measures and indirect costs generated by preventive measures. Direct costs lie in some countries with the operator, but in most countries, the cost of these preventive measures is not covered by the nuclear third party liability insurance policy and the operator may be required to take out a financial guarantee separate from the nuclear third party liability policy, to cover these expenses. In other countries like Belgium and Germany, these costs are incurred by the public authorities, or yet in other countries, shared between the Government, local authorities in the affected zone and the operator of the nuclear installation. Indirect costs arising from preventive measures usually lie with the operator. These costs can be covered by the nuclear third party liability insurance policy. If not, then the operator can take out a separate financial guarantee (France, Germany). Austria, Bulgaria and Lithuania have established special national funds to cover this type of expense.⁶⁶

⁶² See <https://rem.jrc.ec.europa.eu/RemWeb/activities/Eurdep.aspx>.

⁶³ The USIE system is an IAEA web portal for Contact Points of States Parties to the Convention of Early Notification of a Nuclear Accident and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency and of IAEA Member States to exchange urgent information during nuclear and radiological incidents and emergencies for officially nominated INES National Officers to post information on events rated using the International Nuclear and Radiological Event Scale (INES). (See <https://iec.iaea.org/usie/actual/LandingPage.aspx>).

⁶⁴ See further concerning this ENSEMBLE system <http://ensemble.jrc.ec.europa.eu/>.

⁶⁵ The ENSEMBLE platform ensures a common coherent strategy across European national emergency management efforts to take account of differences in national forecasts of atmospheric dispersion. It makes use of new decision-making procedures and web-based tools for real-time reconciliation and harmonisation of dispersion forecasts from meteorological and emergency centres across Europe during an accident. (see <https://rem.jrc.ec.europa.eu/RemWeb/activities/Ensemble.aspx>).

⁶⁶ European Commission 2014.

4.5 Analysis

As was mentioned in the introduction to this chapter, in defining their policies and the implementation of their emergency arrangements, Member States are in principle fully sovereign. Interestingly, countries, even those without Nuclear Power Plants (NPPs), have some regulations, standards, requirements or guidance in addition to primary legislation to provide a framework for the protection of the public in the event of a nuclear emergency.⁶⁷ Countries have different provisions with regard to many factors such as the methods for assessing the on site situation, the models for radiological impact assessment, the appreciation of uncertainties, the intervention levels and their definitions, the definitions of EPZ and the structures, responsibilities and organisations.⁶⁸ Even on the basis of common principles, considerable differences can be justified by *bona fides* interpretations of the data in presence. For example, for the determination of EPZ, authorities may have dissimilar opinions of what it is reasonable to plan for in detail, depending on the assumed magnitude of the accident or the weather. It is not always easy or desirable to make all these decisions converge, and the differences cannot always be rationalized. Besides, similar approaches do not always lead to similar results. In the specific case of EPZ, their intrinsic features do not reflect only technical considerations, but also a large measure of socio-economic and political judgment. Moreover, the mere relative extents of EPZ is no compelling evidence that one country's measure is better than the others. One must factor in that decisions about EPZ are but one single element of broader emergency arrangements.⁶⁹ In this regard, the credibility and public acceptance of emergency arrangements should not solely be based on judgments on specific measures, but must be assessed holistically.

There are many instruments and legal tools available to deal generally with disasters. In addition, there are many institutional arrangements specific for nuclear emergencies. Those are rather peculiar, because nuclear emergencies differ from other types of emergency. An example of such an institutional arrangement for a nuclear emergency is the regulation in the Basic Safety Standards Directive as well as in the Nuclear Safety Directive, made under the Euratom Treaty. The fact that these instruments dealing with nuclear emergencies fall under Euratom also has practical consequences. As a result, "in many countries, "ownership" or "leadership" of nuclear EP&R arrangements rests with national institutions with radiological or nuclear expertise, with civil protection organisations providing support. For most, if not all, other types of emergency, ownership or leadership is exercised by civil protection organisations, with supporting input from relevant specialists, depending on the nature of the emergency. This has important implications for how emergencies are handled in practice and how, and by whom, authority and control is exercised."⁷⁰ The question has been asked in the literature whether a different approach should be sought to cope with nuclear emergency arrangements. Would better results be achieved by incorporating social and economic factors into decisions about radiological protection, or by incorporating radiological protection considerations into decisions about society?⁷¹

As far as cooperation between Member States is concerned, multi-lateral arrangements have often evolved over a long period of dialogue and are largely sustained by good will or "gentleman's agreements".⁷² This is sustained by the lack of legally binding arrangements at the European level.

⁶⁷ *Id*, p. 92.

⁶⁸ Majerus 2013.

⁶⁹ European Commission 2014, p. 92.

⁷⁰ *Id*, p. 81.

⁷¹ Prêtre 1998, p. 11.

⁷² European Commission 2014, p. 66.

It is worth mentioning that legally binding harmonized provisions are not desirable in every emergency situation. For instance, due to the principle of “optimisation of protection”, it reveals challenging to achieve a greater harmonisation of intervention criteria and other EP&R issues, because Members are compelled in their radiological protection policies to take account of their individual social and economic factors.

5. LIABILITY AND INSURANCE SCHEMES FOR NUCLEAR ACCIDENTS

KEY FINDINGS

- International conventions regulating nuclear liability and compensation have been worked out in the 1960s.
- Two different regimes exist: one emerged via the OECD Nuclear Energy Agency (NEA); the other via the IAEA.
- The conventions have similar principles: strict liability, exclusive channelling of liability to the operator, mandatory financial coverage, limitation of liability in amount and time and additional public funding.
- The international nuclear liability framework was created to protect American suppliers of nuclear material against liability risks.
- The nuclear liability conventions have been criticized in the literature.
- It is more particularly argued that the financial limit on liability and the legal channelling of liability have distortive effects for prevention and lead to under compensation.

5.1 Introduction

Already from the origin of the introduction of nuclear energy in Europe several European Member States were party to two types of international conventions that emerged under the auspices of two different international organisations. These international conventions that emerged at the beginning of the 60s of the past century existed for almost 25 years without substantial changes. That fundamentally changed when the world was for the first time confronted with a major nuclear accident that occurred on 26 April 1986 in Chernobyl. Pelzer argues that accident was the incentive for far-reaching international treaty making and in particular it improved international nuclear liability law by initiating the amendment of existing conventions and the adoption of new ones.⁷³ Liability rules are considered of particular importance for two specific reasons: on the one hand an exposure to liability of an operator (in this particular case the licensee of a nuclear power plant) can provide incentives for prevention; on the other hand liability rules can, when they are appropriately constructed, contribute to awarding compensation to the victims.

This chapter intends to examine the international regime concerning the compensation for victims of nuclear accidents. As will be made clear, this on the one hand consists of a regime of liability of the operator, but the far more important compensation comes to a large extent from the government. As the international conventions force the operators to show that their liability is covered through a solvency guarantee, liability insurance equally plays an important role and will therefore also be focused on within the framework of this chapter.

The regime for compensating victims of nuclear accidents, as it has emerged in the 1960s, has been subject to serious criticisms in the literature. In this chapter we will review the existing international legal framework and also provide a critical analysis, based on a review of the literature. Given the fact that there is so much criticism on the inadequacy of the international framework, the next chapter (6)

⁷³ Pelzer 2017, p. 49.

will address the question whether improvements of this international legal framework would in theory be possible (and we will argue this is indeed the case). This will allow us to equally address in chapter 6 whether (differently than is the case today) the EU should also assume a task with respect to the compensation of victims of nuclear accidents.

This chapter will proceed as follows: first, the international legal framework for nuclear liability will be sketched (5.2); next, we will focus on the main principles underlying the international nuclear liability conventions (5.3). Section 5.4 provides an analysis of the origins of the nuclear liability conventions which is helpful to explain why the conventions rather serve the interests of the nuclear operators than of the victims. Section 5.6 provides a critical analysis of the current international legal framework. Section 5.7 concludes.

5.2 International legal framework for nuclear liability

The liability and compensation system for nuclear damage within the EU is fully relying on international conventions. Two main regimes deserved to be mentioned, namely the OECD Nuclear Energy Agency (NEA) regime and the International Atomic Energy Agency (IAEA) regime. Under the auspices of the NEA, the 1960 Paris Convention on Nuclear Third Party Liability (Paris Convention) was developed, as well as the 1963 Brussels Supplementary Convention on Third Party Liability in the Field of Nuclear Energy (Brussels Supplementary Convention or BSC). Under the aegis of the IAEA, the 1963 Vienna Convention on Civil Liability for Nuclear Damage was developed. These two regimes have been qualified the first generation of nuclear liability conventions.⁷⁴

The second generation of Nuclear Liability Conventions was triggered by the Chernobyl accident of 1986. That accident highlighted a few shortcomings of the existing compensation models under the international legal framework. Subsequently, there was a proliferation of amendments and protocols, namely the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (Joint Protocol), the Protocol to amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (the Protocol to the Vienna Convention), the Convention on Supplementary Compensation for Nuclear Damage (CSC), the Protocol to amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 (the Protocol to the Paris Convention) and the Protocol to amend the Convention of 31 January 1963 supplementary to the Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy (the Protocol to the Brussels Supplementary Convention).

Conventions	Date of adoption	Date of entry into force
Joint Protocol	21 September 1988	27 April 1992
Protocol to the Vienna Convention	12 September 1997	4 October 2003
Convention on Supplementary Compensation (CSC)	12 September 1997	15 April 2015
Protocol to the Paris Convention	12 February 2004	Not yet into force
Protocol to the Brussels Supplementary Convention	12 February 2004	Not yet into force

Table 2: Overview of the second generation international conventions

⁷⁴ See Faure 2016.

This second generation of Nuclear Liability Conventions brought about many changes to take account of the needs that became apparent after the Chernobyl accident. Apart from an increase in the liability of the nuclear operation, the definition of damage became broader in scope. In addition to personal injury and property damage, damage under the Protocol to the Paris Convention equally includes to the extent determined by the law of the competent court, *economic loss arising from personal injury and property damage, the costs of measures of reinstatement of impaired environment, loss of income deriving from a direct economic interest in any use or enjoyment of the environment, and the costs of preventive measures*.⁷⁵ Next to these titles, the Protocol to the Vienna Convention also refers to any other economic loss permitted by the general law on civil liability of the competent court.⁷⁶ Besides, the operator is no longer exempt in the event of natural disasters.⁷⁷ Furthermore, the geographical scope is also extended. The Vienna Convention applies to nuclear damage wherever suffered except in the territory of a non-Contracting Party which has a nuclear installation but does not afford reciprocal benefits.⁷⁸ Under the Protocol to the Paris Convention, damage suffered in certain non-Contracting Parties is also covered provided that they meet specific requirements.⁷⁹

5.3 Nuclear liability principles

Generally, there are five fundamental principles underlying the international nuclear liability conventions: strict liability, channelling of all liability to the nuclear operator, limitation of liability, compulsory insurance and exclusive jurisdiction.

5.3.1 Strict liability of the nuclear operator

Under the Paris Convention, absolute liability for the nuclear operator is established as the rule. According to this system, the operator⁸⁰ is liable for damage caused by a nuclear incident in a nuclear installation or involving nuclear substances coming from such installations.⁸¹ This liability results from the risk, irrespective of fault.⁸² Moreover the nuclear operator does not benefit from the classic exonerations such as force majeure, Acts of God or intervening acts of third persons, whether or not such acts were reasonably foreseeable and avoidable. The permitted exonerations include certain disturbances of an international character such as acts of armed conflict and hostilities, of a political nature such as civil war and insurrection, or grave natural disasters of an exceptional character, which are catastrophic and completely unforeseeable.⁸³ While the Vienna Convention sets down similar requirements with regard to absolute liability and exonerations,⁸⁴ it left room for operators to be relieved from this liability. Article IV(2) indeed stipulates that "If the operator proves that the nuclear damage resulted wholly or partly either from the gross negligence of the person suffering the damage or from an act or omission of such person done with intent to cause damage, the competent court may, if its law so provides, relieve the operator wholly or partly from his obligation to pay compensation in respect of the damage suffered by such person."

⁷⁵ Art. I (vii) of the Protocol to the Paris Convention.

⁷⁶ Art. I(k) of the Protocol to the Vienna Convention.

⁷⁷ Art. IX of the Protocol to the Paris Convention; Art. IV(3) of the Protocol to the Vienna Convention.

⁷⁸ Art. I A of the Protocol to the Vienna Convention.

⁷⁹ Art. II(a) of the Protocol to the Paris Convention.

⁸⁰ The "operator" is defined as "the person designated or recognised by the competent public authority as the operator of that installation" (Art. 1(a)(vi)).

⁸¹ Paris Convention, Art. 3.

⁸² The *exposé des motifs* of the Paris Convention, point 14.

⁸³ The *exposé des motifs* of the Paris Convention, point 48.

⁸⁴ Arts. I(1)(k), IV(1), (3) of the Vienna Convention.

5.3.2 Exclusive liability of the operator of a nuclear installation

Under both Conventions, liability is channelled onto the operator,⁸⁵ i.e. the operator – and only the operator – is liable for nuclear incidents at installations and no other person is liable.⁸⁶ This exclusive responsibility is desirable to avoid complicated legal procedures aiming at establishing the liable parties, thus enabling a concentration of the insurance capacity available. The notion of channelling further implies that the operator cannot initiate recourse actions against his suppliers in respect of the compensation paid. This situation would otherwise result in costly duplication of insurance with no benefit to victims.⁸⁷

5.3.3 Limitation of liability in amount and in time

Under the Paris Convention, the maximum liability of the operator shall be 15 million Special Drawing Rights (SDRs), around EUR 17.2 million. Any Contracting Party may establish by legislation a greater or lesser amount taking into account factors such as the capacity of insurance and financial security, and the nature of the nuclear installation, provided that the reduced amount is no less than 5 million SDRs (around EUR 5.70 million). Using this flexibility, Sweden, in its Nuclear Liability Act (SFS 1968:45) set the limit on liability at 300 million SDRs since 2001.⁸⁸ Other countries like Germany and Austria apply a system with unlimited liability.⁸⁹

Under the Vienna Convention, the minimum liability is established at US \$5 million.⁹⁰ In 1997, the Protocol to amend the 1963 Vienna Convention increased the amount to 300 million SDRs.⁹¹ A lower amount can be decided by the installation state provided that there is a minimum operator liability of 5 million SDRs, and provided assurances by the Installation State that public funds shall be made available up to the amount established.⁹²

The liability limitation has, however, been changed under the second-generation nuclear conventions. The Protocol to the Paris Convention increases the limit for nuclear operators to no less than EUR 700 million. The Contracting Party can reduce the liability to no less than EUR 80 million for the carriage of nuclear substances according to the reduced risks.⁹³ The Convention even allows for the adoption of unlimited liability by the Contracting Parties, as long as the financial security required is no less than the amount mentioned above.⁹⁴

⁸⁵ Art. VI(a), (b) of the Paris Convention. See also Arts. II(5), X of the Vienna Convention.

⁸⁶ The *exposé des motifs* of the Paris Convention, point 15.

⁸⁷ *Id.*, point 18.

⁸⁸ OECD, Nuclear Legislation in OECD and NEA Countries, Regulatory and Institutional Framework for Nuclear Activities: Sweden, 2008, p. 13, available at <https://www.oecd-nea.org/law/legislation/sweden.pdf> (last accessed on 5 October 2018).

⁸⁹ OECD, Nuclear Legislation in OECD and NEA Countries, Regulatory and Institutional Framework for Nuclear Activities: Germany 2011, p. 20, available at <https://www.oecd-nea.org/law/legislation/germany.pdf> (last accessed on 5 October 2018). See also OECD, Nuclear Legislation in OECD and NEA Countries, Regulatory and Institutional Framework for Nuclear Activities: Austria, 2016, p. 11, available at <https://www.oecd-nea.org/law/legislation/austria.pdf> (last accessed on 5 October 2018). It is worth noting that with regard to damage suffered in another country the amount of liability of the German operator of a nuclear installation is governed by the principle of reciprocity (see p. 21).

⁹⁰ Art. V(1) of the Vienna Convention.

⁹¹ Art. 7(1) of the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage.

⁹² Art. 7(2) of the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage.

⁹³ Art. 7(a)&(b) of the Protocol to the Paris Convention.

⁹⁴ Art. 10(b) of the Protocol to the Paris Convention.

Both the Paris Convention and the Vienna Convention set the operator's liability at ten years from the occurrence of the nuclear accident. However, extinction period may be extended if the liability of the operator is covered by insurance or other financial security or by State funds for a period longer than ten years.⁹⁵ The time limit to claim compensation with respect to loss of life and personal injury has been extended to thirty years from the date of the nuclear incident to take account of the uncertainties related to the health impact of a nuclear radiation.⁹⁶

5.3.4 Mandatory financial coverage of the operator's liability

Strict liability should be accompanied by some guarantee against insolvency to work efficiently, both in terms of deterrence and compensation.⁹⁷ Seeking financial security coverage for the operator's liability is important for the international regimes on nuclear liability. Both conventions require the operator to have and maintain insurance or other financial security up to its liability cap.⁹⁸ Financial security can take many forms, of which insurance coverage is the most common. To take account of the catastrophic nature of nuclear accidents, insurance is usually provided by nuclear insurance pools through a bundling of resources at the national level. Under an insurance-pooling agreement, each insurer contributes according to the ratio contractually agreed with the pool.⁹⁹ Such a system is very favourable for small insurers because they can participate in the pool without putting their financial capacity at risk.¹⁰⁰ Nuclear pools are a monopoly that excludes competition. Operators can only buy insurance from their own national pools. In such a way, as far as third party liability is concerned, a Belgian nuclear operator can only buy insurance with the Belgian pool, the German operator with the German pool, and so forth. Even if the nuclear operators tender for the most favourable insurance offer, they only receive offers from their national pool. The monopolistic position of the nuclear insurers has been heavily criticized.¹⁰¹ Insufficient competition between nuclear insurers also leads to a lack of capacity and limited coverage.¹⁰²

Liability can also be secured through a combination of insurance, other financial security and State guarantee.¹⁰³

5.3.5 The exclusive jurisdiction clause

According to the exclusive jurisdiction clause, the jurisdiction lies only with the Courts of the Contracting Party within whose territory the nuclear accident occurred. In case a nuclear incident occurs outside the territory of the Contracting Parties, or where the place of the nuclear incident cannot be determined with certainty, the competent court in such incidents is the court of the place where the installation of the operator liable is situated.¹⁰⁴ A single competent forum to deal with all actions against

⁹⁵ Art. VI(1) of the Vienna Convention.

⁹⁶ Art. VIII(a)(i) of the Protocol to the Paris Convention; Art. VI(1)(a)(i) of the Protocol to the Vienna Convention.

⁹⁷ Faure 2016, p. 108.

⁹⁸ Art X. of the Paris Convention; Art. VII of the Vienna Convention.

⁹⁹ Vanden Borre 2010, p. 198.

¹⁰⁰ Liu 2013, p. 224.

¹⁰¹ Faure and Van den Bergh 1995; see also Faure 1995, p. 31-32. For more details on insurance pools in general, see Faure and Liu 2013, Liu 2013, p. 224-229.

¹⁰² Faure and Liu 2013, p. 27.

¹⁰³ See more details on public funding in section 5.3 below.

¹⁰⁴ Art. XIII of the Paris Convention and Art. XI of the Vienna Convention.

the operator is important to provide a single legal mechanism to ensure that the limitation on liability is not exceeded, and offer an equitable distribution of compensation.¹⁰⁵

5.3.6 Public funding

Under the international regime, the liability amount has been substantially raised and a multi-layered system has been established, which involves public funding.

The 1963 Brussels Convention supplementing the 1960 Paris Convention raised the compensation amount to 300 million SDRs.¹⁰⁶ Such compensation is financed through three layers:

- Up to an amount of at least 5 million SDRs (EUR 5.70 million or USD 7.64 million), out of funds provided by insurance or other financial security, such amount to be established by the legislation of the Contracting Party in whose territory the nuclear installation of the operator liable is situated;
- A second tier consisting of the difference between SDR 175 million and the amount required under the first tier (thus maximum 170 million SDRs or EUR 193.72 million or USD 259.70 million), out of public funds to be made available by the Contracting Party in whose territory the nuclear installation of the operator liable is situated;
- A third tier of 125 million SDRs (EUR 142.44 million or USD 19.96 million), out of public funds to be made available by the Contracting Parties according to a formula for contributors which is based on the GNP and the thermal capacity of the reactors.¹⁰⁷

Under the Brussels Supplementary Convention, each Contracting Party has certain freedoms. It can establish the maximum liability of the operator, pursuant to the Paris Convention, at 300 million SDRs, and provide that such liability shall be covered by the insurance of the nuclear operator (in that case the Installation State has met its obligation under the Convention and must not provide for national public funding in the second layer). However, the Contracting Party can also set the maximum liability of the operator at an amount at least equal to the insurance of the nuclear operator and provide that, in excess of such amount and up to 300 million SDRs, public funds shall be made available by some means other than as cover for the liability of the operator.¹⁰⁸

The Chernobyl accident brought about important changes in the international regime. According to the 2004 Protocol to amend the Paris Convention,¹⁰⁹ the first tier liability (the liability of the operator of the nuclear power plant) shall increase to € 700 million.¹¹⁰

Moreover, according to the Protocol to the Brussels Supplementary Convention, the Contracting Parties will undertake that financial compensation in respect to nuclear damage shall be provided up to an amount of EUR 1.5 billion per nuclear incident. This will be divided as follows:

¹⁰⁵ The exposé des motifs to the Paris Convention, point 54.

¹⁰⁶ Art. 3(a) of the Convention of 31st January 1963 Supplementary to the Paris Convention of 29 July 1960 (Brussels Supplementary Convention).

¹⁰⁷ Art. 3(2) sec. (1)-(3) of the Brussels Supplementary Convention. Similar provisions are reflected in the 2004 Protocol to Amend the Paris Convention.

¹⁰⁸ For more details, see VandenBorre 2007, p. 302-308.

¹⁰⁹ 2004 Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982, 12 February 2004.

¹¹⁰ Art. I(H)a of the Protocol to Amend the Paris Convention.

- Up to an amount of at least EUR 700 million: funds provided by insurance or other financial security or out of public funds provided pursuant to Art. 10(c) of the Paris Convention;
- Between this amount and EUR 1,200 million: public funds to be made available by the Contracting Party in whose territory the nuclear installation of the operator liable is situated;
- Between EUR 1.2 million and EUR 1.5 million, out of public funds to be made available by all the Contracting Parties according to the formula for contributions.

It is worth underlining that the Convention on Supplementary Compensation (CSC) was adopted on 12 September 1997 as a new and independent legal instrument, which means that a state does not need to be party to the Vienna or Paris Convention in order to become a party to the CSC. According to Article III.I.a of the CSC, the Installation State shall ensure the availability of at least 300 million SDRs (EUR 341.85 million or USD 432.474 million). The choice of the means of funding is free (private insurance, regional agreement, etc.), and the full amount could even be imposed on the nuclear operator. So, as such, this Article does not oblige a State to make public funds available. However, according to Article II.1.B of the CSC, the Contracting Parties shall, beyond the amount available under the first tier, make public funds available.¹¹¹

Under the second tier supplementing the first tier of liability, 50% of the funds shall compensate claims for nuclear damage suffered in or outside the Installation State, and 50% of the funds shall compensate claims for nuclear damage suffered outside the territory of the Installation State to the extent that such claims are uncompensated from the former amount.¹¹²

If one were to summarise the situation, one could hold that in addition to the individual liability (with financial caps) of the nuclear operator there are two additional types of funding mechanisms: there is an obligation of an Installation State to make certain amounts of money available; it can do so either by providing for public funding, or by making the nuclear operator liable for the total amount – this is the second tier of the Brussels Supplementary Convention and the first tier under the CSC.

Finally, there is a system that can be called an international solidarity fund, funded by all Contracting Parties.¹¹³ This public funding can as such not be shifted as this is the case for a third tier of the Brussels Supplementary Convention and for the second tier under the CSC.

The total amounts available in the nuclear liability regime can be summarized in the following table 3:

Amount in million EUR			
What Convention?	Who pays?	First generation	Second generation
Paris Convention	Nuclear operator	57	700
Brussels Supplementary Convention	Installation State (or nuclear operator)	193.7	500
	Collective State Fund	142.4	300
Total NEA-regime		341.8	1,500
Vienna Convention	Nuclear operator	4.2	170.9

¹¹¹ According to the following formula: the amount which shall be the product of the installed nuclear capacity of that Contracting Party multiplied by 300 SDRs per unit of installed capacity; and the amount is determined by applying the ratio between the United Nations rate of assessment for that Contracting Party as assessed for the year preceding the year in which the nuclear incident occurs, and the total of such rates for all Contracting Parties to 10% of the sum of the amounts calculated for all Contracting Parties.

¹¹² Art. XI of the CSC.

¹¹³ Arts. III(a)-III(b) of the Brussels Supplementary Convention; Liu 2013, p. 214; Sands and Peel 2012, p. 740.

	Collective State Fund	-	170.9
Total Vienna Convention		4.2	341.8
Convention on Supplementary Compensation	Operator/Installation State		341.8
	Collective State Fund		341.8
Total CSC			683.7

Table 3: Available amounts of compensation under the international nuclear liability conventions¹¹⁴

Table 3 demonstrates that under the nuclear compensation scheme of the second generation, public funding is either newly created or kept at the same level as in 1963 in relative terms.¹¹⁵ In absolute terms, there is considerably more public funding in the second-generation conventions: under the 2004 Brussels Supplementary Convention, the public intervention has more than doubled¹¹⁶ and under the IAEA regime, no public intervention existed under the conventions of the first generation.

It is important to emphasise that out of the four new nuclear liability instruments that resulted from the revision exercise, only two have entered into force so far. The Protocol to the Vienna Convention entered into force on 4 October 2003; the CSC entered into force on 15 April 2015.¹¹⁷

As far as victims are concerned, the total amounts available are as follows. "If a country is only member of CSC and not of any of the other nuclear liability conventions, the total amounts available for victims will be € 683,7 million. The same holds true for a country which is member of the Vienna Convention and the CSC — in this case, the total amount available for victims increase with the amount of the second layer of CSC, being € 341.8 million, in which case the total amount available for victims is € 683,7 million. If a country of the NEA regime were to join the CSC, the total amount available for victims would be € 1.841 billion (€ 1.5 billion + € 341.8 million)."¹¹⁸

5.4 Origins of the international nuclear liability framework

As will be made clear in the following section (5.5), the nuclear liability conventions deviate in many respects from ordinary liability law and also from principles of efficient liability and compensation. It has been suggested in the literature that the problems with the international nuclear liability conventions are related to the origins of the conventions and the primary motivations that led to their adoption.

The study of VandenBorre¹¹⁹ on the origins of the current regime is indicative of the nature and the interests that motivated the parties involved. In the 1950s when many Western countries chose to use nuclear energy to cover their energy needs, there were indeed only two countries which were able to supply the necessary nuclear know-how and equipment: the United States and the former Soviet-Union.¹²⁰ These Western European countries had therefore no choice than to rely on American knowledge and technology. While the US found the West-European market interesting and promising

¹¹⁴ See Faure and VandenBorre 2008, p. 239 (providing the amounts of compensation in USD according to the exchange rate in 2008).

¹¹⁵ See VandenBorre 2007, p. 303-304.

¹¹⁶ In the second tier of the Installation State the amount rose from EUR 202 million to EUR 500 million; in the third tier, the Collective State Fund went from approximately EUR 150 million to EUR 300 million.

¹¹⁷ See table 2 in Section 5.2.

¹¹⁸ Faure and VandenBorre 2013, p. 84.

¹¹⁹ See Vanden Borre 2007.

¹²⁰ *Id.*, p. 262-266.

for the expansion of their nuclear industry, the American nuclear industry was not willing to bear liability for possible nuclear accidents in Europe. To address this concern, the first bilateral agreements between the US and Europe contained a so-called "hold-harmless" clause; under such a clause, the (European) nuclear operator held the (American) supplier harmless for all claims resulting from his activities.¹²¹

Later on, the American companies were unsure whether this "hold-harmless" clause provided sufficient and adequate protection. The US "Atomic Industrial Forum" therefore conducted a comprehensive legal study on the possible liability claims of victims of a nuclear accident in Europe against US suppliers. The study intended to investigate not only whether the American suppliers could be held liable, but also whether the European victims had a right to claim compensation in the US as well as ways for the American suppliers to avoid such liability. The results of the analyses were published in two reports: the "Preliminary Report on Financial Protection against Atomic Hazards" (hereinafter called "the Preliminary Report"),¹²² and the "International Problems of Financial Protection against Nuclear Risk" (hereinafter called "the Harvard Report").¹²³

According to the authors of the Preliminary Report, the major problem in assessing the potential liability in case of a nuclear accident was the lack of knowledge concerning the nuclear risk. The biggest risk for the nuclear industry (including operators and every actor involved with the design and construction of an installation) was that a potential liability claim after a nuclear accident would be many times the amount available on the insurance market.¹²⁴ The insurance industry could not offer sufficient cover given the insufficient capacity on the insurance market and given the lack of data on the probability of a nuclear accident; therefore it was difficult to calculate the insurance premium. Thus, the possibilities for a nuclear operator to spread his risk were limited to the means available on the insurance market; consequently, for that part of the damage that was not covered by insurance, he could be held liable with his entire assets.¹²⁵

Given the "undisputed fact that there is a vital national interest in the development of atomic power,"¹²⁶ it was logical that also the authorities (government) had an important role to play. The government had to ensure that a potential liability claim did not hinder the development of the nuclear industry, and protect the safety and the security of the population. It was therefore necessary to create a government program for the protection of the industry against unknown liability claims and the need to protect the public against the damage they would suffer. Practically, the protection of the industry would mean a limitation of the liability. This limitation of liability would only be acceptable if there was an additional compensation available, on top of the liability amount.¹²⁷ Any damage in excess of that amount should be covered by the government. It was stressed that as long as the entire economy of a country would not suffer from this, the public authorities should offer entire compensation. Thus, the authors of the Preliminary Report were in favour of an unlimited government intervention.¹²⁸

¹²¹ *Id.*, p. 263.

¹²² The Preliminary Report was prepared by the experts of Columbia University and published in March 1956.

¹²³ The Harvard Report was prepared by Harvard Law School and published in 1959. According to VandenBorre, the draft text of the Paris Convention was printed as an annex to the Harvard Report.

¹²⁴ *Preliminary Report*, p. 5.

¹²⁵ *Id.*, p. 11.

¹²⁶ *Id.*, p. 16.

¹²⁷ *Id.*, p. 26.

¹²⁸ *Id.*, p. 30.

The Preliminary Report concluded that the interests of both the industry and the public could be met by limiting the amount of liability of the nuclear operator to the amount available on the insurance market and by providing for public funds for damage not covered for by the operator (or his insurer).

The Harvard Report argued that the American industry could play an important role in the development of nuclear energy in the whole world. By so doing, the American companies that would support the nuclear energy industry were exposed to considerable risks.¹²⁹ It was feared that victims of nuclear accidents in Europe would sue American companies in the US. The Report indicated that these companies could indeed be held liable for defects of the material/products delivered to the operator (product liability). The Harvard Report identified three reasons why these companies should not be held liable. First, in case of a nuclear incident, the suppliers feared being prosecuted instead of or jointly with the nuclear operator, even if their role was limited to calculations or supervision of specific parts of the reactor, because the victim of a nuclear incident could be compelled to sue as many companies as possible. It would most certainly be lucrative for a West European victim to sue American suppliers in the US. This could, according to the Harvard Report, result in substantial legal problems, and subsequently lead to lengthy trials of which a large part would be futile.¹³⁰ Secondly, according to the Harvard report, it would be unfair to hold the suppliers liable since, after the delivery of goods and services, they generally lose control there over.¹³¹ The nuclear operator is in a better position than the different suppliers to control the risk. Thirdly, the nuclear operators were more capable of obtaining insurance. By concentrating liability on the operator, pyramidal insurance costs could be avoided.¹³² As a result, not every supplier would have to buy a separate insurance coverage, limiting insurance costs.

The authors of the Harvard Report concluded that the best solution was to make all liability claims against "atomic suppliers" impossible by legislative intervention. To abolish every legal claim against the supplier would be "the most simple and most effective solution"; the new social and economic circumstances, inter alia, resulting from the peaceful use of nuclear energy, necessitated such a legislative intervention; these circumstances were more important than legal dogmatic objections.¹³³ As a result, the Report proposed the introduction of twelve measures which eventually were largely adopted by the nuclear liability conventions (channelling of liability, strict liability, limitation of the liability amount, limitation of the liability in time, the mandatory insurance of liability and the exclusive competence of the court of the country where the incident occurred, etc.).

It is worth underlining that both the Harvard and the Preliminary Report constitute the basis for the creation of the compensation system enacted by the nuclear liability conventions.¹³⁴

5.5 Critical analysis

Even though there were serious attempts to improve the international compensation regimes after the Chernobyl accident in 1986, the fact remains that the current system is still in many regards unsatisfactory. The law and economics doctrine, environmental lawyers and NGOs seem unanimous with regard to the inability of the conventions to adequately protect victims of nuclear accidents in any sufficient manner and they, moreover, are also problematic from a prevention perspective.¹³⁵ The main

¹²⁹ *Harvard report*, p. 5.

¹³⁰ *Id.*, p. 57.

¹³¹ *Id.*, p. 52.

¹³² *Harvard report*, p. 57.

¹³³ *Id.*, p. 59.

¹³⁴ Vanden Borre 2007, p. 266.

¹³⁵ See, inter alia, VandenBorre 2001 and Heldt 2015.

issues with prevention are related to very low financial limits on liability (as a result of which operators are de facto barely exposed to liability) and the so-called legal channelling of liability.¹³⁶

We will now proceed to a more in-depth analysis of the international nuclear liability framework by using the economic approach to liability law. First, we sketch the starting points of how an ideal liability regime should be shaped in order to provide optimal incentives for prevention (5.5.1). Then we focus on the distorting effects of the financial limit on liability (5.5.2) and the distortive effects of legal channelling of liability to the licensee of the power plant (5.5.3).

5.5.1 Economic starting points

The economic approach to liability rules has stressed that liability rules can have the major advantage of providing incentives for prevention.¹³⁷ However, in order to reach that goal particular conditions should be met.

First, the liability of the nuclear operator should be strict. A strict liability rule has generally been advocated for ultra-hazardous activities.¹³⁸ This is because a nuclear accident can be considered as a so-called unilateral accident whereby the victim has no influence on the nuclear accident risk.¹³⁹ For unilateral accidents, strict liability is the preferred rule as it will provide incentives for following both an optimal activity level and an optimal care level by the operator.¹⁴⁰ For that reason strict liability is generally advocated as the preferred rule in order to expose a nuclear operator to the full social costs of his activity.¹⁴¹

Secondly, mandatory solvency guarantees should be imposed upon the tortfeasor, in this particular case on the nuclear operator. The reason is simple: the magnitude of a nuclear accident can easily be substantially higher than the wealth of the operator in which case an insolvency problem would arise. Insolvency could potentially lead to under deterrence and to an externalisation of the harm by the nuclear operator to society.

Thirdly, liability should be unlimited in order to have a full internalisation of the accident risk by the nuclear operator. A so-called "financial cap" which limits the liability of an operator to a particular amount will have the same effect as insolvency, i.e. it will lead to under deterrence and thus negatively affect incentives for prevention. Of course a system involving financial caps is also a serious impairment of the victim's right to full compensation to the extent that the cap is set at a much lower amount than the expected damage. From an economic perspective it is important that nuclear operators should be exposed to the full damage which their activity can cause through accidents. That will lead to prices of nuclear energy correctly reflecting social costs.¹⁴²

A fourth condition for liability rules to be efficient is that liability should be attributed in such a way that all parties that contributed to the risk should be held liable to the extent that their actions actually affected the accident risk. When several tortfeasors have acted together, a joint and several liability rule may provide incentives to the joint tortfeasors for mutual monitoring.¹⁴³ But a system whereby the

¹³⁶ Faure, *The law and economics of nuclear liability*, p. 1.

¹³⁷ See the basic approach in Shavell 1980.

¹³⁸ Landes and Posner 1984.

¹³⁹ Faure, p. 7.

¹⁴⁰ Landes and Posner 1981, p. 875.

¹⁴¹ Trebilcock and Winter 1997, p. 221-223.

¹⁴² Faure and Fiore 2009, p. 432-436.

¹⁴³ See Tietenberg 1989.

liability would be exclusively channelled to one selected tortfeasor (such as for example the licensee of a nuclear power plant) should be avoided as it can negatively affect the incentives of other tortfeasors who equally contributed to the loss.

When we compare the principles embedded in the nuclear liability conventions and the economic starting points, it is obvious that the conventions do not fully correspond to the four aforementioned economic starting points. At two points the international conventions and the economic principles coincide. That is related to the fact that the licensee of a nuclear power plant should be exposed to strict liability and that this strict liability should be covered by a mandatory financial guarantee. There are, however, two aspects of the international convention which are highly problematic from an economic perspective, namely the financial limit on liability and the channelling of liability.

5.5.2 Distorting effects of the financial cap

5.5.2.1 Theory

Already from a theoretical perspective it can be shown that setting a liability limit lower than the actual damage caused by a tortfeasor may create several negative effects. Recall that this financial cap or limitation of liability was based on purely economic reasons, as it was considered necessary in order not to obstruct the development of nuclear industry.¹⁴⁴ That was made clear when we addressed the origins of the international conventions in the previous section (5.3): the limitation of liability was considered as an instrument to protect the nuclear industry and to promote the development of nuclear energy. The Exposé des Motifs of the Paris Convention states that “unlimited liability could easily lead to the ruin of the operator without affording any substantial contribution to compensation for the damage caused.”¹⁴⁵ The limitation of liability is therefore clearly an advantage for the nuclear operator¹⁴⁶ to avoid that the latter bears liability in excess of its financial capacity.

The financial cap regime artificially decreases the costs of the nuclear operator. To the extent that the limit on the liability of the licensee of the nuclear power plant is lower than the magnitude of the damage caused by the accident, this is problematic from at least three perspectives. The first problem is that a financial limit on liability creates a distortive financial subsidy for the nuclear operator.¹⁴⁷ This distortion can be seen at three levels: 1. it might create an artificial competitiveness of the nuclear energy; 2. the cap may reduce the incentives of the operator to prevent nuclear accidents and 3. There may be a reduced compensation to victims.¹⁴⁸ Why the financial limit on liability causes the different distortions just mentioned will be developed in further detail.

The limitation of the liability of the operator implies that the state and all signatory states take over the compensation (up to certain limits) when the damage is higher than the amount of the cap provided by the operator.¹⁴⁹ By covering a second risk layer, the State substitutes for the nuclear operator (without making the operator pay any price for this financing). Considering that the victim of a nuclear

¹⁴⁴ Faure and Vanden Borre 2013, para. 95.

¹⁴⁵ Exposé des Motifs of the Paris Convention, para. 45.

¹⁴⁶ Stoiber et al. 2003, p. 113.

¹⁴⁷ See Faure and Fiore 2008.

¹⁴⁸ Faure and Liu 2013, p. 16.

¹⁴⁹ *Id.*, p. 13.

accident is often the taxpayer, it becomes apparent that through such a mechanism, the victim ultimately pays for part of the compensation himself.¹⁵⁰

As a result, the nuclear operator will only partially internalise and cover his risk costs up to the amount fixed by the Conventions. Since the costs generated by the nuclear activity are not integrated into the sale price, the price does not correctly signal the full social costs of nuclear energy to consumers. There appears an artificial competitiveness on the market. The nuclear kWh price is indeed artificially low and sends a wrong signal to final consumers, leading to a distortion of the market as well. The consumption of nuclear energy is therefore "over-optimal". The artificial competitiveness might stifle the demand for alternative energy sources which, thus, appear much less attractive,¹⁵¹ since other energy forms (more particularly renewable energies) would have higher prices because they would not enjoy a similar type of subsidy (in the form of limits on liability). Consequently, there are reduced incentives to build other types of power plants. Moreover, contrary to other sectors such as wind and solar energy, where the amount of subsidies is voted in Parliament and known to society, the nuclear sector faces transparency issues because it is very hard to calculate the subsidy.¹⁵²

Furthermore, by covering a second risk layer, the State substitutes for the nuclear operator (without making the operator pay any price for this financing). Considering that the victim of a nuclear accident is often the taxpayer, it becomes apparent that through such a mechanism, the victim ultimately pays for part of the compensation himself.¹⁵³

A second problem is that the operator's incentives to prevent nuclear accidents may be affected by the partial internalisation resulting from the nuclear subsidy. Accordingly, the operator will adopt the level of prevention corresponding to the risk he generates. However, since the operator does not take into account all of the risk he generates, his behaviour might be inadequate to prevent accidents in an optimal way. Therefore, if he starts at an underestimation of the level of risk, his preventive actions are necessarily maladjusted and, thus, insufficient to impede an accident. Indeed, the optimality of his level of prevention is determined by the optimality of the level of the considered risks. As a result, a suboptimal estimation of risks leads to a suboptimal level of prevention. It can be inferred that the limit on liability leads to under-deterrence. This distortion created by the nuclear subsidy is all the more problematic since the potential damages of a nuclear accident are very serious and occur over very long periods of time.¹⁵⁴

Nevertheless, one should point to the importance of safety regulation with regard to the prevention of nuclear accidents. The role of nuclear safety authorities may fill the gap created by the lack of incentive of the nuclear operator. Agencies such as the IAEA, the NEA and EURATOM aim to implement at the international level, regulatory safety instruments (standards and recommendations) in order to prevent nuclear incidents and accidents.¹⁵⁵ As chapter 3 made clear, the Nuclear Safety Directive imposes duties to ensure the nuclear safety of the installation and (voluntary) stress tests were carried out post-Fukushima in order to verify the nuclear safety within the Member States. In France for instance, the national safety authorities are numerous and organized around the ASN (Autorité de Sûreté Nucléaire) and the Ministries of Industry and Ecology. All of these organisations contribute to improve the application of safety rules on the nuclear installations, and, thus, work to avoid nuclear accidents. As a

¹⁵⁰ Faure and Vanden Borre 2013, para. 216.

¹⁵¹ Faure and Liu 2013, p. 23.

¹⁵² Faure and VandenBorre 2013, para. 116.

¹⁵³ *Id.*, para. 216.

¹⁵⁴ Faure and Liu 2013, p. 18.

¹⁵⁵ The headlines of the nuclear safety regime have been reviewed in more detail *supra* in chapter 3.

result Member State law imposes safety regulations upon the nuclear power plants aiming at the prevention of accidents. To an important extent, nuclear safety should hence primarily be promoted through this safety regulation. However, as was equally indicated in chapter 3, even though directives oblige Member States to have an adequate nuclear safety framework in place, implementation is still to a large extent dependent upon the Member States. There are, as we indicated at the end of chapter 3, therefore critical voices that also doubt the inclusiveness of the current regulatory safety regime. That implies that liability rules still can play an important role, also to provide incentives for prevention.¹⁵⁶ Exposure to liability of the operator remains important precisely to complement weaknesses in the nuclear safety regime. But that complementary function can obviously only be fulfilled if operators are fully exposed to the damage caused by the activity.

Finally, a limit on the liability of the nuclear operator can of course have as an effect that victims would remain largely uncompensated. The current nuclear liability regime offers strikingly low amounts to cover the nuclear risk.¹⁵⁷ In the international regime, the 2004 Protocol to the Paris Convention increased the total available amount to EUR 1200 million at a national level, and at EUR 1500 million at a supranational level. However, in spite of the increase of the caps, the operator's subsidy remains high and a large part of the nuclear risk costs are still neither covered nor internalized. As a consequence, the new amounts of coverage might still be too small to cover many nuclear accidents, particularly major accidents.¹⁵⁸

5.5.2.2 Practice

The table provided in section 5.3 indicated the total available amounts under the international nuclear liability conventions. Assessing the full consequences of the financial caps on liability necessitates a comparison of the expected damage caused by a nuclear accident with the financial limits imposed on the operator.

The main issues with regard to the liability limits result from the fact that the real costs of a nuclear accident are substantially higher, not only than the liability limits of the operator, but also than the additional layers of liability, provided by the states.

For example, a report by the French Institut de Radioprotection et de Sureté Nucléaire (IRSN) has indicated that a serious nuclear accident in France would cost about EUR 120 billion.¹⁵⁹ A small part of this damage relates to damage to the site. The other heads of the damages relate to: radiological costs off-site, costs of radioactive contamination, costs related to the production of electricity, and reputation damage. According to the study, the last two types of damages account for about seventy-five percent of the total damage. This scenario assumes that about 3,500 people will have to be evacuated. The other scenario in the study presupposes the evacuation of 100,000 persons and assumes severe radioactive fall-out in neighbouring countries. According to this scenario, the total cost of the accident would amount EUR 400 billion. The damage caused to third parties would be as high as EUR 300 billion. Also the information available to date with the estimates of the costs of the Fukushima incident are insightful in that respect. Of course one has to be careful as the total damage is not known yet. However, the estimates indicate spectacular amounts. For example an estimate of December 9, 2016 in the Asian Review mentioned that the Japanese government's estimate of the total costs of compensating victims

¹⁵⁶ Faure and Liu 2013, p. 18.

¹⁵⁷ See some examples of figures on available compensation amounts chapter 6.

¹⁵⁸ Faure and Liu 2013, p. 18.

¹⁵⁹ Pascucci-Cahen and Momal (2012), available at: www.irsn.fr/FR/Actualites_presse/Actualites/Documents/FR_Eurosafe-2012_Rejets-radioactifs-massifs-vs-rejets-controles_Cout_IRSN-Momal.pdf.

of the Fukushima nuclear disaster will amount to 21.5 trillion yen (approximately 188 billion USD).¹⁶⁰ The World Nuclear Industry Status Report of 2017 even mentioned an estimate of the total official costs of the Fukushima disaster of 200 billion USD. The Report even refers to an independent assessment which has put the total costs at 444-630 billion USD, depending on the level of water decontamination.¹⁶¹

These estimates provided by the IRSN as well as the currently available estimates of the total costs of the Fukushima disaster show that both the financial caps on the liability of the operator and the additional layers lead to substantial under compensation. Even if the additional protocols and the Brussels Supplementary Convention had entered into force, they would only provide EUR 1.5 billion in compensation for damages now estimated at EUR 300 billion. This result effectively means that the international regime would only compensate for less than one percent of the damage. This comparison between the amounts of the financial cap and the estimates of the damage caused by a nuclear accident therefore show that the financial caps do not only cause a theoretical problem, but indeed lead to serious under deterrence and under compensation.

5.5.3 Distortive effect of legal channelling

5.5.3.1 Theory

The other aspect which is highly problematic in the nuclear liability conventions is the exclusive channelling of the liability to the operator. The channelling of liability has been criticized as it excludes liability suits against third party contributors,¹⁶² even though they could have contributed to the accident risk as well. A suit based on tort law against the licensee for the amount not covered by the financial cap is usually excluded in domestic law and the law suit against a third party is excluded due to the channelling.¹⁶³ In the international conventions the licensee or operator who is held liable still has the possibility of a right of recourse against a third party who may be liable and there is a possibility to pass on liability, e.g. on the basis of contract. However, this private reallocation of liability may not always be possible and the scope for recourse according to the conventions is also quite limited. In fact, this channelling of liability completely corresponds to the intentions of the drafters of the Harvard Report, being to protect US suppliers of nuclear material from an exposure to liability.¹⁶⁴

5.5.3.2 Practice

Channelling of liability is not only theoretically a problem. It can in practice also lead to under deterrence of those parties whose liability is excluded as a result of legal channelling of liability. This can be illustrated by the accident which occurred at the Fukushima nuclear power plant in Japan.¹⁶⁵ In a provocative article titled "Why power companies build nuclear reactors on fault lines: the case of Japan",¹⁶⁶ Ramseyer showed that the decision to locate the power plant in an earthquake prone area was the result of both the channelling of liability as well as the limitation on liability.

¹⁶⁰ Nikkei Asian Review, 9 Dec 2016, Fukushima cost estimate set to swell to \$188bn, <https://asia.nikkei.com/Politics-Economy/Policy-Politics/Fukushima-cost-estimate-set-to-swell-to-188bn>.

¹⁶¹ December 9, 2016 (Mainichi Japan) Fukushima clean-up to cost Z1.5 trillion yen, double original estimate, <https://mainichi.jp/en-lish/articles/20161209/p2a/OOm/Ona/009000c>.

¹⁶² See Vanden Borre 1999.

¹⁶³ Liu 2013, p. 212.

¹⁶⁴ See in this respect, the analysis of the origins of the international nuclear liability framework in section 5.4.

¹⁶⁵ For more details see Nakamura 2012, and Faure and Liu 2012.

¹⁶⁶ Ramseyer 2011.

Related to the latter point, Ramseyer indicates that the nuclear operator (TEPCO) was able to externalise harm to the Japanese society since the damage resulting from a nuclear disaster will be substantially larger than its own wealth. Although in Japan unlimited liability applies to the nuclear operator Ramseyer shows that the liability was de facto limited, as a result of the limited liability of the corporate entity. The second problematic aspect was indeed the channelling of liability: the company that designed the power plant and decided on the location of the reserve diesel generators was an American company (General Electric). The reserve diesel generators were de facto installed at the location where they were prone to be subject to flooding. As a result the cooling system was ineffective in case of a tsunami or flooding. However, the potentially liable entity (General Electric) could not be held liable since in Japan (like in the international conventions) liability is exclusively channelled to the licensee of the nuclear power plant (TEPCO). Channelling of liability therefore excludes liability of third parties like General Electric. In this particular case liability rules could not provide incentives to General Electric for a better design of the power plant for the simple reason that liability was exclusively channelled to the operator, thus shielding third parties (like General Electric) from liability.¹⁶⁷ The conclusion is therefore straightforward: the Fukushima case shows that a channelling of liability does not only theoretically, but also de facto increase the risk of nuclear accidents, precisely as predicted by the economic literature.¹⁶⁸

5.6 Concluding Remarks

This overview of the international nuclear liability conventions shows many principles which deviate from “ordinary” tort law. More particularly the financial limit on liability and the exclusive legal channelling to the operator are considered problematic. An analysis of the origins of nuclear liability law showed that these particular problematic features appeared in the international conventions to satisfy the interests on the one hand of the American providers of nuclear material and on the other hand the European power plant owners.

The international liability conventions have to some extent been adapted after the Chernobyl accident, but even 30 years after Chernobyl not all changes have been implemented and even after implementation most of the highly problematic aspects (such as the low limit on compensation) have remained unchanged. Vanden Borre has analysed the relatively slow pace of changes in the international system and points at three particular aspects:

First, it does not seem to be easy to reach an international agreement on nuclear liability issues. The Chernobyl accident happened in 1986 and only a moderate step forward was relatively quickly taken, being the 1988 Joint Protocol. It took 11 years to reach an agreement on the first wave of nuclear liability conventions: on 12 September 1997 the Protocol to the Vienna Convention and the Convention on Supplementary Compensation were opened for signature. Afterwards, another 7 years elapsed before the second wave of second generation nuclear liability conventions. 18 years after the Chernobyl accident, the Protocols to the Paris and to the Brussels Supplementary Convention were opened on 12 February 2004.¹⁶⁹

Second, the international compensation system is regrettably becoming more of a jungle rather than a coherent set of legal rules, since the conventions of the second generation. The complexity arising from

¹⁶⁷ For details see Faure and Liu 2012, p. 202-203.

¹⁶⁸ Incidentally law suits have apparently been filed against the designers of the power plant, General Electric, before American courts.

¹⁶⁹ VandenBorre 2007, p. 302.

the difference between the NEA and IAEA regime in terms of public funding¹⁷⁰ is further worsened by the creation of two entirely new conventions of which one deals exclusively with the private funding (Joint Protocol) and the other with the public funding (Convention on Supplementary Compensation).¹⁷¹

Third, 20 years after the Chernobyl accident¹⁷² the major shift in the international nuclear compensation system remains virtual because most of the "new" conventions have not entered into force. Unlike the improvement in the American compensation system, the shift in the international system is far less positive. "Even if the nuclear liability conventions of the second generation enter into force, a victim of a nuclear accident in the US will by far be better off than the victim of a nuclear accident in Europe. The Vienna Convention offers a total compensation amount of € 356 million (470 million USD); that is about 22 times lower than that available in the US (even after being amended by the Protocol to the Vienna Convention). The entry into force of the NEA-conventions will increase the total compensation amount for victims to € 1.5 billion (1.8 billion USD).¹⁷³

This problematic nature of the international nuclear liability convention hence justifies the question whether it is possible to change the convention and shape them in a different manner; it equally justifies the question whether there should be a separate and specific task of Europe with respect to nuclear liability. Those questions will be the central focus of the next chapter.

¹⁷⁰ VandenBorre underlined that "whereas the NEA regime provided for the availability of both private and public funds (Paris Convention and Brussels Supplementary Convention respectively), the IAEA regime only provided for a private funding mechanism."

¹⁷¹ VandenBorre further pointed out that "Given the sovereignty of every State to decide for itself whether to sign and ratify an international convention, the determination of the rights and obligations of every State and of every individual victim has become very complicated in the international compensation scheme. As the public funds of the international system only have to be made available after an accident has occurred, this might be detrimental to victims, certainly as soon as one has to call upon the collective public tiers of the Brussels Supplementary Convention and of the Convention on Supplementary Compensation. On top of that, we can question whether the Parties to the Brussels Supplementary Convention are keen on signing the Convention on Supplementary Compensation given the fact that both Conventions have different allocation rules, different beneficiaries" (See VandenBorre 2007, p. 303.)

¹⁷² When VandenBorre wrote his piece (in 2007!).

¹⁷³ VandenBorre 2007, p. 306.

6. A EUROPEAN APPROACH TO LIABILITY AND COMPENSATION

KEY FINDINGS

- There are substantial differences between the liability and compensation regimes in the different Member States.
- The US Price-Anderson Act awards higher total amounts of compensation than the international regime, has reduced public funding and has economic rather than legal channelling.
- Japanese law has unlimited liability and additional government compensation is provided against the payment of an indemnity fee.
- In other catastrophic risks (natural catastrophes and terrorism) the government intervenes as reinsurer of last resort.
- In the case of marine oil pollution, high amounts of compensation are provided (without public subsidy) that are able to cover most cases of also catastrophic risks; an EU initiative to create a European Fund has triggered changes at the international level.
- A basis for the EU to legislate in the domain of nuclear liability can be found in Article 98 or Article 203 of the Euratom Treaty.

6.1 Introduction

From the analysis of the international liability framework in the previous chapter, it appeared that it shows many unsatisfactory aspects. The question of course arises what that means for the EU Member States and for a possible task of the EU itself. To some extent logically the EU has so far been very active (as shown in chapter 3) concerning nuclear safety, even though (as we showed) also in that domain national sovereignty of the Member States still seems to be important. However, even though the EU has been legislating in many other domains of liability law¹⁷⁴ so far the EU has not taken any action with respect to nuclear liability. The reason was of course that most of the Member States were member of one of the international legal frameworks. The EU could therefore consider that implementation of the international legal framework concerning nuclear liability would provide a satisfactory answer as far as compensating the victims of a nuclear accident is concerned. There was no specific reason for EU action in this domain.

However, things changed after the Chernobyl accident (1986) and especially after Fukushima. Both at a political level and in scholarship it was increasingly realised that (as was shown in the previous chapter) this international nuclear liability regime shows important limitations. That therefore also led to questions at the EU level whether there should not be any separate action by the EU with respect to nuclear liability. Within the European Commission an expert group has been working on the question

¹⁷⁴ The most prominent is undoubtedly the Environmental Liability Directive of 21 April 2004, Directive 2004/35/EC OJ L143 of 30 April 2004. For a commentary see, inter alia, the contributions in Bergkamp and Goldsmith 2013.

whether it would be possible to generate substantially higher amounts than are currently available in the international nuclear liability conventions.

The critical analysis provided in the previous chapter therefore basically leads to two questions that will be explored within this chapter: the first question is whether there are possibilities, for example based on a comparison with regimes in other countries (the US or Japan) or with other compensation regimes for catastrophic incidents (natural catastrophes, terrorism or oil pollution) to generate higher amounts of compensation than currently available under the international conventions. The second related question is whether, if an improvement were possible, this should be done within the current framework of the conventions or whether there may be reasons for a separate action at the EU level.

We first start this chapter by sketching that the current compensation for nuclear accidents provided in the Member States represent some kind of a patchwork and that there are substantial differences (6.2). We then sketch the compensation regime in two domestic regimes that are not part of the international conventions, more particularly the US (6.3) and Japan (6.4). We then explain that within the domain of terrorism and natural catastrophes a compensation regime has emerged where the government compensation is shaped in a different manner without necessarily providing a subsidy to the industry as is the case in the nuclear (6.5). Also the international regime for oil pollution damage is discussed as that regime has been able to generate relatively large amounts and, moreover, an interesting role has been played by the EU in improving the international regime (6.6). The next section (6.7) focuses on a potential role of the EU and section 6.8 concludes.

6.2 Liability and compensation for nuclear accidents in EU Member States¹⁷⁵

The EU states have a so-called patchwork nuclear liability regime.¹⁷⁶ They are subject to different nuclear liability conventions or are not member of any convention at all.¹⁷⁷

The following table gives an overview of the different regimes in the European Union.

International Regime	Member States				
Paris Regime (NEA) <i>Paris (1960)</i> <i>and Brussels SC (1963)</i>	Belgium, Denmark, Finland, France, Germany, Greece, Italy, The Netherlands, Portugal, Slovenia, Spain, Sweden, The UK				
	<table border="1"> <thead> <tr> <th>Ratified <i>Joint Protocol (1988)</i></th> <th>Signed <i>Joint Protocol (1988)</i></th> </tr> </thead> <tbody> <tr> <td>Denmark, Finland, Germany, Greece, Italy, The Netherlands, Sweden, Slovenia</td> <td>Belgium, France, Spain, the UK</td> </tr> </tbody> </table>	Ratified <i>Joint Protocol (1988)</i>	Signed <i>Joint Protocol (1988)</i>	Denmark, Finland, Germany, Greece, Italy, The Netherlands, Sweden, Slovenia	Belgium, France, Spain, the UK
	Ratified <i>Joint Protocol (1988)</i>	Signed <i>Joint Protocol (1988)</i>			
Denmark, Finland, Germany, Greece, Italy, The Netherlands, Sweden, Slovenia	Belgium, France, Spain, the UK				
<i>Paris (1960) only</i>	Portugal				
<i>Paris 2004</i>	None				

¹⁷⁵ This discussion of nuclear liability in those four Member States is largely based on Bruggeman and Faure 2018.

¹⁷⁶ See Reymers 2009, p. 93-104.

¹⁷⁷ Faure and Liu 2017, p. 228.

Vienna Regime (IAEA)	<i>Vienna (1963)</i>	Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia	
	<i>Joint Protocol (1988)</i>	All	
	<i>Ratified Vienna (1997)</i>	<i>Signed Vienna (1997)</i>	
	<i>Vienna (1997)</i>	Latvia, Poland, Romania	The Czech Republic, Hungary, Italy, Lithuania,
Convention on Supplementary Compensation for Nuclear Damage (1997)	Ratified	Signed	
	Romania	The Czech Republic, Italy, Lithuania	
Nothing	Cyprus, Ireland, Malta, Austria, Luxemburg ¹⁷⁸		

Table 4: Overview of the different regimes in the European Union¹⁷⁹

Member States domestic legislation has different attitudes towards many important issues such as limited/unlimited liability, amounts required for financial security and so on.¹⁸⁰ Despite these current divergences it is worth noting that the European Union is now making efforts towards a more harmonised system of nuclear liability, and many scholars are supporting this idea.¹⁸¹

In this section we will provide four examples from nuclear liability in specific Member States. Since to an important extent the nuclear power plant at Tihange constituted one of the starting points of this study¹⁸² we look at the nuclear liability legislation in Belgium, France, Germany and the Netherlands and subsequently provide a brief comparison to show that there are considerable differences between the ways in which liability has been organised even between these four Member States. That may obviously constitute one reason to think about an EU role in that respect with a view on harmonisation.

6.2.1 Belgium

Rules on nuclear third party liability are contained in the Act of 22 July 1985 on Third Party Liability in the Field of Nuclear Energy,¹⁸³ as modified.¹⁸⁴ This law implements the 1960 Paris Convention and the

¹⁷⁸ Austria and Luxembourg both signed the 1960 Paris Convention, the 1964 Additional Protocol to amend the Paris Convention and the 1982 Protocol to amend the Paris Convention. Neither country has ratified any of these instruments.

¹⁷⁹ Adapted from Handrlica 2010.

¹⁸⁰ For example, in Austria and Germany, unlimited liability was adopted. But in most Member States, the liability is capped. Within those countries with limited liability, the required limitations also vary. For an overview of the liability limit in EU Member States, see Gomez Acebo and Pombo 2005, 22-23.

¹⁸¹ For example, Ameye 2010.

¹⁸² See for a discussion of the specific problems, *supra* 2.2.

¹⁸³ Wet van 22 juli 1985 betreffende de wettelijke aansprakelijkheid op het gebied van de kernenergie [Act of 22 July 1985 on Third Party Liability in the Field of Nuclear Energy], Jul. 22, 1985, B.S., Aug. 31, 1985, 48087 (Belg.). See annex 1.

¹⁸⁴ Several decrees have been adopted to implement the 1985 Law, in particular:

- Royal Decree of 28 April 1986, determining the financial security certificate for transport of nuclear substances, whose purpose is to ensure that financial security certificates (given to all carriers of nuclear substances by the operator liable) comply with the Paris Convention requirements in this respect, as prescribed by the 1985 Law. Available at: <http://www.ejustice.just.fgov.be/eli/bsluit/1986/04/28/1986011107/justel>;
- Ministerial Decision of 9 March 1987 on the register concerning nuclear installations, which aims to implement Section 13 of the 1985 Law regarding the obligation to make available to the public the register containing the texts granting recognition to the operators of nuclear installations. This register contains a certified copy of the royal

1963 Brussels Supplementary Convention as well as its protocols. The 1985 Act, as modified, lays down the principle of strict liability, limited liability in amount and time, channelled to the operator of a nuclear installation.¹⁸⁵ In this respect, Article 7 of the law establishes the maximum amount of the operator's liability for nuclear damage at EUR 1.2 billion. A royal decree can increase or reduce this amount in order to fulfil Belgium's international obligations as well as to take into account low risk installations or transport; however, it may not set a level lower than EUR 80 million for transportation and EUR 70 million for the nuclear installations. Pursuant to the terms of the law, the operator is obliged (in conformity with Art.10 a) and d) of the Paris Convention) to take out insurance or another form of financial security to cover his liability up to the amount set in the law (Article 8). The private insurance market, however, does not have sufficient capacity to complete the totality of such a high liability risk, which the operators nevertheless need to have insured. The problems arise in particular for the coverage of liability claims that might arise more than ten years after the accident, and to a lesser extent, the coverage of damage to the environment. There are insurance policies available for this type of risk, but the coverage amounts offered in the market do not reach the requirement amount of EUR 1.2 billion or – for low risk installations or transport – EUR 297 million. That is why the Act of 29 June 2014 (modifying the Act of 22 July 1985) has introduced a state guarantee, to be enjoyed by the operators of nuclear installations against a fee and insofar the private insurance market does not offer the coverage (Article 10/1).

Consequently, the Royal Decree of 10 December 2017 establishes a guarantee program for legal liability in the area of nuclear energy.¹⁸⁶ This Royal Decree was promulgated after the European Commission allowed the program in the framework of Articles 107 and 108 on state support. Since state intervention must be subsidiary to the private market, the premium from the operator to the State has been established at an amount that is higher than the market price (the supplement is situated around 15%). This should encourage operators and insurers to develop insurance solutions instead of appealing on the state. The operators are free to choose their affiliation to the guarantee program and the amount compensated by the state will have to be repaid by the liable operator, as long as this amount does not exceed the liability ceiling laid down in the Act of 22 July 1985. Finally, the damage caused by a nuclear accident should be covered in the first place by the insurance policies of the operator. Only when the amount of the damage exceeds the insured amount, the State should intervene, to the extent of the surplus, to warrant the liable operator in case he fails to compensate.

Article 23 of the law establishes a prescription period of thirty years for nuclear physical injuries and of ten years for other nuclear damage from the date of the nuclear incident in respect of the right to claim financial compensation from the operator. The state is responsible for the payment of compensation in respect of claims for nuclear physical damage which are time barred, within a period between 10 and years from the date of the incident. From 1 January 2019 onwards, the state's obligation to compensate will be transferred to the operator.¹⁸⁷

decrees of recognition and a card of the installations indicating the limits of each site. It may be consulted at the Federal Public Service for Economy, SME's, Self-Employed and Energy. The local authority for the territory where the installation is located must comply with a similar obligation. Available at:

- <http://www.ejustice.just.fgov.be/eli/bsluit/1987/03/09/1987011069/justel>

¹⁸⁵ See on those principles the discussion in the general framework, *supra* 5.3.

¹⁸⁶ Koninklijk besluit van 10 December 2017 tot opstelling van een waarborgprogramma voor de wettelijke aansprakelijkheid op het gebied van de kernenergie [Royal Decree of 10 December 2017 establishing a guarantee program for civil liability in the field of nuclear energy] of Dec. 10, 2017, B.S., Dec. 20, 2017, 113492 (Belg.).

¹⁸⁷ Koninklijk besluit van 7 december 2017 betreffende de inwerkingtreding van artikel 2, b), van de wet van 7 december 2016 tot wijziging van de wet van 22 juli 1985 betreffende de wettelijke aansprakelijkheid op het gebied van de kernenergie en tot bepaling van de datum bedoeld in artikel 23, vierde lid, van de wet van 22 juli 1985 betreffende de wettelijke aansprakelijkheid

6.2.2 France

French law on third party liability in the field of nuclear energy is derived from a combination of, on the one hand, the Paris Convention and the Brussels Supplementary Convention which under the Constitution are directly integrated into the domestic legal system on ratification and, on the other hand, Act No. 68-943 of 30 October 1968,¹⁸⁸ as amended, on third party liability in the field of nuclear energy.

The legal regime introduced by the Paris Convention and adopted in the Act of 30 October 1968 introduced into French law the principle of strict liability on the nuclear operator regardless of fault, relieving the victim of the burden of proving the liability of the operator and making the operator strictly liable for damage to or loss of life of any person and damage to or loss of any property caused by any nuclear accident occurring in his installation or during transport on his behalf. It is relevant to state, however, that the Paris Convention does allow the operator to have a conventional right of recourse against another party to a contract if the accident was caused by an intentional act or omission, but this may not operate against the victim.

The liability of the operator is limited to:

- EUR 91 469 410 for an accident occurring in an installation (Art.4 Act No. 68-943);
- EUR 22 867 353 for transport or a low-risk installation (Art.4 Act No. 68-943).

Over and above the amount of the operator's liability, victims are compensated under the conditions and within the limits laid down by the Brussels Supplementary Convention:

- up to 175 million SDR by the State in whose territory the installation is located;
- up to 300 million SDR by the contracting parties to this Convention, including France, whose own financial contribution under the method of calculation used currently stands at approximately 34 %.

Article 7 of the Act of 30 October 1968 requires each operator to have and maintain insurance or other financial security for an amount corresponding to his liability for an accident. This financial security must be approved by the Minister of the Economy and Finance. Should the victims of a nuclear accident be unable to obtain financial compensation for their damage from the insurer, financial guarantor or operator, the compensation burden will shift to the State up to the amount of EUR 91 469 410 and without prejudice to any possible additional amounts.

Protocols amending the Paris and Brussels Conventions were signed in Paris on 12 February 2004. Although these protocols have yet to enter into force, their approval was authorised in France by Act No. 2006-786 of 5 July 2006.¹⁸⁹ They have already been transposed into national law (Article 55 of Act

op het gebied van de kernenergie [Royal Decree of 7 December 2017 on the entry into force of Article 2, b) of the Act of 7 December 2016 amending the Act of 22 July 1985 on civil liability in the field of nuclear energy and to determine the date referred to in Article 23, fourth paragraph, of the Act of 22 July 1985 on civil liability in the field of nuclear energy] of Dec. 7, 2017, B.S., Dec. 21, 2017, 114049, Art. 2 (Belg.).

¹⁸⁸ Loi 68-943 du 30 octobre 1968 relative à la responsabilité civile dans le domaine de l'énergie nucléaire [Law 68-943 of October 30, 1968 on third party liability in the field of nuclear energy], J.O., Oct. 31, 1968, p. 10195.

¹⁸⁹ Loi 2006-786 du 5 juillet 2006 autorisant l'approbation d'accords internationaux sur la responsabilité civile dans le domaine de l'énergie nucléaire [Law 2006-786 of July 5, 2006 authorising the approval of international agreements on third party liability in the field of nuclear energy], J.O., Jul. 6, 2006, p. 10115.

No. 2006-686 of 13 June 2006 on nuclear transparency and safety,¹⁹⁰ whose provisions will be applicable upon entry into force of the Protocol amending the Paris Convention) in order to bring French law into line with the new legal regime thus introduced. Once the Protocol amending the Paris Convention enters into force, the maximum liability of the operator is set at EUR 700 million for nuclear damage caused by each nuclear accident (see Art. L-597-4 Ordonnance no 2012-6 du 5 janvier 2012 modifiant les livres Ier et V du code de l'environnement).

6.2.3 Germany

Liability for nuclear installations is laid down in the Atomic Energy Act (*Atomgesetz*),¹⁹¹ which executes the international conventions mentioned above.¹⁹² The Atomic Energy Act, which aims both at promoting the use of nuclear energy and preventing damages, was passed in 1959, recast in 1985, and modified in 2002, 2011 and 2017. In addition to this act, Germany is also a party to the Paris Convention and to the Brussels Supplementary Convention, as well as to the Joint Protocol.¹⁹³ According to the Atomic Energy Act, "the Paris Convention shall apply as national law in the Federal Republic of Germany, unless its provisions depend on reciprocity as effected by the entry into force of the Convention" (§ 25 (1) AtG). The provisions of the Paris Convention provide the basis of nuclear liability in Germany. They are complemented by Sections 25 – 40 of the Atomic Energy Act.

According to the Atomic Energy Act, nuclear liability in Germany has the following characteristics.¹⁹⁴ As in the international regime, liability is channelled to the operators of a nuclear power plant and the operators are strictly liable for the damage caused by a nuclear incident (§ 25 (1) AtG). The liability is even stricter in Germany, since the defences under the international regimes are no longer available, such as an armed conflict, hostilities, civil war, insurrection or a grave natural disaster of an exceptional character (§ 25 (3) AtG). However, if the damage occurs abroad, financial compensation is only due if that country provides reciprocal benefits (§ 25 (3) AtG). The territorial restrictions under Article 2 of the Paris Convention do not apply; the operator is liable irrespective of the place of the damage (§ 25 (4) AtG). One significant difference between the German and the international system is that an unlimited liability system is established in Germany. Only if the damage is caused by an armed conflict, hostilities, civil war, insurrection or a grave natural disaster of an exceptional character, the liability is limited to the maximum amount of the government indemnification (§ 31 (1) AtG).

To provide coverage for the potential liability, the operators are required to seek financial security (§ 13 (1) AtG). The administrative authority shall determine the type, terms and amount of the financial security, but within the limit of EUR 2.5 billion (§ 13 (2) AtG) – a limit which was established in

¹⁹⁰ Loi 2006-686 du 13 juin 2006 relative à la transparence et à la sécurité en matière nucléaire [Law 2006-686 of June 13, 2006 on transparency and nuclear safety], J.O., Jun. 14, 2006, p. 8946.

¹⁹¹ Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren [AtG] [Atomic Energy Act], July 15, 1985, BGBl. I at 1565, as amended by Gesetz zur Modernisierung der Rechts der Umweltverträglichkeit [Act on the modernisation of the law of environmental compatibility], July 20, 2017, BGBl. I at 2808, § 2 section 2 (Ger.).

¹⁹² See *supra* Section 3.2.

¹⁹³ OECD-NEA, Nuclear Legislation in OECD and NEA Countries. Regulatory and Institutional Framework for Nuclear Activities. Germany, 2011, available at: <https://www.oecd-nea.org/law/legislation/germany.pdf>. Germany signed the 2004 Protocols to Amend the Paris Convention and the Brussels Supplementary Convention and enacted relevant legislation jointly with other EU states to deposit its instruments of ratification of the Protocols. Gesetz zu den Pariser Atomhaftungs-Protokollen 2004 [Act on the 2004 Paris Nuclear Liability Protocols], August 29, 2008, BGBl. II at 902; Gesetz zur Änderung haftungsrechtlicher Vorschriften des Atomgesetzes und zur Änderung sonstiger Rechtsvorschriften [Act to amend the liability provisions of the Atomic Energy Act and other legal provisions], August 29, 2008, BGBl. I at 1793 (Ger.)

¹⁹⁴ See Liu 2013, p. 226-227, for further details.

2002.¹⁹⁵ Since the maximum coverage amount of EUR 2.5 billion is not available at the insurance market, the operators of nuclear power plants started to find alternatives: in 2001, the four parent companies of the 19 nuclear power plants negotiated and concluded a “Solidarity Agreement” (*Solidarvereinbarung*).¹⁹⁶ The Agreement consists of six sections and four annexes. Under this agreement, up to EUR 255.6 million nuclear liability is covered by third party liability insurance taken out by each operator.¹⁹⁷ Between this amount and EUR 2.5 billion, cover is provided under the framework of a contract jointly subscribed to by all nuclear power plant operators and their parent companies respectively. Each party has an obligation to contribute a percentage of the total amount in case a damage is attributed to one of the parties. The percentage for each nuclear power station is calculated according to the square root of the thermal reactor output. The percentage of power plants is then attributed to the parent companies on the basis of their participation (Clause 1 (3) Solidarity Agreement). This allocation of liability is different from that in the US, where each operator bears the same quota. In Germany, the allocation of contribution is based on the generating capacity. As in the US, the obligation to make the contribution only comes due after a damage in excess of the insurance capacity happens. However, the risk that the operators have to contribute is even smaller in Germany: the partners only have to pay if neither the operator nor the parent company are in a position to pay up to EUR 2.5 billion (Clause 1 (5) Solidarity Agreement). The solidarity agreement is hence only a guarantee for the payment by the liable parties.

If the liability is not covered by or cannot be satisfied by financial security, the Confederation shall indemnify the operator (§ 34 (1) AtG). The maximum amount of indemnification – to the extent that the damages are not covered by private financial security or that claims cannot be paid out of such security – is set at EUR 2.5 billion, and the obligation of payment is the maximum amount minus the amount that is covered by financial security. Such indemnification is borne for up to the amount of EUR 500 million, 75% by the federal authorities and 25% by the Land within which the installation is situated. The federal state covers the amount between EUR 500 million and 2.5 billion alone. After the payment of the indemnification, recourse is possible if the operator disobeys specific obligations, or the operator caused the damage wilfully or by gross negligence, or if the operator did not seek financial security to the required extent (§ 37 AtG). But the liability for third parties prevails over the claims for recourse (Clause 1(8) Solidarity Agreement). In addition to mutually guaranteeing the coverage of liability, the partners also need to provide help in handling the claims such as to make available legal and commercial staff capacity and infrastructure. For this kind of support, the partners cannot ask for repayment. The partners also provide help for the use of independent contractors, up to the amount of EUR 122.218 million (Clause 2 Solidarity Agreement). To ensure the availability of assets in case of damage, the partners need to submit an auditor’s certification each year (Clause 3 Solidarity Agreement).

German law therefore differs importantly from the international conventions by providing a much higher amount of compensation via a retrospective pooling scheme. The amount of financial security

¹⁹⁵ In the beginning of the 1970s, a pooling system in Germany emerged. At that time, an increase of the financial security up to 1 billion DEM (\approx EUR 500 million) was on the legislative agenda. The first DEM 500 million should be covered by private means while the government should indemnify the remaining half. The insurers and nuclear operators negotiated to cover liability up to DEM 500 million fully by insurance. The first DEM 200 million was covered by insurers while for the remaining DEM 300 million, the insurer only fronted contract. The remaining DEM 300 million was reinsured by the operators of nuclear power plants as a whole. This arrangement remained valid until 2002. In 2002, the amendment to the Atomic Energy Act increased the amount of financial security up to EUR 2.5 billion and allowed financial security in other forms rather than through liability insurance. See Pelzer 2007, p. 43; Carrol 2008, p. 91.

¹⁹⁶ Pelzer 2007, p. 44, n. 24.

¹⁹⁷ Insurers argued they could only provide full coverage up to EUR 256 million. See Carrol 2008, p. 91.

to be provided through the pool moreover does not eliminate the principal liability of the operator. In other words, in Germany the nuclear operators are still liable if the capacity of the pool is depleted.

6.2.4 The Netherlands

The Netherlands ratified the 1960 Paris Convention and the 1963 Brussels Convention on 28 September 1979 by the Act of 17 March 1979.¹⁹⁸ The 1979 Act came into effect on 28 December 1979, bringing both conventions into force on that date in the Netherlands. On that same date, the Nuclear Incidents (Third Party Liability) Act of 1979 laying down the regulations governing nuclear third party liability in the Netherlands also came into force.¹⁹⁹ On 1 August 1991, an Act amending the 1979 Nuclear Incidents (Third Party Liability) Act came into effect, implementing the Paris and Brussels Protocols.²⁰⁰ Simultaneously, another Act amending the 1979 Act on Third Party Liability in implementation of the Joint Protocol was passed by Parliament.²⁰¹ This act came into effect on 27 April 1992. Further, Parliament approved on 30 October 2008 a bill to ratify the 2004 Protocols to the Paris Convention and to the Brussels Supplementary Convention and a bill to amend the Nuclear Incidents (Third Party Liability) Act.

The limitations on the scope of the Paris Convention do not apply to the liability of an operator of a nuclear installation on Netherlands territory, for damage: (a) suffered on the territory of a state party to the Convention wherever the incident occurred; (b) suffered on the territory of a state not party to the Paris Convention, but party to the Joint Protocol, as a result of an incident in the territory of a state party to the Joint Protocol; or (c) wherever suffered, as a result of an accident on Netherlands territory (Art. 15(1)). The operator is also not exonerated from paying financial compensation for damage caused by an incident due directly to a grave natural disaster (Art.3).

The maximum liability of the operator under the Paris Convention has been raised to EUR 1,2 billion (Art.5(1)). Under Article 5(3), a lower amount may be set by ministerial order for low-risk installations. If, in the opinion of the Minister for Finance, an operator of a nuclear installation cannot obtain the financial security required by the Paris Convention or if such financial security is only available at an unreasonable cost, the minister may enter into contracts on behalf of the state as insurer or provide other state guarantees up to the operator's liability limit. In so far as the funds available from the operator's financial security are insufficient to compensate for the damage, the state shall make available funds up to the operator's maximum liability. In such cases, the minister is entitled to exercise the operator's rights of recourse (Art. 10).

If the amount of damage caused by a nuclear incident on Netherlands territory exceeds the limit of the Brussels Convention, the government will make available supplementary funds up to a maximum total of EUR 2.27 billion (Art. 18(1)). Under Article 18(4), these public funds will also be made available for damage suffered in the territory of parties to the Brussels Convention on condition of reciprocity.

¹⁹⁸ Art. 3 Goedkeuringswet Verdrag inzake wettelijke aansprakelijkheid op het gebied van de kernenergie [Approval Act Convention on Third Party Liability in the Field of Nuclear Energy], Mar. 17, 1979, *Stb.* 1979, 160.

¹⁹⁹ Wet van 17 maart 1979, houdende regelen inzake aansprakelijkheid voor schade door kernongevallen [Wet aansprakelijkheid kernongevallen] [Act on liability or nuclear accidents], Mar. 17, 1979, *Stb.* 1979, 225.

²⁰⁰ Modification of the Act on liability for nuclear accidents [Act amending the Nuclear Incidents Act], Aug. 1, 1991, *Stb.* 1991, 369 (Neth.).

²⁰¹ Modification of the Act on liability for nuclear accidents [Act amending the Nuclear Incidents Act], Apr. 27, 1992, *Stb.* 1991, 373 (Neth.).

6.2.5 Comparison

Although all countries have based their system on the same international conventions there are important differences between the countries examined, as is also made clear in overviews provided by the Nuclear Energy Agency of the OECD.²⁰² These differences could relate to: 1) the total amount of financial compensation available to victims; 2) the question whether the operator is sufficiently exposed to liability and 3) whether it is the state rather than the operators who provide the compensation. The differences can be summarized in the following table:

Country	Operator's liability amount	Funds available		
		Financial security limit to cover operator's liability amount	Public funds	International funds (established under either the BSC or the CSC)
Belgium	EUR 1.2 billion	EUR 1.2 billion		SDR 125 million
France	EUR 700 million	EUR 700 million ²⁰³	After depletion of the operator's liability amount up to SDR 175 million	SDR 125 million
Germany	Unlimited	EUR 2.5 billion	EUR 2.5 billion ²⁰⁴	SDR 125 million
The Netherlands	EUR 1.2 billion	EUR 1.2 billion	After depletion of the operator's liability amount up to EUR 2.3 billion	SDR 125 million

Table 5: Nuclear operator's third party liability amounts and financial security limits

Looking at this table several of the questions mentioned above can be answered. First addressing the question of the total funds available there appear some similarities and some differences. German law is most generous as it has a financial security available up to EUR 2.5 billion. Belgium and the Netherlands are similar in that they have a financial security limit for the operator of EUR 1.2 billion and in addition international funds up to SDR 125 million. The Netherlands has, however, after the depletion of the operator's liability, also public funds available up to EUR 2.3 billion. The country which has most nuclear power plants in Europe, France, is strikingly the least generous by only having a limit for the operator of EUR 700 million, public funds for SDR 175 million and international funds of 125 million.

It is anyway clear that even the "best" country does not have sufficient funds available to cover the costs of an average nuclear accident. Looking not only at estimates of the costs of nuclear accidents, but also at the real costs, more particularly of the Fukushima incident, it is clear that they amount more in the direction of USD 80 billion and higher, clearly showing that there is serious undercompensation of victims.

Related is obviously whether the operator is fully exposed to liability. Again, the situation is probably worse in France where the operator, Electricité de France (EDF), is exposed to the lowest amount of EUR

²⁰² See OECD Nuclear Energy Agency, Nuclear Operators' Third Party Liability Amounts and Financial Security Limits (Apr. 2018), <http://www.oecd-nea.org/law/table-liability-coverage-limits.pdf>.

²⁰³ This amount will only be applicable when the Protocol to the Paris Convention will enter into force.

²⁰⁴ The public funds come into play when the damages are not covered by private financial security or when claims cannot be paid out of such security.

700 million. Belgium and the Netherlands already do a lot better with an operator liability of EUR 1.2 billion and a financial security to be provided for the same amount. But the “best” is undoubtedly Germany, which not only has the principal position of having unlimited operator liability, but also of financial security of up to EUR 2.5 billion.

The results are therefore the same when concerning the question whether it is the operator or rather the state who takes financial responsibility: Germany comes out best as at least EUR 2.5 billion is financed by operators; France comes out worst as only EUR 700 million is financed by the operator; Belgium and the Netherlands are in between since EUR 1.2 billion is financed by the operator. The Netherlands is, however, problematic as after the depletion of the operator's liability, public funds are made available up to EUR 2.3 billion. Note that in comparison, Germany makes an amount available of EUR 2.5 billion, but paid by the operators.

6.3 The US Price-Anderson Act

The US did not join the international conventions when they were created at the end of the 1950s. Instead the US created its own nuclear liability legislation which has a number of features that are remarkably different from the international regime.²⁰⁵ It is important to stress that there are a few important differences between the Price-Anderson Act and the international regime. The first difference with the international regime is the substantially higher liability of the power plant operator under the Act, which has been increased to USD 450 million.²⁰⁶

A second important difference is that whereas the international conventions rely on a second tier of compensation (beyond the liability limit of the operator) stemming largely from public funding (by the operator's state and by all contracting states), the US Price-Anderson Act relies on a system of private funding to provide an additional layer of compensation. Since 1975 it was decided that the regimes' public funds needed to gradually disappear. This system intends to shift the financial burden of the government arising from nuclear electricity production towards the industry so that the latter could bear the responsibilities.²⁰⁷ The shift was achieved by introducing a new tier in the compensation scheme, the so-called retrospective premium,²⁰⁸ which is financed by all American nuclear operators. This retrospective risk pooling enables to generate a high amount of compensation, currently more than USD 13.6 billion. Furthermore, the second layer of compensation does not consist of public funding and is paid by all operators. This avoids the negative effects of government subsidies, while still providing positive effects for risk reduction.

A third important difference is that the US Price-Anderson Act did not incorporate the highly criticized liability channelling system, whereby any stakeholders other than the operator are not subject to liability. This is related to the fact that nuclear liability insurance under the Price-Anderson Act provides a system of so-called “omnibus”- coverage. This means that, per the Act, liability insurance provides cover for “anyone who may be liable”²⁰⁹ for “public liability”. The Act defines “public liability” as “any legal liability arising out of or resulting from a nuclear incident or precautionary evacuation . . .”²¹⁰ As a result

²⁰⁵ The US regime will not be described in any amount of detail. For a further discussion of the Price-Anderson Act see, *inter alia*, Faure and VandenBorre 2008, p. 241; Liu 2013, p. 233-234.

²⁰⁶ On June 15, 2016, the Nuclear Regulatory Commission (NRC) adapted the liability amounts to inflation. As of January 1, 2017, a limit in the first tier (liability of the operator) of USD 450 million hence applies.

²⁰⁷ H.R. Rep. No. 94-648, at 9 (1975); S. Rep. No. 94-454, at 10 (1975).

²⁰⁸ See further on this retrospective premium scheme Liu 2013, p. 244-246.

²⁰⁹ 42 U.S.C. §2014(t) (2015) (defining “person indemnified”).

²¹⁰ *Id.* §2014(w).

of this provision, everyone who can be held liable for the damage from a nuclear accident (including the supplier) can benefit from the liability insurance coverage of the nuclear operator. The mechanics of this system were demonstrated following the Three Mile Island accident, where a single law firm represented all defendants (the nuclear operator as well as the designer and constructor of the nuclear power plant).²¹¹ Thus, unlike the international compensation regime, the Price-Anderson Act has a system of economic rather than legal channelling.²¹²

6.4 Japan

Japan's nuclear liability law has to some extent similar weaknesses as the international regime, but there are a few strengths as well.²¹³ Japan also has a channelling of liability to the operator. The channelling can only be set aside in case of a wilful act of third party against whom the operator then can have a right of recourse and if the nuclear operator could enter into a special agreement with any person regarding the right of recourse. However, liability of the operator in Japan is in principle unlimited and the amounts of operator liability are higher than in the international regime. But more importantly: in Japan additional compensation is provided on the basis of an indemnity agreement with the government for which the operator pays a fee to the state. Differently than in the international regime the additional compensation via the indemnity agreement is hence not a subsidy, but requires the payment of an indemnity fee. However, also in Japan, there still is a subsidy effect since, in addition to the indemnity agreement, the Japanese state will still intervene in case the available financial security is not sufficient to compensate the victims. Also in the Fukushima-case, some bailing out of the nuclear operator (and hence subsidisation) took place.²¹⁴ This shows that Japanese law may have the advantage of unlimited liability, but that it remains necessary to impose sufficiently high financial security obligations upon operators to cover the total accident costs.

6.5 Insights from other high risk sectors

It is interesting to mention that with respect to the compensation for other types of catastrophic risks, more particularly natural hazards and terrorism, the outright subsidy under the nuclear conventions has been replaced by a system within which the government acts as reinsurer of last resort, i.e the State assumes at least part of the risk for losses from catastrophes. While this government intervention is required since the private insurance market cannot provide adequate catastrophe insurance coverage, the underlying philosophy of this approach is that private insurance should keep on playing a significant role in allocating compensation for victims of catastrophes. These types of intervention by the government are now largely applauded since it allows a different type of government intervention whereby the government stimulates the functioning of the insurance market. In order to correspond

²¹¹ Brown 1999, p. 481.

²¹² Under a system of legal channelling of liability, a claim against other persons is legally impossible, precisely because of the fact that liability is exclusively concentrated on one person. Economic channelling means that the rules of ordinary tort law remain applicable, but that the economic burden of such liability lies with one person only. Other persons than those to which liability is economically channelled can therefore be held legally liable, in the sense that they can reclaim the amounts paid from the one who is economically liable. This is exactly the case under the Price-Anderson Act: also suppliers can be held liable, but their liability is covered by the omnibus coverage of the nuclear operator. For more details, see VandenBorre 1999, p. 13-39.

²¹³ For a more detailed analysis see Weitzdörfer 2011 and Faure and Liu 2012.

²¹⁴ Faure and Liu 2012, p. 198-201.

with market principles this government intervention should, however, correspond with several principles:²¹⁵

1. It has to be clear that reinsurance cannot be obtained on the regular market;
2. The government charges a competitive price for the reinsurance it provides;
3. The government intervention is temporary (with a so-called sunset clause); and
4. Structured in such a way that it provides incentives to market participants to develop market solutions.

It is also possible to look for guidance in other sectors where governments act as reinsurers of last resort. An interesting example is provided by France: the *Caisse Centrale de Réassurance* (CCR), which is completely owned by the state, offers reinsurance for natural disasters. In the United States there are also many instances of public-private partnerships wherein the government even acts as primary insurer. This is, for instance, the case with the California Earthquake Authority (CEA).²¹⁶ The model also proved successful for the insurance of terrorism-related risks after 9/11. In many countries so-called terrorism pools were created, such as for example GAREAT in France, EXTREMUS in Germany, POOL RE in the United Kingdom and the Dutch Terrorism Risk Reinsurance Company, NHT in the Netherlands.²¹⁷ While it is not the purpose of this document to provide extensive details of these examples, they serve to highlight that a smart design of government intervention as reinsurer of last resort can be non-distortive and can stimulate the creation of effective market solutions. This is a type of “smart” government intervention whereby all the currently existing distortive effects of the financial caps and government subsidies in the nuclear liability conventions can be avoided.

6.6 Marine oil pollution

Marine oil pollution is interesting as it shows to some extent similar features as the nuclear case in the sense of also being a low probability high-risk catastrophic incident. The starting point is equally a limited strict liability of the tanker owner, but differently than in the case of the nuclear conventions, the international legal framework for oil pollution has been adapted much more dynamically than in the nuclear case (6.5.1). Moreover, additional compensation is provided through a fund, but again differently than in the nuclear case, this is not financed by the government, but by oil receiving companies (6.5.2). It also leads to a total amount of compensation which is now able to pay for most of the also catastrophic marine oil pollution losses. An interesting role was also played by the European Union as in fact the threat of action at the regional (EU) level triggered an adaptation of the international legal framework (6.5.3) that obviously could constitute an interesting example for a possible task of the EU as far as the international legal framework is concerned.

6.6.1 Liability of the tanker owner

The international oil pollution compensation system consists of two important conventions that are interrelated. The first is the International Convention on Civil Liability for Oil Pollution Damage

²¹⁵ See Bruggeman, Faure and Fiore 2010, p. 376-379.

²¹⁶ The CEA is not completely state funded. Indeed, it is funded by participating insurers, along with bond sales, reinsurance, and the premiums charged for policies sold. Moreover, the initial operating capital was provided through mandatory contributions by the participating insurers. See in this regard Bruggeman, Faure and Heldt 2012, p. 224-225.

²¹⁷ On the role of the government as reinsurer of last resort in the case of terrorism for those four cases, see Bruggeman, Faure and Heldt 2012, p. 231-235.

(CLC),²¹⁸ and the second is the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund Convention).²¹⁹

The CLC adopts strict liability.²²⁰ Hot debates took place during the negotiation of the convention with regard to whom the liability should rest on. Under the influence of the international regimes for nuclear liability, no doubts have been expressed on the reasonability of the channeling of liability. The debates focused on whether the ship-owner or the oil industry that bears the liability. In the end, a compromise was made: Liability under the CLC fell on the shoulders of the ship-owner. In return, the oil industry also needed to contribute to the compensation through a compensation fund. At the conference on the passage of the 1969 CLC, parties agreed that an international compensation fund would be established in the near future.²²¹

From what was just mentioned as far as the creation of the 1969 CLC and the 1971 Fund Convention is concerned, it is clear that the 1969 CLC channelled liability to the tanker owner. The ship-owner is defined as “the person or persons registered as the owner of the ship or, in the absence of registration, the person or persons owning the ship.”²²² However, the 1969 CLC preempts other legislation: No other claims are eligible other than those under the convention. It shows explicitly that no claims are made against the servants or agents of the owner.²²³

The liability established under the 1969 CLC was capped at FF 210 million or FF 2,000 for each ton of the ship’s tonnage. Several serious oil spills that happened after the adoption of the 1969 CLC and the Fund Convention—for example, the *Amoco Cadiz* in 1978 and the *Tanio* in 1980—triggered the revisions to the original conventions. The first protocols to revise the conventions were drafted in 1984. Since the United States did not ratify the protocols, they could not come into force. Nevertheless, the changes in the 1984 protocols are largely incorporated in the 1992 protocols.²²⁴

In 1992, two protocols were adopted to revise the original conventions: the 1992 CLC and the 1992 Fund Convention. The 1992 CLC increased the limit of liability to 4.51 million SDRs or 89.77 million SDRs, depending on the size of the ships. As a compromise to the increase of the liability limit, the criteria when the ship-owners lose their right to limit liability are further constricted: Damage must result from their willful misconduct.²²⁵

The 1969 CLC requires the owner of a ship registered in a Contracting State and carrying more than 2,000 tons of oil in bulk as cargo to maintain insurance or other financial security up to his liability limits.

²¹⁸ The original CLC was adopted in 1969, and it was revised in 1992. International Convention on Civil Liability for Oil Pollution Damage, Nov. 29, 1969, 973 U.N.T.S. 3 [hereinafter 1969 CLC]; Protocol to Amend the International Convention on Civil Liability for Oil Pollution Damage, Nov. 27, 1992, 1956 U.N.T.S. 255 [hereinafter 1992 CLC].

²¹⁹ The original Fund Convention was adopted in 1971, and it was revised in 1992. Protocol of 1992 to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Nov. 27, 1992, 1953 U.N.T.S. 330 [hereinafter 1992 Fund Convention]; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Dec. 18, 1971, 1110 U.N.T.S. 5767 [hereinafter the 1971 Fund Convention]; see Wang 2007, 212; see also Wang 2011, p. 53–130.

²²⁰ 1969 CLC, *supra* note 212, Art. III; see also Sands and Peel 2012, p. 746–747.

²²¹ See Sands & Peel 2012, at p. 745–55.

²²² 1969 CLC, *supra* note 212, Art. I(3).

²²³ *Id.* Art. III.

²²⁴ For details of this evolution see Wang 2011, p. 131–188 (describing the evolution of the international regime, the failure of the 1984 Protocols and the adoption of the 1992 Conventions).

²²⁵ 1992 CLC, *supra* note 212, Art. V(1)–V(2).

In addition to insurance, financial security can also be in the form of a bank guarantee or certificate delivered by an international compensation fund.²²⁶ The 1992 CLC retained this requirement.²²⁷

6.6.2 The Fund Convention

The establishment of a compensation fund was decided upon at the 1969 conference leading to the conclusion of the CLC 1969. Thereafter, two years after the adoption of the 1969 CLC, the 1971 Fund Convention was enacted. The 1971 Fund Convention has two aims: to provide compensation when the protections provided under the 1969 CLC are inadequate; and to relieve ship owners from additional financial burdens.²²⁸

The 1971 Fund Convention plays two roles: compensating the victims, and indemnifying ship owners. First, it supplements the compensation provided by the 1969 CLC in the following situations: where no liability can be established under the 1969 CLC; and where an owner and his financial guarantors are financially incapable of compensation and the damage exceeds the owner's liability. To encourage preventive measures, the costs raised from the voluntary activities of the owners are also treated as pollution damage.²²⁹ The Fund has no obligation to pay if it can prove that the damage at issue resulted from an act of war, hostilities, civil war or insurrection; or the oil from a warship or a state owned or operated ship; or if the claimant is unable to prove that the damage resulted from a ship-related incident. The Fund may also raise the defence of contributory negligence.²³⁰ The compensation available from the 1971 Fund, however, is not unlimited: the total amount available from the 1969 CLC and the 1971 Fund Convention, together, is capped at 450 million francs. Similarly, the amount payable for the damage caused by a natural disaster of an exceptional, inevitable and irresistible character is capped at FF 450 million. However, the Assembly of the Fund has the right to increase the amount to 900 million francs. If claims exceed the amount payable from the fund, payment should be reduced proportionally for each claimant.²³¹

In addition to providing complementary compensation to victims, the 1971 Fund also indemnifies ship owners. Indemnification is available for quantities between (1) an amount in excess of FF 1500 for each ton of the ship's tonnage, or FF 125 million, whichever is less; and (2) an amount not in excess of FF 2000 per ton of said tonnage, or FF 210 million, whichever is less. However, indemnification is not available for damage caused by the willful misconduct of the ship owners.²³² Claims for compensation or indemnification should be made within three years of the occurrence of the damage and within six years of the occurrence of the incident.²³³

The Fund is financed by big oil importers in contracting states. The eligible importers need to make initial contributions as the working capital of the fund, as well as annual contributions to cover administrative expenses and claims.²³⁴ The calculation of contributions is based on a fixed sum for each ton of contributing oil received.²³⁵ Each Contracting State has the duty of ensuring that each eligible

²²⁶ 1969 CLC, *supra* note 217, Art. VII.

²²⁷ 1992 CLC, *supra* note 218, Art. VII.

²²⁸ See 1971 Fund Convention, *supra* note 219, Art. 2(1).

²²⁹ See *id.*, Art. 4(1).

²³⁰ See *id.*, Art. 4(2)-(3).

²³¹ See *id.*, Art. 4(4)-(6).

²³² See *id.*, Art. 5(1).

²³³ See *id.*, Art. 6(1).

²³⁴ Wu 1996, 98.

²³⁵ See 1971 Fund Convention, *supra* note 219, Arts. 11(1) & 12(2).

contributing importer appears on a list and to communicate this information to the Fund.²³⁶ Moreover, a Contracting State may, by means of a simple declaration, assume the burden of making contributions on behalf of importers within its territory.²³⁷

The original CLC and Fund Convention proved to be insufficient to cover the potentially catastrophic damage of oil pollution. In 1992, a new compensation fund was established. The 1992 Fund Convention removed the Fund's burden of alleviating the liability of ship owners. Therefore the only function of the 1992 Fund became that of providing additional protection to the victims of oil pollution. The conditions for the application of the 1992 Fund are the same as those of the 1971 Fund.²³⁸ Moreover, the available compensation increased to 203 million SDRs.²³⁹

The 1992 Fund is also financed by the oil industry through annual contributions. Furthermore, the calculation of the contributions is also based on the amount of oil received.

Though the compensation limits under the 1992 Fund Convention increased considerably, the amount was dwarfed shortly afterwards by various catastrophic oil pollution cases.²⁴⁰ Against this backdrop, a Supplementary Fund was established in the 2003 Protocol.²⁴¹ The Supplementary Fund provides an additional layer of compensation for oil pollution victims under the 1992 CLC and the 1992 Fund Convention. In other words, a condition to receive a payment from the Supplementary Fund is that the victim be entitled to compensation under the 1992 CLC and the 1992 Fund Convention, and unable to obtain full and adequate compensation from them.²⁴² The Supplementary Fund Convention increased the aggregate amount of compensation from the previous level of 203 million SDRs, to 750 million SDRs.²⁴³

²³⁶ See *id.*, Art. 15(1).

²³⁷ See *id.*, Art. 14(1).

²³⁸ See 1992 Fund Convention, *supra* note 212, Art. 4.

²³⁹ See *id.*

²⁴⁰ The Nakhodka accident near Japan in 1997 and the Erika disaster in France in 1999 are two examples.

²⁴¹ Protocol of 2003 to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1992, May 16, 2003, IMO Doc. LEG/CONF.14/20 [hereinafter Supplementary Fund Protocol].

²⁴² See *id.*, Art. 4.

²⁴³ See *id.*, Art. 4(2).

The amount of compensation available under the international marine pollution regime can be summarized as follows:

Tonnage of ship (GT)	CLC 1969 (Euro)	CLC 1992 (Euro)	2000 Protocol (Euro)	
Ships ≤ 5000	153 per ton	3.45 million	5.19million	
5,000<Ships<140,000	153 per ton	3.45 million + 483/additional ton	5.19million + 726/additional ton	
Ships ≥ 140,000	16.1 million	68.6 million	103.2million	
	1971 Fund (Euro)	1992 Fund (Euro)	2000 Protocol (Euro)	2003 Supplementary Fund (Euro)
Overall limit ²⁴⁴	69 million	155.2 million	233 million	862 million

Table 6: Compensation for pollution damage under the international regime²⁴⁵

One advantage of the International Oil Pollution Compensation Fund is that the fund is financed by levies on the oil transported, which is paid by oil receivers.²⁴⁶ The international regime for maritime pollution hence consists, on the one hand, of the (limited) liability of the tanker owner and, on the other hand, of compensation provided through a fund financed by oil receivers. That structure constitutes an important difference with the nuclear liability regime since it is not the state that finances the second layer, but rather oil receivers and hence private industry. The amount is considered to be of such a magnitude that it can provide compensation for most catastrophic cases of marine oil pollution. As a result of the dynamic evolution of the international regime dealing with marine oil pollution is now able to provide adequate compensation in most cases. In that respect the evolution of the international marine oil pollution regime has been far more dynamic than the evolution of the nuclear liability regime. Recall that even when the second generation conventions under the NEA regime would completely enter into force, the total amount available under the NEA regime would still only be EUR 1.5 billion, largely insufficient to cover the costs of an average nuclear accident.²⁴⁷ Moreover, of this EUR 1.5 billion compensation, only EUR 700 million would be based on the liability of the operator; EUR 800 million would still be paid through the installation state or a collective state fund and would therefore consider a subsidy. These subsidising effects are absent in the international marine oil pollution regime which can therefore provide interesting learning effects.

6.6.3 The role of the EU

The interesting oil pollution liability regime also constitutes a striking example of an interaction between the regional (EU) level and the international level as the threat of action at the EU level triggered important changes at the international level.

²⁴⁴ The overall limit is the maximum compensation payable by the Fund for any incident and it includes the compensation made by the ship owner or his insurer under the CLC.

²⁴⁵ The original unit of calculation in the Conventions are in SDR as defined by the International Monetary Fund (IMF). For the convenience of comparison, all the units are converted to Euros, as per exchange rate on February 22, 2013, 1SDR=1.1498 Euro.

²⁴⁶ See Faure and Wang 2007, p. 213.

²⁴⁷ See *supra* 5.4.2.2.

After the European Union had been confronted with serious cases of oil pollution in European waters, more particularly the Erika (1999)²⁴⁸ and the Prestige (2002)²⁴⁹ the European Commission proposed to set up a European fund with a ceiling of EUR 1 billion.²⁵⁰ Interestingly, this European initiative to come with a regional fund solution²⁵¹ led to the establishment of a supplementary fund of SDR 750 million, at the time of the adoption corresponding to approximately €920 million or US\$1 billion.²⁵² It was hence this regional initiative by the European Union that initiated, or at least speeded up, decision-making at the international level to change the Fund convention and to adopt eventually the 2003 Supplementary Fund Protocol.²⁵³ This constitutes an interesting example showing how the fear of a regional solution could trigger a change at the international level.

6.7 The role of the European Union

6.7.1 Starting point: reluctance by Member States

As had already been made clear in previous chapters, even though there may be possibilities, based on the other examples sketched before in this chapter, to take action at the EU level to come with an improved nuclear liability regime (at least in comparison with the international framework), it is not very likely that this will emerge. This has not so much to do with a limited willingness of Member States to have EU action in the domain of nuclear liability; generally in the energy and nuclear domain there seems to be little enthusiasm to have further going action at the EU level. The result is that an EU wide approach to safety regulation and standards and a single regulatory body are still missing in Europe. Obviously, Member States still hold the view that national nuclear programmes and their control is a matter of national sovereignty.²⁵⁴ The nuclear package of the EU, for instance, gave rise to controversial discussions because Member States do not want to give away their national discretion in the nuclear safety field, formally arguing that the Euratom Treaty originally did not grant competence on nuclear safety to the Community, and they still today are not ready to agree to a Euratom competence. In that context, Pelzer argued: “If this is the reality within the almost “state-like” European Union and among like-minded states – how could anyone assume that states at worldwide level would ever accept a strong international nuclear safety regime?” In his opinion, “insisting on strong international regime would mean jeopardising the idea of internationalising nuclear safety altogether.”²⁵⁵

Notwithstanding this pessimistic starting point with respect to the promotion of EU action with respect to nuclear liability, it is useful to at least examine the legal possibilities for action at the EU level.

²⁴⁸ The Maltese tanker *Erika* carrying some 31,000 tons of heavy fuel oil as cargo broke in two in a severe storm on December 12, 1999 causing an oil spill of approximately 20,000 tons. See *ERIKA, West of France, 1999*, ITOPF, <http://www.itopf.com/in-action/case-studies/case-study/erika-west-of-france-1999>.

²⁴⁹ The *Prestige* was a tanker that sank before the coast of Galicia (Spain) in 2002, causing thousands of kilometers of coastline being polluted in Spain, France, and Portugal.

²⁵⁰ See Wang 2011, p. 176-177.

²⁵¹ Which dated from September 2002 (*Id.* at p. 176).

²⁵² *Id.* at p. 179.

²⁵³ See further on this EU activism and its influence on the European level, *id.* p. 207-209.

²⁵⁴ Pelzer 2006, p. 94.

²⁵⁵ *Id.* p. 94.

6.7.2 Relationship between the Euratom Treaty and the TFEU

As has been regularly mentioned in the dissertation by Heldt²⁵⁶ the treaty that provides legislative powers in the domain of nuclear energy is EURATOM.²⁵⁷

There are core differences between the Euratom Treaty and the TFEU. While the European Union as it is known today has undergone many institutional reforms so as to fit the needs of political and economic unification,²⁵⁸ Euratom and its founding Treaty is still founded on the older rationale of its founding fathers that nuclear energy is worthy of being promoted and necessary for high standards of living.²⁵⁹ The TFEU was based on the underlying goal of the further development of the internal market, while the Euratom Treaty was motivated by a need to create and foster an industry that was meant to compensate the scarcity in oil brought about by the Suez crisis. Therefore, the current approaches in the nuclear sector are no longer considered compatible with contemporary economic needs and the structure of the market.²⁶⁰

The relationship between the Euratom Treaty and the TFEU has to be analyzed in the light of Article 106a(3) of the Euratom Treaty which stated that:

"The provisions of the Treaty of the European Union and of the Treaty on the Functioning of the European Union shall not derogate from the provisions of this Treaty".

This article represents a codification of the well-founded principle of *lex specialis derogate lex generalis*, the Euratom Treaty in this case being the more specialised legislation.²⁶¹ This calls for three observations. First, if provisions of the TFEU do not deviate from those of the Euratom Treaty, both Treaties can apply. Secondly, in the absence of specific provisions of the Euratom Treaty regarding a certain area, the TFEU can apply unless the issue is contrary to the objective of the Euratom Treaty or falls into the sphere of its exclusive competences. Thirdly, the TFEU would not apply if a certain matter has been exhaustively addressed by the Euratom Treaty.²⁶²

The complexity of the (inter)relationship between the TFEU and the Euratom Treaty could potentially undermine environmental protection within the EU because nuclear law international instruments differ from core paradigms of environmental protection and do not guarantee a sufficient level of environmental protection.²⁶³

Due to the unclear delineation of powers between Euratom and the TFEU, it is also unclear to what extent each Treaty is applicable. For some areas such as radiation protection and nuclear safety, the

²⁵⁶ Heldt 2015, p. 85.

²⁵⁷ For an introduction to EURATOM, see *supra* section 3.2.

²⁵⁸ See Heldt 2015, p.85. The European Union was only created with the coming into force of the Maastricht Treaty in 1993. The nature of the Union was changed by two amending treaties, further culminating in the Lisbon Treaty which abolished the pillar structure introduced by the Maastricht Treaty, leading to the current Union.

²⁵⁹ See Article 1 of the Treaty establishing the European Atomic Energy Community: "it shall be the task of the Community to contribute to the raising of the standard of living in Member States and to the development of relations with the other countries by creating the conditions necessary for the speedy establishment and growth of nuclear industries."

²⁶⁰ Heldt 2015, p. 85.

²⁶¹ *Id.*, p. 86.

²⁶² See in this regard Montjoie 2012, p. 473.

²⁶³ Heldt 2015, p. 87-88.

exclusive competence of Euratom is established, while other areas such as nuclear liability are not regulated under Euratom.²⁶⁴

6.7.3 Euratom and environmental protection

Environmental protection does not seem to be the main concern of nuclear law. Environmental law applies both in a direct and indirect way to nuclear law. The direct application refers to international environmental law that is applicable to the nuclear sector and the indirect application constitutes the process that environmental principles are increasingly introduced into international nuclear law.²⁶⁵ To further appraise the importance of a broader perspective with regard to nuclear law, one could seek guidance in principle 21 of the Stockholm Declaration:²⁶⁶

“States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.”

This principle was also confirmed by the International Court of Justice (ICJ), stating in its Advisory Opinion “Legality of the threat or Use of Nuclear Weapons”²⁶⁷ that it is “part of the corpus of international law relating to the environment.”²⁶⁸ However, nuclear activities are still excluded from a lot of international and regional instruments in the field of environmental law; this is because nuclear law is specifically regulated in other international conventions, which obstructs the necessity to include it in environmental law instruments.²⁶⁹

The international instruments that specifically focus on nuclear law are not in line with core paradigms of environmental protection, and therefore do not guarantee a sufficient level of environmental protection. In this regard, rather than promoting environmental law, nuclear law appeared to hinder the progress achieved by environmental law.²⁷⁰

At the European level, environmental protection does not seem to fit in the preamble of the Euratom Treaty and its main goals. It appears not to be a competence that was originally foreseen by the founding fathers of the Treaty. Environment is merely mentioned in Article 37 of the Euratom Treaty dealing with the disposal of radioactive waste which states:

“Each Member State shall provide the Commission with such general data relating to any plan for the disposal of radioactive waste in whatever forms will make it possible to determine whether the implementation of such plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State.” (emphasis added)

The *prima facie* conclusion is that Euratom does not have competences in the area of environmental protection, which implies that the TFEU would apply for related matters. As it stands, the TFEU has clear environmental protection competences and could legislate in this area, even to remedy effects of

²⁶⁴ *Id.*, p. 105.

²⁶⁵ Emmerechts 2010, p. 123.

²⁶⁶ Declaration of the United Nations Conference on the Human Environment, June 1972.

²⁶⁷ Legality of the threat or Use of Nuclear Weapons, ICJ reports 1996, p. 226.

²⁶⁸ *Id.*, para. 30.

²⁶⁹ Emmerechts 2010, p. 127.

²⁷⁰ Heldt 2015, p. 88.

radiation if this does not fall under the exclusive competence of Euratom.²⁷¹ In 1998 however, the CJEU in *Land de Sarre*²⁷² ruled that Article 37 indeed does confer “upon the Commission powers of some considerable scope in order to protect population and the environment against the risk of nuclear contamination.”²⁷³ Through this ruling, the Court gave Euratom some, even if limited, environmental protection competences. This increases the complexity to delineate competences between the Euratom Treaty and the TFEU. Secondary legislation from both treaties does not shed more light on the issue. As Heldt emphasizes, “certain TFEU Directives take the nuclear sector into account,²⁷⁴ while others explicitly exclude it.²⁷⁵ Directives which are based on the Euratom Treaty do not explicitly refer to environmental protection. The Directive on the management of spent fuel and radioactive waste²⁷⁶ or the Nuclear Safety Directive for example only mentions environmental protection in a rather indirect and incidental way in the respective preambles. The latter in its Article 3(2) even defines nuclear safety without reference to environmental protection.”²⁷⁷ The inconsistencies and the complexity could potentially undermine environmental protection within the EU, and create potential gaps in the regulatory system.

6.7.4 The role of the European Parliament

The role of the European Parliament has continuously been strengthened throughout the last decade. From a mere consultative position, the European Parliament has now been put on equal footing as other European institutions, especially in decision-making procedure. Under the ordinary legislative procedure in the framework of the TFEU, the European Parliament has an important role to play and can veto European legislation.²⁷⁸

This general observation does not seem to apply to the nuclear sector. The powers of the European Parliament under the Euratom Treaty are quite different. From a legal perspective, the European Parliament has a rather limited role, but has undertaken to be very active. It has endeavored to strengthen its position through the demand for the annulment of Regulation 3954/87.²⁷⁹ “This regulation was adopted pursuant to Article 31 of the Euratom Treaty, which only foresees a consultative role for the European Parliament. The latter however argued that the Regulation should have been adopted under the legal basis for the Internal Market, which is now Art. 114 TFEU. This article would have given the European Parliament more power in the decision-making procedure. The Court, however, contrary to the view of the European parliament, did not regard the Regulation as “a harmonisation measure within the meaning of Article 100a of the EEC Treaty” (now Art. 114 TFEU). It therefore concluded that the Regulation indeed was rightly based upon Article 31 of the Euratom

²⁷¹ Montjoie 2012, p. 474.

²⁷² Case 187/87 *Saarland and others v. Minister for Industry, Post and Telecommunications and Tourism and Others* (1988).

²⁷³ *Id.*, para.11.

²⁷⁴ See for example Directive 2008/56/EC establishing a framework for Community action in the field of marine environmental policy.

²⁷⁵ See for example Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage.

²⁷⁶ Council Directive 2011/71/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

²⁷⁷ Heldt 2015, p. 89.

²⁷⁸ *Id.*, p. 90.

²⁷⁹ Council Regulation (Euratom) No. 3954/87 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency.

Treaty.^{280/281} Consequently, the European Parliament has so far, formally, not enjoyed great influence on nuclear legislation. There is a different standing with regard to the powers under the TFEU.

6.7.5 Legislative competences for nuclear liability

As far as legislative competences are concerned, overlaps between the TFEU and Euratom do not always make it clear which Community of the two is empowered to legislate.²⁸² But one must keep in mind that the actual scope of any specific legislative provision is largely dependent upon the interpretation that is given to it. Article 98 Euratom could be used to illustrate this point. It states:

"Member States shall take all measures necessary to facilitate the conclusion of insurance contracts covering nuclear risks.

The Council, acting by a qualified majority on a proposal from the Commission, which shall first request the opinion of the Economic and Social Committee, shall, after consulting the European Parliament, issue directives for the application of this Article."

The question arises whether this article should be restrictively interpreted, or whether the adoption of a broader perspective would impose a duty on the European Union to act. The obligation in Article 98 emphasized already in 1957 that nuclear insurance is a crucial part of an appropriate nuclear liability framework. However, the Euratom Treaty does not mention any specific obligation of Member States concerning the characteristics of a nuclear liability framework. In analysing Article 98 Euratom, the interpretation given is determining of Euratom's prerogatives. A restrictive interpretation suggests that the Euratom Treaty regulates exclusively the area of insurance contracts without implications for the liability framework, which means that the powers of the Council to issue "directives for the application of this article" are limited to the area of nuclear insurance.

Extensively interpreted, the obligation of Member States arising from Article 98(1) of the Euratom Treaty entails both the obligation to abolish any barriers with respect to the conclusion of insurance contracts to cover nuclear risks and the obligation to establish a nuclear liability legal framework. This is in line with two recommendations. Commission Recommendation 65/42/Euratom and Commission Recommendation 66/22/Euratom advocated a tendency to a broader interpretation, enabling the Commission to use Article 98 not only for insurance matters, but also in a more extensive manner.²⁸³ At a workshop on nuclear liability, Prof Wathelet shared that Article 98 can not only serve as legal basis for matters dealing with insurance contracts, but also for the harmonisation of nuclear liability regimes. He also argued that Article 98 represent a mere right for the Commission and no duty.²⁸⁴ Within the same logic, the Commission stressed that "the Euratom Treaty, and in particular Article 98, does not impose any obligation to legislate in this field."²⁸⁵ While one could agree that Article 98 might lay a duty on the

²⁸⁰ Case C-70/88 European Parliament v. Council of the European Communities (1990), paras. 17 and 18.

²⁸¹ Heldt 2015, p. 90.

²⁸² True 2010, p. 2.

²⁸³ Legal study for the Accession of Euratom to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, TREN/CC/01-2005, p. 51-60.

²⁸⁴ See Heldt 2015, p. 94 (citing Prospects of a Nuclear Liability Regime in the Framework of the European Union, Berichtuebereinen Workshop der Europaeischen Kommission und der Brussels Nuclear Law Association, June 2010, Brussels in : EurUP 2010, p. 190).

²⁸⁵ See Official Journal OJ C 158 1998, p. 191.

Commission, it is however less reasonable to extend this duty beyond the scope of insurance contract, and expect it to cover a harmonized nuclear liability regime.²⁸⁶

To further ascertain Euratom's jurisdiction, one can consider Article 203 of the Euratom Treaty as it could give powers to the Community to set up a framework in the area of nuclear liability:

"If action by the Community should prove necessary to attain one of the objectives of the Community and this Treaty has not provided the necessary powers, the Council shall, acting unanimously on a proposal from the Commission and after consulting the European Parliament, take the appropriate measures."

Even in an event of a restrictive interpretation of Article 98, Article 203 of the Euratom Treaty could serve as an authorisation of the Community's jurisdiction in the area of nuclear liability.²⁸⁷

To follow the current trends with regard to legislation and enforcement, it is apparent that personal injury and private property are no longer the sole purpose of environmental law. There is shift towards an increasing recognition of the environmental damage per se. As a result, reparation of the environmental damage is no longer only monetary compensation, but more emphasis is put on restoration. In this regard, the exclusion of the nuclear sector from the Environmental Liability Directive (ELD)²⁸⁸ could still be seen as a missed chance to achieve a more comprehensive system because under the ELD the environment is offered protection per se.²⁸⁹ A modernisation of the definition of nuclear damage might also reveal useful to take account of a more developed nuclear sector and public expectations in such a mature sector.²⁹⁰ Furthermore, initiatives to regulate nuclear liability at the EU level could help adopt a comprehensive and broad that would remedy the current shortcomings in the nuclear sector.²⁹¹

6.7.6 Current action at EU level

The previous analysis made clear that according to legal doctrine there is a possibility for the EU to legislate in the domain of nuclear liability, either on the basis of Article 98 or Article 203 of the Euratom Treaty. It should be mentioned that various initiatives in this domain have also been taken. As mentioned in the introduction to this chapter the European Commission to a large extent did not take any action as far as environmental liability is concerned and only relied on the EU Member States being members to the different international nuclear liability regimes. However, the Commission is increasingly dissatisfied with the scope of protection under the international regimes and has hence launched initiatives to examine whether a European nuclear liability regime, allowing compensation for much higher amounts than under the conventions, should be worked out.²⁹²

Within the European Commission, an expert group has been working on a proposal to generate substantially higher amounts than are currently available in nuclear liability. An important role is played

²⁸⁶ Heldt 2015, p. 95.

²⁸⁷ See for further details Handrlica 2010, p. 39-45.

²⁸⁸ Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environment liability with regard to the prevention and remedying of environmental damage.

²⁸⁹ Danzi 2009, p. 22.

²⁹⁰ Soljan 2000, p. 64.

²⁹¹ Heldt 2015, p. 104.

²⁹² See, e.g., the international workshop on nuclear liability organized in January 2014 by Directorate-General Energy of the European Commission, *International Workshop on Nuclear Liability*, European Comm'n, <https://ec.europa.eu/energy/en/events/international-workshop-nuclear-liability> (last updated Dec. 26, 2015).

there by the largest re-insurer in the world, Munich Re.²⁹³ That company presented a proposal within the working group whereby the nuclear pools (the nuclear insurers) would provide coverage up to EUR 2 billion. Munich Re could create a second layer providing coverage for between EUR 2 billion and EUR 10 billion. The coverage type would be the same as the one for natural catastrophes (natcats). This would mean that others could participate in the facility and provide coverage for perhaps EUR 10 billion for one year. Long-tail risks thus would be excluded. It would be more like a capital-market solution. If during the year nothing happened, a participant could take his benefit and leave the facility.²⁹⁴ A condition for intervening through such a facility therefore would be that the damage is of a sudden and accidental nature, which excludes long-tail risks. Moreover, Munich Re itself, of course, would not generate the total capacity but would invite others to participate in the facility. The risk differentiation via the facility would be minimal. The assumption therefore would be that there would be an EU-wide regulation of the nuclear risk, which would result in stringent mandatory standards for all operators.²⁹⁵

Those initiatives have not yet led to legislative proposals. But if they do, the interesting question will arise to what extent this regional initiative could trigger a further revision of the international nuclear liability conventions.²⁹⁶

6.8 Concluding Remarks

This chapter followed the critical analysis in the previous chapter with respect to the international legal framework for nuclear liability. The question was asked whether it would be possible to provide an improved nuclear liability framework and whether there should be a particular role for the EU in that respect. We started by showing that the international nuclear liability conventions have been implemented as a type of patchwork in the Member States. Just by focusing on the examples of four Member States, section 6.1 could highlight substantial differences.

An analysis of a few other regimes dealing with catastrophic risks shows that there are clear alternatives for dealing with nuclear liability in the way the international liability conventions do. One interesting lesson is that the international regime does not always provide better results (both in terms of deterrence and victim compensation) than domestic legislation. Some domestic solutions are interesting in that they principally adopt unlimited liability (like in Germany and Japan) or that they provide substantially higher amounts of compensation via constructions whereby the entire nuclear industry is bound to provide compensation (in the US and in Germany). The discussion of the domestic examples, compensation for natural hazards and terrorism as well as the international marine oil pollution regime all show that there are possibilities to generate high amounts of compensation without government subsidy.

The international compensation system for nuclear damage and the American compensation system initially (i.e. in the early sixties) showed clear similarities: a small part of the total compensation was paid by the nuclear operator and a much bigger part of the total compensation was paid by public funds.²⁹⁷ Over the years, an important shift in governance occurred in both compensation schemes, especially with regard to the part of the total compensation to be paid by private and by public funding as well as the amount to which the nuclear operator is liable.²⁹⁸ The major difference, however, remains in the

²⁹³ See Faure and Wang 2017, p. 287-288.

²⁹⁴ Interview with Hermann Kramer, Munich Re Insurance Company, 12 March 2013.

²⁹⁵ *Id.*

²⁹⁶ Faure 2016, p. 176.

²⁹⁷ Vanden Borre 2007, p. 302.

²⁹⁸ *Id.*, p. 302.

responsiveness of each system to various circumstances that suggest, either implicitly or explicitly, the need for positive changes. In the US, the Price-Anderson Act is revised about every decade.²⁹⁹ By contrast, changes in the international system have, as illustrated, been rather slow.

Today, in the US compensation financed by the nuclear industry can be generated to an amount of 13.6 billion USD, without government intervention and also the marine oil pollution regime is able to compensate for also the most catastrophic oil pollution accidents via a combination of contributions from the tanker owner (through the civil liability convention) and the oil industry (via the fund convention). Again, also in the marine oil pollution regime the distortive government subsidies in the compensation are in principle absent.

Even if a form of government intervention in the compensation would still be desirable, the examples of compensation provided for victims of natural disasters and terrorism show that the government might in that case well act as reinsurer of last resort, thus stimulating the functioning of the market (and obviously charging a market premium for its intervention) rather than continuing its distortive subsidies.

All those examples show that there are ample possibilities, also in the case of nuclear liability, to generate far higher amounts than is currently the case under the international nuclear liability conventions and in far less distortive ways. Moreover, section 6.7 showed that there are possibilities in the Euratom Treaty to see a competence for the EU to legislate in the domain of nuclear liability and therefore to strive for a harmonised nuclear liability and insurance regime within the EU. Moreover, as the example from marine oil pollution shows: such a one-sided action at the regional (EU) level could even trigger changes at the international level and thus potentially lead to improving the international legal framework.

²⁹⁹ It has indeed been revised in 1966, 1975, 1988 and 2005.

7. COMMON CRITERIA FOR SITING, DESIGNING AND CONSTRUCTING NUCLEAR POWER PLANTS

KEY FINDINGS

- Environmental impact assessment (EIA) can be an important tool in the siting of nuclear power plants.
- IAEA safety standards are an important guidance point to reduce the risk of the discharge of radiation.
- Site and design safety reviews are also mandated by the Convention on Nuclear Safety.
- The EU Safety Directive also provides principles.
- But implementation is to an important extent an issue of Member States.

7.1 Introduction

One obvious important question within the framework of the EU is whether there are large differences between the safety in the various nuclear power plants that have been constructed in Europe. That therefore raises the question whether there are common criteria for siting, designing and constructing nuclear power plants.

We will first illustrate that this is an important issue, as was already mentioned by the Nuclear Energy Agency at the end of the 1970s. Especially the Chernobyl and Fukushima accidents showed that to some extent the inadequacy of the design was also at the source of the accident (7.2). To an important extent siting nuclear power plants is regulated via environmental impact assessments and (in the transboundary context) the Espoo Convention, but also via a Convention on Nuclear Safety and standards set by the International Atomic Energy Agency (IAEA). We will therefore sketch the international legal framework (7.3). In the European context on the one hand the Convention on Nuclear Safety is applied, but specific norms with respect to the siting of a nuclear power plant can also be found in the Nuclear Safety Directive which was already discussed at length in chapter 3.³⁰⁰ After this sketch of the rules concerning siting and operation of nuclear power plants within the EU (7.4) section 7.5 concludes.

7.2 Importance of the issue

The issues of safety and siting of nuclear installations near installations borders already arose more than thirty years ago, leading the OECD/NEA Committee of the safety of Nuclear Installations to hold a meeting in this regard. The Sub-Committee on Licensing delivered a report³⁰¹ in January 1979. Differences between criteria such as bordering countries in regulatory criteria for site acceptance, for radioactive discharges and for emergency reference levels might put groups of populations in neighbouring countries at different degree of radiological risk.³⁰² To cope with the situation, it was in many forums underlined that it was desirable to set up between bordering countries adequate

³⁰⁰ See *supra* 3.4.

³⁰¹ OECD/NEA, Safety and siting of nuclear installations near international borders in NEA Member countries, CSNI report N°35, OECD 1979.

³⁰² OECD/NEA 1979, p. 4.

channels for information and preventive consultation on siting, safety and effluent discharges of nuclear installations and for co-ordination of actions and assistance in case of nuclear emergencies.³⁰³

Despite this commitment, the Fukushima accident thirty years later still resulted in significant environmental, economic and social damage, and revealed many shortcomings inherent to the safety of nuclear installations.³⁰⁴ Although triggered by an earthquake and tsunami of an immense magnitude, investigations of the causes of the accident reveal a range of foreseeable factors which combined to produce a catastrophic outcome, in other words, strong deficiencies of the plant's design basis caused the accident.³⁰⁵ As the analysis of the Fukushima accident reveals quite substantial, well-known and recurring technical issues as well as persistent institutional failures that emerged to a large degree already from the post-accident evaluations of 1979's TMI and 1986's Chernobyl nuclear accidents, the attention of the public and policy makers focused on the safety and security risks associated with the NPPs in their own region.³⁰⁶

Many of the EU NPPs were constructed already three to four decades ago, and are based on designs and safety provisions that were continuously updated since then. Following the Fukushima accident, the Commission together with ENSREG launched in May 2011 a comprehensive review of the NPPs in the EU and some neighbouring countries to assess if current safety margins are sufficient to cover various unexpected events.³⁰⁷ These tests show various strengths and weaknesses, but remarkably also pointed at significant differences in national approaches to beyond-design basis assessments that make an adequate assessment of current safety levels difficult or impossible.³⁰⁸

7.3 The international regime

7.3.1 Environmental impact assessment

Nuclear issues are to be appraised in a broad perspective. Raetzke, for instance, ascertained how nuclear law relates to environmental law. He first explains that environmental law is the body of law concerned with protecting the environment. In this regard, within national and international environmental law, environmental protection is established by two main types of legal provisions which are used in conjunction with each other. One set of environmental laws protects particular aspects of the environment, such as environmental media (water, air or the soil) or certain species or habitats, against harm, whatever the cause of that harm may be. The other group of laws protects the environment in general against specific harmful or hazardous activities or substances, such as pollution from industry, release of gases causing climate change or risks emanating from genetically modified organisms. He then argues that beyond and above these two types of substantive law, there is a layer of procedural environmental law covering all these aspects and embodied, for example, by requirements for preparing an Environmental Impact Assessment (EIA). In this general context, it is apparent that the law of nuclear installations, understood as the aspects of nuclear law governing the siting, design,

³⁰³ *Id.*

³⁰⁴ See for a further discussion of the causes of the failure at Fukushima the discussion in section 5.3.4.2 on the distortive effects of legal channelling in that particular case.

³⁰⁵ Commission Staff Working Document Impact Assessment Accompanying the document Proposal for a Council Directive amending Directive 2009/71/EURATOM establishing a Community framework for the nuclear safety of nuclear installations, /* SWD/2013/0423 final */.

³⁰⁶ /* SWD/2013/0423 final */.

³⁰⁷ See further on these stress tests *supra* section 3.4.

³⁰⁸ For example, in some cases earthquake risk was not considered in the original design basis but only introduced at a later stage or clearly underestimated. New methodologies in seismic hazard and risk assessment have since been developed, but not all operators have reassessed site hazards and seismic risks with recent methodologies, See /* SWD/2013/0423 final */.

construction and operation of nuclear facilities, performs a function which can be discerned as part of environmental law: it is the law protecting man and the environment against a specific hazard, namely the potential harmful effects of radiation emanating from a nuclear installation.³⁰⁹

The obligation to carry out an EIA is obviously an important legal component in the decision concerning the siting of a nuclear power plant. One important aspect is to what extent the public at large can intervene in those types of siting decisions. That is an aspect, which we will analyse separately in chapter 9 which is devoted to citizen and NGO involvement in the decision-making concerning nuclear power plants.

The obligation to carry out an Environmental Impact Assessment is an essential requirement with regard to the safety of nuclear installations, as established by the Espoo Convention.³¹⁰ The obligation to perform an EIA for an industrial activity with possible adverse transboundary impact has also been acknowledged in 2010 by the International Court of Justice (ICJ) in the *Pulp Mills on the River Uruguay* case to be an obligation under international customary law.³¹¹

The Espoo Convention lays down obligations for Parties to assess environmental impact of certain activities at early stage of planning and lays down general obligations of states to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. These provisions are further strengthened in the Protocol on Strategic Environmental Assessment (SEA)³¹² which was adopted in Kiev in 2003.³¹³ Article 4 of the SEA Protocol requires that a strategic environmental assessment is carried out for plans and programmes which are likely to have significant environmental, including health effects. It states:

‘2...

(b) Nuclear power stations and other nuclear reactors, including the dismantling or decommissioning of such power stations or reactors (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load).

3.

(a) Installation for the reprocessing of irradiated nuclear fuel;

(b) Installations designed:

- For the production or enrichment of nuclear fuel; – For the processing of irradiated nuclear fuel or high-level radioactive waste;

- For the final disposal of irradiated nuclear fuel;

- Solely for the final disposal of radioactive waste; or

³⁰⁹ Raetzke 2013, p. 56.

³¹⁰ See further on the Espoo Conventions, Sands and Peel 2012, p. 610-613.

³¹¹ *Pulp Mills on the River Uruguay (Argentina vs. Uruguay)* (20 April 2010), ICJ Reports 2010, p. 14, at p. 82-83, para. 204. See further on this case Sands and Peel 2012, p. 619-621.

³¹² Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context (2003), 2685 UNTS 140, entered into force 11 July 2010 (SEA Protocol).

³¹³ See Sands and Peel 2012, p. 613-614.

- Solely for the storage (planned for more than 10 years) of irradiated nuclear fuels or radioactive waste in a different site than the production site."

According to Article 1 of the Espoo Convention, any major change to an activity listed under Appendix I of the Convention also falls within its scope of application. Annex I to the SEA Protocol provides for similar provisions listing the projects for which each party to the SEA Protocol shall ensure that an SEA is carried out at the plan or programme level. "The Parties shall, either individually or jointly, take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities."³¹⁴

7.3.2 IAEA safety standards

The obligation to prevent and control transboundary environmental impact does put some obligations on a country to ensure the safety of its planned and existing nuclear power plants and to limit the discharge of radiation. IAEA safety standards are appropriate points of reference for an assessment within the framework of this requirement. But, these standards are not binding on IAEA Member States; there seems to be no sufficient evidence that there is a customary principle of law that they define the extent of a country's obligation to prevent radiological harm to the environment of another country.³¹⁵ National legislation can establish different assessment procedures for different kinds of activities depending on their impact, varying in the level of scrutiny (e.g. broad screening vs. a comprehensive study) or type of administrative process (e.g. review by an authority vs. review by a panel with experts). For example, the Canadian Environmental Assessment Act provided until recently for three tracks of environmental assessment: a screen, a comprehensive study and a panel review.³¹⁶

The IAEA also establishes international guidance. The obligations of the Parties are based on the principles contained in the IAEA Safety Fundamentals document "Fundamental Safety Principles (SF-1)". The Safety Standard on Safety Assessment (GSR Part 4), for example, states: "It shall be determined in the safety assessment for a facility or activity whether adequate measures are in place to protect people and the environment from harmful effects of ionising radiation."³¹⁷ Within the areas of radiological impact assessment, the IAEA Basic Safety Standards establish that "Any person or organisation applying for authorisation ... shall, as required by the regulatory body, have an appropriate prospective assessment made for radiological environmental impacts, commensurate with the radiation risks associated with the facility or activity."³¹⁸

7.3.3 Convention on Nuclear Safety

The main IAEA obligations are laid down in the Convention on Nuclear Safety (CNS)³¹⁹ that obliges Parties to submit reports on the implementation of their obligations for "peer review" at meetings of the Parties that are held at the IAEA. The CNS aim to legally commit contracting parties operating land-based nuclear power plants to maintain a high level of safety by setting international benchmarks to which they would subscribe. The obligations of the contracting parties cover the siting, design, construction and operation of nuclear power plants as well as the availability of adequate financial and

³¹⁴ Espoo Convention (fn. 3), Article 2, para.1.

³¹⁵ Raetzke 2013, p. 85.

³¹⁶ *Id.*, p. 78.

³¹⁷ IAEA (2009), "Safety Assessment for Facilities and Activities, General Safety Requirements", No.GSR Part 4, Requirement 9, IAEA, Vienna (emphasis added).

³¹⁸ IAEA No.GSR Part 3 (fn.40), paragraph 3.9 (e).

³¹⁹ See for an introduction to this convention, *supra* section 3.2.1.

human resources. In 2012, Members agreed to hold in Vienna an Extraordinary Meeting (EM) of the CNS (5th Review Meeting). Within this framework, each Contracting Party is encouraged to take the IAEA Safety Standards into account, and host international peer review mission including site and design safety reviews prior to commissioning its first nuclear installation. Amendments were also proposed to the CNS.

- Art. 17 (Siting), *amendment to sub-para. (iii)*

(iii) for re-evaluating as necessary *according to the state of the art of science and technology* all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;

This change was motivated by the fact that the Fukushima accident highlighted the importance of state-of-the-art re-evaluations of the site-related factors likely to affect the safety of a nuclear installation and of the likely safety impact of a proposed nuclear installation on individuals, society and the environment.

- Art. 18 (Design and Construction), *new sub-para. (iv)*

(iv) *the design of a nuclear installation is reviewed by external experts with regard to its compliance with the requirements of the Agency.*

In this regard, the Fukushima accident demonstrated the importance of the adequate design of NPPs against extreme natural hazards. The IAEA Action Plan on Nuclear Safety calls the Member States for reassessing their NPPs' design against site specific extreme natural hazards and the IAEA Secretariat for supporting the Member States in this respect. Furthermore, the Action Plan requires the IAEA to strengthen its peer review services, including design safety reviews. Accordingly, design reviews by external experts should be embedded in the CNS.

It is important to mention that the Nuclear Safety Directive³²⁰ defines nuclear installations in a broader context than the Nuclear Safety Convention. It equally includes research reactors and nuclear fuel cycle facilities (except for off-site waste management facilities).

7.4 The European regime

7.4.1 General framework

All nuclear power plants on the territories of the EU Member States are regulated by the national regulatory authorities in accordance with their respective national laws and in conformity with the legal framework of the Community.³²¹

The main provision with regard to nuclear installations is laid down by Article 8a of the Nuclear Safety Directive (NSD). This article states the nuclear safety objective for nuclear installations:

³²⁰ See further on this Directive, *supra* 3.4.

³²¹ European Atomic Energy Community, Report on the implementation of the obligations under the Convention on Nuclear Safety, 7th Review meeting of the Contracting Parties to the Convention on Nuclear Safety (CNS) Vienna, 27 March- 7 April 2017.

'1. Member States shall ensure that the national nuclear safety framework requires that nuclear installations are designed, sited, constructed, commissioned, operated and decommissioned with the objective of preventing accidents and, should an accident occur, mitigating its consequences and avoiding:

(a) early radioactive releases that would require off-site emergency measures but with insufficient time to implement them;

(b) large radioactive releases that would require protective measures that could not be limited in area or time.

2. Member States shall ensure that the national framework requires that the objective set out in paragraph 1:

(a) applies to nuclear installations for which a construction licence is granted for the first time after 14 August 2014;

(b) is used as a reference for the timely implementation of reasonably practicable safety improvements to existing nuclear installations, including in the framework of the periodic safety reviews as defined in Article 8c(b).'

This article is to be read concurrently with Directive 2014/87/Euratom amending the NSD. The 19th Recital of the latter indeed stipulates that "Where 'reasonably practicable' is used in this Directive it should be applied in accordance with established definitions, in particular the WENRA and IAEA definitions." In this regard, the Western European Nuclear Regulators Association (WENRA) endeavored to provide a guidance document to provide a better understanding of Article 8a, in particular for a common approach to inform Members' own national frameworks in terms of "timely implementation of reasonably practicable improvements to existing nuclear installations".³²²

WENRA described reasonably practicable and reasonably achievable as follows:

"Within the WENRA Safety Objectives for New Nuclear Power Plants the words "reasonably practicable" or "reasonably achievable" are used. In this report the words 'Reasonably Practicable' are used in terms of reducing risk as low as reasonably practicable or improving safety as far as reasonably practicable. The concept of reasonable practicability is directly analogous to the ALARA principle applied in radiological protection, but it is broader in that it applies to all aspects of nuclear safety. In many cases adopting practices recognized as good practices in the nuclear field will be sufficient to show achievement of what is "reasonably practicable". For some design expectations in this report, "reasonable practicability" should be taken to mean that, in addition to meeting the normal requirements of good practice in engineering, further safety or risk reduction measures for the design or operation of the facility should be sought and that these measures should be implemented unless the utility is able to demonstrate that the efforts to implement the proposed measures are grossly disproportionate to the safety benefit they would confer."³²³

³²² WENRA, WENRA Guidance Article 8a of the EU Nuclear Safety Directive: "Timely Implementation of Reasonably Practicable Safety Improvements to Existing Nuclear Power Plants", Report of the Ad-hoc group to WENRA 13 June 2017.

³²³ WENRA 2017, p. 3. "The safety measures that are applied to facilities and activities that give rise to radiation risks are considered optimized if they provide the highest level of safety that can reasonably be achieved throughout the lifetime of the facility or activity, without unduly limiting its utilisation. To determine whether radiation risks are as low as reasonably achievable, all such risks, whether arising from normal operations or from abnormal or accident conditions, must be assessed (using a graded approach) as a priority and periodically reassessed throughout the lifetime of facilities and activities. Where

Article 8c of the NSD further lays down provisions for the initial assessment and periodic safety reviews. It stipulates:

“Member States shall ensure that the national framework requires that:

(a) any grant of a licence to construct a nuclear installation or operate a nuclear installation, is based upon an appropriate site and installation-specific assessment, comprising a nuclear safety demonstration with respect to the national nuclear safety requirements based on the objective set in Article 8a;

(b) the licence holder under the regulatory control of the competent regulatory authority, re-assesses systematically and regularly, at least every 10 years, the safety of the nuclear installation as laid down in Article 6(c). That safety reassessment aims at ensuring compliance with the current design basis and identifies further safety improvements by taking into account ageing issues, operational experience, most recent research results and developments in international standards, using as a reference the objective set in Article 8a.”

The Nuclear Safety Directive does not provide specific provisions with regard to siting, design, construction and operation of nuclear installations. The relevant provisions are to be found in the Convention on Nuclear Safety. For the implementation of these provisions, Euratom possesses competences, shared with its Member States.³²⁴

7.4.2 Siting

As underlined above, the EU relies on international norms with regard to siting of nuclear power plants. Specific provisions are contained in the Convention on Nuclear Safety. In this respect, Article 17 of the CNS states:

“Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

i. For evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

ii. For evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

iii. For re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation:

iv. For consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the like safety impact on their own territory of the nuclear installation.”

there are interdependences between related actions or between their associated risks (e.g. for different stages of the lifetime of facilities and activities, for risks to different groups or for different steps in radioactive waste management), these must also be considered. Account also has to be taken of uncertainties in knowledge.”

³²⁴ EAEC, *supra* note 320, p. 9.

Under Article 37 of the Euratom Treaty, the Community possesses competence as regards "any plan for the disposal of radioactive waste in whatever form" if the implementation of that plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State. Seen in this light, there are sufficient grounds to conclude that Euratom possesses competence in the field covered by Article 17 of the Convention.³²⁵

Furthermore, the amended Nuclear Safety Directive contains only a reference to the licence holder's responsibility for siting, by defining the term "licence" as "any legal document granted under the jurisdiction of a Member State to confer responsibility for the siting, design, construction, commissioning and operation or decommissioning of a nuclear installation."³²⁶ Besides, Article 6(2) sets up a general obligation for licensees: "Member States shall ensure that the national framework in place requires licence holders, under the supervision of the competent regulatory authority, to regularly assess, verify and continuously improve, as far as reasonably achievable, the safety of their nuclear installations in a systematic and verifiable manner.

That shall include verification that measures are in place for the prevention of accidents and mitigation of the consequences of accidents, including the verification of the application of defence-in-depth provisions.³²⁷

It is worth mentioning that there are no detailed applicable Euratom legal acts currently in force which set out criteria for the siting of nuclear installations. In this regard, one must include factors relating to radiation protection, such as the demographic characteristics of the site. It is apparent that Article 17(ii) of the Convention relates to those factors.³²⁸

7.4.3 Design and construction

With regard to design and construction of nuclear installations, Article 18 of the CNS lays down:

"Each Contracting Party shall take the appropriate steps to ensure that:

(a) The design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;

(b) The technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

(c) The design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface."

Also in this regard, detailed Euratom legal acts are not available, and the design, construction and operation of nuclear installations lie within the competence of the national authorities. However, in its Judgement of 10 December 2002 the Court of Justice of the EU held that "the measures required by Articles 18 and 19 of the Convention concerning the design, construction and operation of nuclear

³²⁵ See Judgment of the Court of 10 December 2002, Commission of the European Communities v Council of the European Union, C-29/99, ECLI:EU:C:2002:734.

³²⁶ Art. 3(4) of Directive 2009/87/Euratom.

³²⁷ EAEC 2017, p. 80.

³²⁸ *Id*, p. 81.

installations can be the subject of the provisions which the Member States lay down to ensure, in accordance with the first paragraph of Article 33 of the Euratom Treaty, compliance with the basic standards. However, the Commission has competence to make recommendations for harmonising those provisions, as is clear from the second paragraph of Article 33 of the Euratom Treaty, interpreted in the light of the considerations set out in paragraphs 75 to 83 of the present judgment. The Member States are required to assist in drawing up those recommendations through the communications referred to in the third paragraph of Article 33 of the Euratom Treaty."

In fact, due to the cross-border risks associated to a nuclear accident, the Community *acquis provides* that, whenever a nuclear installation is to be built in any of the Member States, an Environmental Impact Assessment must be carried out, necessarily including the consultation of potentially affected Member States.³²⁹

7.4.4 Operation

As far as operation of nuclear installations is concerned, Article 19 of the Convention on Nuclear Safety stipulates:

"Each Contracting Party shall take the appropriate steps to ensure that:

(a) The initial authorisation to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

(b) Operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

(c) Operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;

(d) Procedures are established for responding to anticipated operational occurrences and to accidents;

(e) Necessary engineering and technical support in all safety related fields is available throughout the lifetime of a nuclear installation;

(f) Incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;

(g) Programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organisations and regulatory bodies;

(h) The generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal."

³²⁹ Council Directive 85/337/EEC, of 27 June 1985, on the assessment of the effects of certain public and private projects on the environment, as revised by Council Directive 97/11/EC, of 3 March 1997.

The design, construction and operation of nuclear installations lie within the competence of the national authorities. However, in its Judgement of 10 December 2002 the Court ruled that "the measures required by Articles 18 and 19 of the Convention concerning the design, construction and operation of nuclear installations can be the subject of the provisions which the Member States lay down to ensure, in accordance with the first paragraph of Article 33 of the Euratom Treaty, compliance with the basic standards. However, the Commission has competence to make recommendations for harmonising those provisions, as is clear from the second paragraph of Article 33 of the Euratom Treaty, interpreted in the light of the considerations set out in paragraphs 75 to 83 of the present judgment. The Member States are required to assist in drawing up those recommendations through the communications referred to in the third paragraph of Article 33 of the Euratom Treaty."³³⁰

Before the adoption of the Nuclear Safety Directive, there were proposals to include in the final document provisions that would enable an EU-wide licensing process. However, this proposal did not make it to the final text. Discussions within the framework of the "Nuclear Package" did not result in the strong provisions aimed at, but much softer conclusions were drawn.³³¹ It is important to recall that the CJEU explicitly stated that, "even though the Euratom Treaty does not grant the Community competence the construction or operation of nuclear installations, under Articles 30 and 32 of the Euratom Treaty, the Community possesses the legislative competence to establish for the purpose of health protection an authorisation system which must be applied by Member States. Such a legislative act constitutes a measure supplementing the Basic Safety Standards referred to in that Article."³³² There certainly is a need for a more harmonized approach at the EU-level to ensure more transparency and achieve more legitimacy and public trust.

7.4.5 Decommissioning

New reactors are designed to meet higher levels of safety than the existing ones. Despite the fact that existing reactors undergo Periodic Safety Reviews as a result of which safety enhancements are implemented, it is likely that there will remain a difference between the safety level of oldest and newest reactors.³³³ This might sometimes leads to decommissioning of the nuclear power plant.

Decommissioning means "all activities covering the technical decommissioning of the nuclear installation (decontamination, dismantling and demolition) and waste management (management and disposal of radioactive waste and spent fuel) leading to the release of the nuclear installations from radiological restrictions."³³⁴ The decommissioning of a nuclear installation such as a power plant or research reactor is the final step in its lifecycle. It involves activities from shutdown and removal of nuclear material to the environmental restoration of the site. The whole process is complex and lengthy (up to 30 years), and must be carried out with the highest safety standards.

³³⁰ Judgment of the Court of 10 December 2002, *Commission of the European Communities v Council of the European Union*, C-29/99, ECLI:EU:C:2002:734, p. 102-103.

³³¹ Veuchelen 2010, p. 219.

³³² See in this regard the analysis of Veuchelen 2010, p. 219-220.

³³³ WENRA 2017, p. 5. One example is a difference between the severe accident mitigation provisions integrated into the design in new reactors compared to the back-fitting measures in the older reactors. In some cases, it will be reasonably practicable to enhance safety to reach a higher safety level but sometimes further enhancement toward the benchmark is not reasonably practicable.

³³⁴ Article 2a Commission Recommendation of 24 October 2006 on the management of financial resources for the decommissioning of nuclear installations, spent fuel and radioactive waste, OJ L 330, 28.11.2006, p. 31-35.

Section 3 of Commission Recommendation on the management of financial resources for the decommissioning of nuclear installations, spent fuel and radioactive waste stipulates:

- 1. All nuclear installations should be decommissioned after permanent shutdown and the management of waste should be properly addressed.*
- 2. Decommissioning activities should be carried out without undue risk to the health and safety of workers and the general public.*
- 3. The polluter pays principle should be fully applied throughout the decommissioning of nuclear installations. In this regard, the primary concern of nuclear operators should be to ensure the availability of adequate financial resources for safe decommissioning by the time the respective nuclear installation is permanently shut down.*
- 4. The financial resources available should be aimed at covering all aspects of decommissioning activities, from technical decommissioning of the installation to waste management."*

7.5 Concluding remarks

All nuclear power plants on the territories of the EU Member States are regulated by the national regulatory authorities in accordance with their respective national laws and in conformity with the legal framework of the Community. As confirmed through the nuclear stress tests and the initial check of Member States' transposition of the Directive, there are differences from country to country over the identification and management of safety issues. This is partly due to the fact that the 2009 Directive only contains broad principles, leaving leeway to Member States as regards their implementation.³³⁵ This means that contents and structure of authorisations for nuclear installations, as well as the distribution of competencies vary considerably from country to country.³³⁶ In some countries, legislation establishes that the environmental impact is assessed within the nuclear licensing process and that the license issued by the nuclear regulator covers, fully or in part, environmental issues. This is the case, for example in Germany.³³⁷

The Environmental Impact Assessment was introduced as the most important instrument to be applied in the decision concerning the siting of a nuclear power plant. The Espoo Convention regulates the application of EIA also in a transboundary context. Still questions can arise concerning the involvement of the public at large or NGOs in the EIA. Questions can equally arise on the application of the EIA when there is not formally a new siting of a power plant, but a renewal of the licence, a so-called plant lifetime extension. Questions arise as to the necessity to apply an EIA in that particular context. Those questions will be further elaborated in chapter 9.

It also appeared that to an important extent the Convention on Nuclear Safety provides rather broad obligations. To some extent these are further implemented in the IAEA safety standards and in the EU Safety Directive. However, case law of the Court of Justice of the EU also makes clear that the

³³⁵ EAEC 2017, p. 25.

³³⁶ Raetzke 2013, p. 69.

³³⁷ See Raetzke 2013, p. 69. He states: "According to Article 2a of the German Atomic Energy Act (fn.19), "the environmental impact assessment shall constitute an integrated part of the licensing procedures stipulated by this Act"; this means it is part of the nuclear licensing process. According to Article 8, paragraph 2, any licence which would be required for the facility according to the Federal Emission Control Act – which is the most important piece of legislation dealing with "conventional"– environmental impact (see fn.21) – is replaced by the nuclear licence".

Commission has competence to make further recommendations concerning the harmonisation of safety rules.

8. THE ENFORCEMENT OF NUCLEAR SAFETY STANDARDS

KEY FINDINGS

- The enforcement of nuclear safety regulation is primarily the responsibility of Member State authorities.
- Member States are required to report on the implementation of the Nuclear Safety Directive to the Commission, but sanctions or enforcement mechanisms are lacking.
- A periodic safety review applies every 10 years.
- Problems arise in the enforcement with respect to civil liability; there are considerable gaps and discrepancies in the system of judicial cooperation in nuclear liability cases.
- The international liability conventions are silent on how to deal with mass tort litigation; the issue is left at the discretion of the Member States.
- It is recommended that further enforcement powers would be allocated to the European level to directly monitor and inspect at the plant level in the Member States.
- Risk-based enforcement mechanisms exist in some Member States. EU-wide methods of monitoring and inspection equally need to be prescribed.

8.1 Introduction

An important question is who has competence to enforce the various safety standards that we have reviewed so far in chapters 3 and 7. As section 8.2 will make clear, public enforcement is completely entrusted to the national authorities in the Member States. There are only reporting obligations and systems of periodic review. Questions of enforcement are equally important with respect to the liability regime that was discussed in chapter 5. The literature has indicated that problems may arise as a result of the existence of different regimes in the Member States (8.3). Moreover, a nuclear accident is probably the best example of a mass tort as many potential victims can result from a nuclear accident. That equally raises the question how enforcement will take place for example through mass tort litigation (8.4). Section 8.5 illustrates how public enforcement takes place within Member States by presenting Belgium as an example. Cross border cooperation between enforcement agencies is discussed as well. Section 8.6 concludes.

8.2 Public enforcement of nuclear safety regulation

8.2.1 Sovereignty, reporting and periodic review

The law of the EU establishes the sovereignty of Member States with regard to the enforcement system of the nuclear safety provisions within their territory.

With regard to the protection against the dangers arising from exposure to ionising radiation, rules on inspections are laid down in article 104 of the Basic Safety Standards Directive (2013/59/EURATOM):

'1. Member States shall establish a system or systems of inspection to enforce the provisions adopted pursuant to this Directive and to initiate surveillance and corrective action where necessary.

2. Member States shall ensure that the competent authority establishes an inspection programme taking into account the potential magnitude and nature of the hazard associated with practices, a general assessment of radiation protection issues in the practices, and the state of compliance with the provisions adopted pursuant to this Directive.'

Members shall further ensure that findings of inspections are recorded and communicated to the undertaking concerned (art 104.3) and the outlines of the inspection programmes and the main findings from their implementation are made available to the public (art. 104.4)

As far as enforcement is concerned, article 105 of the BSS Directive states:

'Member States shall ensure that the competent authority has the power to require any individual or legal person to take action to remedy deficiencies and prevent their recurrence or to withdraw, where appropriate, authorisation when the results of a regulatory inspection or another regulatory assessment indicate that the exposure situation is not in compliance with the provisions adopted pursuant to this Directive.'

The 8th recital of the Nuclear Safety Directive equally emphasizes that the safety of nuclear energy production within the EU is the primary responsibility of power plant operators supervised by independent national regulators. In addition, Recital 9 underlined that each Member State may decide on its energy mix in accordance with relevant national policies. Within this framework, the competence of the EU Community institutions is to ensure the adoption of uniform Community-wide safety standards and the compliance of Member States with the terms of the Directive.³³⁸

Members are required to submit a report to the Commission on the implementation of the Nuclear Safety Directive. The first report had to be submitted by 22 July 2014, and then by 22 July 2020.³³⁹ The Commission must in turn submit a report to the Council and the European Parliament on progress made with the implementation of the Directive, on the basis of the Member States' reports.³⁴⁰ It is important to underline that the reporting requirements under the Nuclear Safety Directive differ from those under the Convention on Nuclear Safety.³⁴¹ Under the CNS, a Contracting Party is required to submit a report every three years at the meeting of the IAEA to other contracting parties for their review and comment. As underlined by Stanic, there is no mechanism of enforcement or sanction in the case of non-compliance with the reporting requirements or recommendations made by other state parties. Instead, the effectiveness of the Convention relies on a process of peer review and, by extension, peer pressure.³⁴²

In all WENRA countries, licensees are expected to perform a periodic safety review (PSR) (ref 5) of their plant at least every ten years. This is an opportunity to review not only the conformity of the plant, but also identify possible safety improvements. Safety improvements can be related to the plant design but also to organisational issues (e.g. management systems and procedures). On the basis of the results of the PSR, regulators generally review the continued acceptability of the continuation of operation of the

³³⁸ Stanic 2010, p. 154. Nuclear safety standards will be proposed by the Commission and adopted by the EU Council in accordance with the procedure set out in Articles 31 and 32 of the Euratom Treaty. The ENSREG will take a leading role in drafting Community-wide safety standards.

³³⁹ Article 9(1) of the Nuclear Safety Directive.

³⁴⁰ Article 9(2) of the Nuclear Safety Directive.

³⁴¹ Stanic 2010, p. 156.

³⁴² Stanic 2010, p. 157.

plant. This does not mean that further improvements should not be considered or implemented between PSRs. PSR significantly contributes to the continuous improvement of safety.

Moreover, the Nuclear Safety Directive lays down in its Article 8e provisions for peer reviews:

"1. Member States shall, at least once every 10 years, arrange for periodic self-assessments of their national framework and competent regulatory authorities and invite an international peer review of relevant segments of their national framework and competent regulatory authorities with the aim of continuously improving nuclear safety. Outcomes of such peer reviews shall be reported to the Member States and the Commission, when available.

2. Member States shall ensure that, on a coordinated basis:

(a) a national assessment is performed, based on a specific topic related to nuclear safety of the relevant nuclear installations on their territory;

(b) all other Member States, and the Commission as observer, are invited to peer review the national assessment referred to in point (a);

(c) appropriate follow-up measures are taken of relevant findings resulting from the peer review process;

(d) relevant reports are published on the above mentioned process and its main outcome when results are available.

3. Member States shall ensure that arrangements are in place to allow for the first topical peer review to start in 2017, and for subsequent topical peer reviews to take place at least every six years thereafter.

4. In case of an accident leading to situations that would require off-site emergency measures or protective measures for the general public, the Member State concerned shall ensure that an international peer review is invited without undue delay."

8.2.2 Stress tests

The international peer review mechanism as established in Article 8e(4) is also different from the one of the Convention because this process is compulsory rather than voluntary in nature.³⁴³ One of the most notable implementation strategies was the development of comprehensive risk and safety assessments of nuclear power plants, the so-called stress tests, established as an EU response to the Fukushima accident. These tests are carried out by nuclear operators under the supervision of national regulatory authorities. Despite their valuable inputs and their role of enhancing the safety of EU NPPs, the weakness of this exercise is related to its non-binding nature. "Indeed, the Stress Tests are only a voluntary exercise which does not guarantee that the recommended improvements will be (fully) implemented. Another weakness of the Stress Tests is that they are only a one-time, ad-hoc exercise. It does not guarantee that the identified measures will be regularly updated and implemented also in the future, where appropriate. Further, as the EU Stress Tests were developed in the light of the events which occurred at the Fukushima NPP in March 2011, they represent targeted reassessments of the safety margins of NPPs against impacts from a limited range of extreme external initiating events. Therefore, various important aspects of nuclear safety have not explicitly been treated, such as ageing

³⁴³ Stanic 2010, p. 157.

of structures and components, human and organisational factors or independence of the regulator vis-à-vis the licensee.”³⁴⁴

National reports should be subjected to a process of peer review to enhance credibility and accountability. However, “the main shortcomings of the Nuclear Safety Directive are that it does not provide for surprise inspections of NPPs and independent verifications will continue to be undertaken by national regulators rather than by Community institutions.”³⁴⁵

8.2.3 Alternatives

It is in a way striking that for such an important domain as nuclear safety enforcement is completely entrusted to national authorities. Sovereignty of the Member States apparently prevails. However, that is not the case in all domains of EU law. In some domains public enforcement by the EU authorities is possible, a well-known example being provided by EU competition law.³⁴⁶ But there are equally domains closer to environmental and nuclear law where the Member States have allocated powers to the EU level for a direct enforcement. A well-known example comes from the domain of the common fisheries policy.

In the fishery sector, the 68th recital of the Common Fisheries Policy (CFP)³⁴⁷ emphasized that “implementing powers should be conferred on the Commission” “in order to ensure uniform conditions for the implementation of the provisions of this Regulation in respect of temporary measures to alleviate a serious threat to the conservation of marine biological resources, of the entry-exit scheme in fleet management and of the recording, format and transmission of data for the Union fishing feet register.” In this regard, Article 36(2b) of the CFP provides that control and enforcement of the CFP shall in particular be based, inter alia, on and shall include “*cooperation and coordination between Member States, the Commission and the Agency*” (b), “*a Union framework for control, inspection and enforcement*” (e), “*a risk-based strategy focused on systematic and automated cross-checks of all available relevant data*” (f).

Furthermore Article 37 of the CFP states that:

1. “*An expert group on compliance shall be established by the Commission to assess, facilitate and strengthen the implementation of, and compliance with, the obligations under the Union fisheries control system.*”
2. “*The expert group on compliance shall be composed of representatives of the Commission and the Member States. At the request of the European Parliament, the Commission may invite the European Parliament to send experts to attend meetings of the expert group. The Agency may assist the expert group on compliance meetings as an observer.*”

³⁴⁴ Commission Staff Working Document Impact Assessment Accompanying the document Proposal for a Council Directive amending Directive 2009/71/EURATOM establishing a Community framework for the nuclear safety of nuclear installations, /* SWD/2013/0423 final */.

³⁴⁵ Stanic 2010, p. 157.

³⁴⁶ See for example Wils 2005.

³⁴⁷ Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC, OJ L 354/22 of 28.12.2013.

This example shows not only competences for enforcement at the EU level, but also very precise indications on how monitoring and inspection should take place. In that respect other examples can be found in EU environmental law.

In the Industrial Emissions Directive³⁴⁸ for example, clear rules are established to carry out regular environmental inspections. Article 23(4) states:

“Based on the inspection plans, the competent authority shall regularly draw up programmes for routine environmental inspections, including the frequency of site visits for different types of installations.

The period between two site visits shall be based on a systematic appraisal of the environmental risks of the installations concerned and shall not exceed 1 year for installations posing the highest risks and 3 years for installations posing the lowest risks.

If an inspection has identified an important case of non-compliance with the permit conditions, an additional site visit shall be carried out within 6 months of that inspection.”

In addition, Article 25 provides for non-routine visits to tackle serious issues:

“Non-routine environmental inspections shall be carried out to investigate serious environmental complaints, serious environmental accidents, incidents and occurrences of non-compliance as soon as possible and, where appropriate, before the granting, reconsideration or update of a permit.”

These articles provide for risk-based inspections to enhance the quality of the enforcement.³⁴⁹

Similar provisions can also be found in other domains of EU environmental law.³⁵⁰

These examples show that in some cases direct competences to EU institutions to monitor, inspect and enforce are awarded and that in other cases the method of monitoring is prescribed in a very precise manner. It is remarkable that in the domain of nuclear safety, where the public interest of shifting powers to the EU level, also for inspection, is obviously much larger, this has not taken place yet. The comparison with other domains therefore constitutes an important possibility of mutual learning.

8.3 Enforcement with regard to liability

As underlined earlier, the EU has not regulated in the area of nuclear liability.³⁵¹ As such liability and compensation regimes are dependent upon the international conventions.³⁵² This entails that the flaws inherent in the international regime will also be reflected in the enforcement mechanism within the EU. The main issue with regard to enforcement is countries' membership with different conventions. Lamm reported that “after the Chernobyl accident, the then Soviet Union refused to pay compensation to the foreign victims. Some observers felt that if the Soviet Union had been bound by the Vienna Convention, foreign victims would at least have had a chance to receive damages. Their compensation, however, posed a problem: the amount finally payable under the 1963 Vienna Convention would have made it

³⁴⁸ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control), OJ L 334, 17.12.2010, p. 17-119.

³⁴⁹ See further Jans and Vedder 2012, p. 366.

³⁵⁰ For example in the so-called Basel Regulation 259/93 of 1.2.1993 on the supervision and control of shipments of waste within, into and out of the European Community, OJ L30 of 6.2.1993.

³⁵¹ In chapter 6 we discussed in detail whether there are arguments for any EU action in that respect.

³⁵² Which were discussed and criticised in chapter 5.

possible to satisfy only a ridiculously minimal proportion of the claims for compensation in light of the scale of the accident. According to the Vienna Convention, the amount of the operator's liability may be limited, since Article V provides that "The liability of the operator may be limited by the Installation State to not be less than USD 5 million for any one nuclear incident."³⁵³

Lamm further clarified that even if victims in Western Europe or Scandinavia were to suffer nuclear damage, they would not be entitled to claim compensation from the former USSR or from the Soviet operator, because the latter were Party to the 1960 Paris Convention instead of to the Vienna Convention.³⁵⁴

This issue was later solved by the Joint Protocol that provides a link between the two conventions.³⁵⁵ However, the Joint Protocol and the amendments to the first generation conventions have not levelled all enforcement-related problems. Pointing to the current nuclear liability patchwork in the EU, Handrlica ascertained that many issues result from the lack of a uniform legal framework on jurisdiction in the field of nuclear liability. To illustrate his point he used, *inter alia*, the following scenarios:

1. "If an incident occurs in France (a contracting party to the Paris Convention and the BSC), victims from neighbouring Belgium, the Netherlands, Germany, Italy, Spain and Great Britain (all of which are contracting parties to the same two conventions), can claim damages against the liable nuclear installation operator before the relevant French court. Under the BSC regime, additional compensation is to be made available to these victims, for a combined total of 300 million Special Drawing Rights (SDR)";

2. Victims from Portugal and Greece, (both contracting parties to the Paris Convention only) can claim damages against the liable operator, but only up to the maximum liability amount under French law.³⁵⁶

3. Since France has not yet ratified the 1988 Joint Protocol, the Regulation I Brussels would apply to determine which court has jurisdiction to rule on damage claims brought by victims in all other member states which are not contracting parties to the Paris Convention;

4. Similarly, if there is a nuclear accident in the Slovak Republic (a contracting party to the 1963 Vienna Convention), the Slovak courts will have jurisdiction to rule on nuclear damage claims from victims in Bulgaria, the Czech Republic, Estonia, Lithuania, Latvia, Hungary, Poland and Romania (all being contracting parties to that same convention). In addition, since the Slovak Republic is party to the 1988 Joint Protocol which extends the jurisdictional unity principle to those states which are party to both the Paris Convention and the 1988 Joint Protocol, the Slovak courts) will also have jurisdiction to determine nuclear damage claims of victims from Denmark, Finland, Greece, the Netherlands, Germany, Slovenia, Sweden and Italy.

5. On the contrary, Regulation I Brussels is directly applicable to claims of victims from states which have neither signed the 1988 Joint Protocol (such as Cyprus, Ireland, Luxembourg, Malta and Austria) nor ratified it (Belgium, France, Portugal, Spain, United Kingdom).³⁵⁷

³⁵³ Lamm 2017, p. 37.

³⁵⁴ *Id.*, p. 38.

³⁵⁵ For a discussion of this Joint Protocol, see *supra* section 5.2.

³⁵⁶ According to French law (Loi No. 68-943 du 30 octobre 1968 relative à responsabilité civile dans le domaine de l'énergie nucléaire, modifié par loi No. 90-488 du 16 juin 1990 et loi No. 2006-686 du 13 juin 2006) this limit is set at SDR 76 million.

³⁵⁷ Handrlica 2010, p. 17-18.

It is worth underlining that it is not fully clear whether Article 71(1) Regulation I Brussels is applicable on the revised Paris Convention. The Regulation Brussels I is since 2015 replaced by Regulation 1215/2012³⁵⁸ on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters. It is the outcome of the so-called communitarisation of international private law that gives the EU exclusive competence in the area of judicial cooperation and enforcement of decisions.³⁵⁹

These examples were aimed at highlighting that considerable gaps and discrepancies subsist in the system of judicial co-operation in nuclear liability cases within the Community, and the Community could take legislative measures in matters of judicial competence based on the EC Treaty provisions in the field of judicial co-operation in civil matters.³⁶⁰

8.4 Mass tort litigation

8.4.1 Silence of the international liability conventions

Nuclear accidents are probably the best example of accidents where the potential number of victims can be quite large. That of course raises the question how litigation will take place in an effective manner, still awarding adequate compensation in a timely manner to the victims. It is striking that in the international nuclear liability framework these procedural questions related to mass tort litigation are not discussed.³⁶¹ Pelzer stressed that this fact is a consequence of the leitmotiv of the conventions, “Whenever risks, even those associated with nuclear activities, can properly be dealt with through existing legal processes, they are outside the scope of the Convention.”³⁶² He further argued that for the drafters of the conventions, this appears to be the case as the national procedural law of the contracting parties shall continue to apply.³⁶³ International harmonisation is also lacking, and national rules regulate the procedure of bringing compensation claims, which potentially leads to differences in approach and in substance among the states.³⁶⁴ However, the conventions agree that jurisdictions lie exclusively with the courts of the Contracting Party in whose territory the nuclear incident occurred; or otherwise where a nuclear incident occurs outside the territory of the Contracting Parties, or where the place of the nuclear incident cannot be determined with certainty, jurisdiction over such actions shall lie with the courts of the Contracting Party in whose territory the nuclear installation of the operator liable is situated.³⁶⁵ This constitutes an exemption of extraordinary and decisive importance: the conventions, in a binding way, define the court that has exclusive jurisdiction over actions made under the conventions.³⁶⁶

Furthermore, with regard to enforcement, contracting Parties must ensure that only one of their courts shall have jurisdiction in relation to any one nuclear incident.³⁶⁷ Pelzer argues that “the procedural concentration of lawsuits to the courts of one country, and even to a single court of the country that

³⁵⁸ Regulation (EU) No 1215/2012 of the European Parliament and of the Council of 12 December 2012 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters, OJ L 351, 20.12.2012, p. 1-32.

³⁵⁹ Novotná and Varga 2014, p. 103.

³⁶⁰ Handrlica 2010, p. 18.

³⁶¹ Pelzer 2017, p. 47.

³⁶² NEA (1982), Revised text of the Exposé des Motifs of the Paris Convention, approved by the OECD Council on 16 November 1982, para. 7, available at http://www.oecd-nea.org/law/nlparis_motif.html (last accessed on 9 December 2018).

³⁶³ Pelzer 2017, p. 47.

³⁶⁴ *Id.*, p. 47.

³⁶⁵ Article 13 of the Paris Convention and the 2004 Paris Convention; Articles XI and XII of the Vienna Convention; Articles XI, XI A and XII of the 1997 Vienna Convention; Article XIII of the CSC.

³⁶⁶ Pelzer 2018, p. 48.

³⁶⁷ Article XII(4) of the 1997 Vienna Convention, and Article 13(h) of the 2004 Paris Convention,. There is no corresponding provision in the CSC.

has jurisdiction, is an indispensable component for successfully overcoming the complex problems of mass tort litigation in cases of transboundary nuclear damage. It supplements the substantive concentration of liability solely onto the operator of a nuclear installation (channelling of liability). Without material and procedural channelling, the compensation of nuclear damage after a major nuclear incident with transboundary detrimental effects would be a most difficult and complex affair. The courts of all states in whose territories nuclear damage was suffered would be competent to hear claims. It does not need an explanation that such multiplicity is not at all helpful for smooth and quick compensation. Diverging judgements are probable, and that situation will not contribute to legal peace."³⁶⁸

8.4.2 Discretion of the Member States

Within the EU, practical arrangements are equally left to the discretion of each Member State. For example, claims handling costs may in some countries lie with the operator, while in other countries they may, up to a certain limit, be the responsibility of the insurer. Similarly, handling the registration and payment of compensation claims may lie either with the operator or the insurer, or even both operator and insurer working in tandem.³⁶⁹ Therefore, as a general rule, Members do not have special provisions to face nuclear mass tort litigations in the event of a catastrophic nuclear damage. Solutions are sometimes sought in options to deal with mass litigations that are provided by general national law. Members may think that there is no urgent need for a detailed advance regulation of nuclear proceedings, and defer decisions to the time when concrete actions are needed after a nuclear incident.³⁷⁰

8.4.3 Examples

Various examples can illustrate this tactics within the legislation of the Member States to defer decisions concerning mass tort litigation to the moment that a nuclear accident would have occurred. A first example provided by Pelzer constitutes Germany.³⁷¹ The deferred legislative approach is contained in the 1959/1985 German Atomic Energy Act.³⁷² In cases where the damage exceeds the compensation money available, Section 35 of the Atomic Energy Act provides that the distribution of the compensation money available and "the procedure to be observed in this context shall be governed by an act or, pending such act, by statutory ordinance". The provision is not only a reminder but it also contains a clear mandate: an adequate procedure shall be adopted to deal with the distribution of the money available. This procedure may include specifically designed mass tort litigation rules.³⁷³

A second example of such a deferred legislation constitutes the case of France.³⁷⁴ French nuclear liability law also has legislation deferring decision-making.³⁷⁵ If the money available is insufficient to cover all

³⁶⁸ Pelzer 2017, p. 48.

³⁶⁹ For an overview of these differences, see OECD 2003.

³⁷⁰ Pelzer 2017, p. 51.

³⁷¹ See Pelzer 2017, p. 51.

³⁷² Act on the Peaceful Utilisation of Atomic Energy and the Protection against its Hazards (Atomic Energy Act) of 23 December 1959, in the version of 15 July 1985 (Bundesgesetzblatt (BGBl.)1985 I, p. 1565), as last amended by the Act of 27 January 2017 (BGBl. 2017 I, p. 114).

³⁷³ Pelzer emphasized that "the legislator (Parliament) is, of course, not bound by this "mandate". Parliament may do more or less than what Section 35 prescribes. This does not apply for the statutory ordinance, which may be issued as a provisional instrument as long as the act on apportionment is still pending."

³⁷⁴ See Pelzer 2017, p. 52.

³⁷⁵ Loi n° 68-943 du 30 octobre 1968 relative à la responsabilité civile dans le domaine de l'énergie nucléaire [Act No. 68-943 of 30 October 1968 on third party liability in the field of nuclear energy], Journal officiel de la République Française [Official Journal of the French Republic] (JORF), 31 October 1968, p. 10195; as last amended by Ordonnance n° 2012-6 du 5 janvier 2012 modifiant les livres Ier et V du code de l'environnement [Ordonnance No. 2012-6 of 5 January 2012 amending Books I and V of

nuclear damage, the cabinet of ministers has to state this “*situation exceptionnelle*” [exceptional situation] in a “*décret*” [decree] within six months after the nuclear incident and to fix the modalities of compensation within the amounts established under Articles 4 and 5 of the Nuclear Liability Law. Personal injury has to be prioritised, and the remaining money has to be apportioned among the victims with personal injury and victims suffering other damage (French Nuclear Liability Law, Article 13(3)).

A third example constitutes Belgium. In 2017, the Belgian legislator adopted the Law of 7 May 2017 to reform the inspection of nuclear installations in the country.³⁷⁶ Belgian legislation now explicitly reaffirms the primary responsibility of the holder of the authorisation: “The authorisation holder is responsible in all circumstances for the protection of workers, the population and the environment against the risks or health hazards that may result from the exercise of his practice.” Furthermore, this responsibility cannot be delegated.

At the same time, each authorisation holder is obliged to set up a Physical Control Service (PCS) for the practice for which he is responsible.³⁷⁷ However, assignments to the PCS do not affect the authority or the responsibilities of the authorisation holder. The FANC is responsible for monitoring how the PCS performs its mission.³⁷⁸ Appendix 1 provides a few relevant articles of the Belgian domestic law that may illustrate the issue.

8.5 Practice in Member States: The Belgian example

The legal framework in Belgium defines several provisions intended to regulate inspections so as to ensure a high level of protection. As Belgium is a Member State of the European Union and Euratom, the Belgian national policy and strategy for safety are framed by the Euratom Treaty and its directives (including the directive setting basic safety standards, the directive on medical exposure, the directive on radioactive waste and spent fuel; the directive on high-activity sealed radioactive sources, the directive on nuclear safety...) and regulations (e.g. regulation on radioactive shipment within EU...).

The regulation of nuclear facilities and activities is a federal matter.³⁷⁹ The management of radioactive waste on the Belgian territory is organised at the federal level. The involvement of the regional authorities in the regulation of nuclear activities remains limited to consultation (for instance in the clearance from licence) and exchange of information, with the aim to ensure a coordinated treatment of the nuclear and non-nuclear environmental aspects. The policies and strategy which establishes the

the French Environmental Code], JORF, 6 January 2012, p. 218, text no. 4; ratified by Article III of loi n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte [Act No. 2015-992 of 17 August 2015 on the energy transition for green growth], JORF, 18 August 2015, p. 14263, text no. 1).

³⁷⁶ Law of 7 May 2017 amending the law of 15 April 1994 on the protection of the population and the environment against the dangers arising from ionising radiation and relating to the Federal Agency for Nuclear Control, concerning the organisation of Physical control, M.B. May 29, 2017.

³⁷⁷ Physical control is defined as all measures carried out under the responsibility of the holder of the authorisation, in order to verify that the population, the workers and the environment are effectively protected against the danger of ionising radiation, and that the associated risks are effectively managed, except : 1. measures relating to the monitoring of the health of persons occupationally exposed to ionising radiation; 2. measures relating to the monitoring of the medical exposure of persons; 3. physical protection measures; and 4. security measures for radioactive substances.

³⁷⁸ Lysy, B., Réforme de l’inspection des installations nucléaires, Press release, 31/05/2017.

³⁷⁹ In the federal government, the Minister of Home Affairs is politically accountable for nuclear safety matters. In addition to supervising the FANC, this Minister is also responsible for: regulations (promulgation), licensing of class I facilities, emergency response planning and coordination of response in case of an emergency (nuclear or not), appeal against decisions of the FANC, including appeal to licenses for class II and III facilities; See Kingdom of Belgium, Seventh Meeting of the Contracting Parties to the Convention on Nuclear Safety, National Report, August 2016, p.24.

legal framework for nuclear and radiation safety in Belgium are broadly defined in the Act of 15 April 1994 and several royal decrees.³⁸⁰

With regard to inspections, the main provisions are laid down in Article 9 of the Act of 15 April 1994.

Article 9 states:

§1

Without prejudice to the powers of the judicial police officers referred to in Article 8 of the Code of Criminal Investigation, the statutory and contractual staff members of the Agency appointed by the King for this purpose oversee the respect of the regulations of the European Union, which fall within the competence of the Agency, the provisions of this Law, its implementing decrees, as well as the respect of the conditions mentioned in the authorisations, permissions or approvals in execution of these provisions, and are in charge of the accompaniment in accordance with Article 10, paragraph 2, of the law of 20 July 1978 establishing provisions to enable the International Atomic Energy Agency to carry out inspection and verification activities on Belgian territory, in implementation of the International Agreement of 5 April 1973 made in application of §§ 1 and 4 of Article III of the Treaty of 1 July 1968 on Non-Proliferation of nuclear weapons 3 [and in Article 12, § 5, of the Act of 1 June 2005 on the application of the Additional Protocol of 22 September 1998 to the International Agreement of 5 April 1993 adopted pursuant to Article III, paragraphs 1 and 4, of the Treaty of 1 July 1968 on the Non-Proliferation of Nuclear Weapons] 3.

§2

The staff members designated in accordance with § 1 are named "nuclear inspectors".

§3

The staff members appointed in accordance with § 1 shall take an oath, prior to the performance of their duties and in the terms provided for in Article 2 of the decree of 20 July 1831 concerning the oath to the implementation of the representative constitutional monarchy, in the hands of the Minister who exercises guardianship over the Agency or its delegate.

§4

Nuclear inspectors may exercise their powers throughout Belgium, but only for the purpose of supervising the implementation of the provisions of this Law and its implementing decrees, as well as compliance with the conditions set out in the authorisations, permissions or approvals in execution of these provisions, the law of July 20, 1978 establishing provisions to allow the International Atomic Energy Agency to carry out inspection and verification activities on Belgian territory, in execution of the International Agreement of 5 April 1973 made in application of §§ 1 and 4 of Article III of the Treaty of 1 July 1968 on the Non-Proliferation of Nuclear Weapons, of the Act of 1 June 2005 on the application of the Additional Protocol of 22 September 1998 to the International Agreement of 5 April 1973 made pursuant to Article III, paragraphs 1 and 4, of the Treaty of 1 July 1968 on the non-proliferation of nuclear weapons and Articles 477 to 477sexies and 488bis 3 [to 488quinquies] 3 of the Penal Code.

§5

An updated nominal list of the staff members designated in accordance with § 1 shall be published at least every two years in the form of a ministerial decree.

³⁸⁰Examples of such decrees are The Royal Decree of 20 July 2001 laying down the "General Regulations regarding the protection of the public, the workers and the environment against the hazards of ionising radiation"(GRR-2001, amended for the last time in 2015); or The Royal Decree of 30 November 2011 on the Safety Requirements for Nuclear Installations (SRNI-2011 amended for the last time in 2015).

The powers conferred in accordance with § 1 may be withdrawn by the King.

The first paragraph of Article 10 further clarifies the role of nuclear inspectors:

§1

Staff members referred to in Article 9, provided with documentary evidence of their duties, shall have the following supervisory powers in the exercise of their duties, both in the context of the administrative processing power and in the context of the recording of infringements by minutes:

1° They shall at all times and without prior warning have free access to the means of transport, factories, storage facilities, hospitals and, more generally, to all establishments where are produced, manufactured, detained or used devices or substances capable of emitting ionising radiation, and in all places for which they may have a reasonable ground to presume that the above-mentioned apparatus or substances may be found, subject to the provisions of the laws under their supervision, or evidence of the existence of an offense. However, they have no access to the inhabited premises or other spaces and places actually developed as housing and used as such without the prior authorisation of the investigating judge. A home visit authorisation for access to inhabited areas may be obtained after 9 pm and before 5 am, subject to a specially motivated request addressed to the investigating judge;

(...)

Art. 10septies

§1

Staff members referred to in Article 9 may take or impose all appropriate measures, including organisational measures, which they consider necessary for the health and safety of workers and the public and for the protection of the environment against the ionising radiation, both for the prevention of hazards and for the purpose of combating or eliminating any deficiencies or nuisances which they identify and consider to be a danger.

In Belgium, the various establishments that use radioactive substances or devices capable of emitting ionising radiation have been divided into four classes of establishments. These classes are determined by the size of the potential nuclear or radiological risk of the operation. Nuclear reactors are in class I and are subject to stricter control and authorisation rules because of the higher risk associated to these activities.

The FANC,³⁸¹ together with its technical subsidiary Bel V, constitute the regulatory body in Belgium. Nevertheless, some decisions on safety matters do not legally rest with the FANC, such as the promulgation of binding legislation/regulation and the licensing of class I nuclear facilities (the King issues the licence). FANC has a key role in the preparation of these legislations/regulations and licences.³⁸²

³⁸¹ The FANC is established as the public interest organisation having legal personality. Its missions include, inter alia, to propose and prepare new regulations related to this Act, review the license applications for nuclear facilities; grant licenses for specific facilities, except those with the highest risk (class I), perform safety and security assessment of nuclear facilities and conduct inspections in those facilities, perform radiological surveillance of the territory, provide technical assistance to the Ministry of Home Affairs in case of nuclear emergencies, to gather scientific and technical documentation in the field of nuclear safety and to stimulate and coordinate R&D; and issue neutral and objective information to the public. The FANC can also delegate some of its missions to organisations that FANC has recognized or to legal entities that it has created to that end. See Articles 14-15 of the Act of 15 April 1994.

³⁸² Kingdom of Belgium, Seventh Meeting of the Contracting Parties to the Convention on Nuclear Safety, National Report, August 2016, p. 21.

8.5.1 Control of class I facilities

Control during the operation of the Class I facilities is carried out at various levels and by various authorities. The first level is the operator's physical control service. Its mission is to examine and control the protective measures implemented to ensure compliance with the regulations on the protection of workers, the population and the environment. It reviews and approves projects or modifications to the installation. It also examines the measures to be taken after an incident or accident. The second level of control is exercised by Bel V experts or the approved body. They check, among other things, whether the physical control service is functioning properly and whether the operation of the facility meets the requirements of the authorisation. They also follow the implementation of corrective measures following an incident or accident. These controls can be almost daily, but they can also be limited to a few operations per quarter depending on the installation. For example, a Bel V expert is present almost daily at the sites of the Doel and Tihange nuclear power plants. The third level of control is operated by the FANC. Nuclear inspectors can take any measure necessary to ensure nuclear safety and, in particular, emergency measures to protect workers, the public or the environment. The FANC inspection program has two components. On the one hand, there are planned thematic inspections (on topics such as the release of waste, sealed sources of high activity, gaseous and liquid discharges ...). On the other hand, the FANC carries out reactive inspections in different cases, such as following an incident or accident, after a complaint concerning the safety of an operator, or at the request of the Federal Police or the public prosecutor.

The regulatory body (the FANC and Bel V) defines a 3-year strategy for class I facilities which is used to design an annual plan for the inspection of all class I facilities. Inspections are either announced or unannounced, and in a category of proactive or reactive as a function of established criteria and circumstances. Inspection methods include documentation review, events review, interviews and field visits, and the monitoring and sampling of activities or parameters.³⁸³

8.5.2 Enforcement policy and processes

The different enforcement tools and powers of the Regulatory Body are described in the Act of 1994 as well as in the Royal Decree of 20 July 2001 on the powers and appointment of members of the inspection section of the FANC.³⁸⁴

According to the legislation, the nuclear inspectors are auxiliary officers of the Public Prosecutor's criminal investigation department. The FANC has about 15 nuclear inspectors. Bel V inspectors do not have enforcement powers.

The different enforcement measures are warning, confiscation, measure intended to render sources harmless, withdrawal/revocation/modification/suspension of the license, simplified administrative fines, administrative fines imposed by the FANC, prosecution recording for courts, and also financial and prison penalties according to the Law of 1994.³⁸⁵

³⁸³ IAEA, Integrated Regulatory Review Service (IRRS) Mission to Belgium, Brussels, Belgium, 1 to 13 of December 2013, p. 72.

³⁸⁴ The enforcement tools are further described in the Royal Decree of 20 December 2007 laying down the terms of the simplified administrative procedure for paying administrative fines and in the Royal Decree of 20 December 2007 laying down the terms of the administrative procedure for paying administrative fines.

³⁸⁵ IAEA, Integrated Regulatory Review Service (IRRS) Mission to Belgium, Brussels, Belgium, 1 to 13 of December 2013, p. 83.

8.5.3 International cooperation

8.5.3.1 Cooperation at bilateral level

With regard to cross-border cooperation, the law does not provide provisions for foreign nuclear inspectors to carry out independent inspections in Belgian power plants. However, “several bilateral agreements are in force and the FANC has extended collaboration with foreign regulatory bodies, in particular with his neighbouring countries (France, the Netherlands and Luxembourg). Among others, this cooperation includes sharing of information, technical meetings, attendance at inspections on the field, and exchange of experts. With respect to emergency planning and response, the Belgian provincial authorities are also regularly involved in foreign emergency exercises for the nuclear power plants that are close to the Belgian border. Exchanges of observers with the French Safety Authority (ASN) for emergency planning exercises are organized on a systematic basis, as well as participation of inspectors to cross-inspections.”³⁸⁶

At the European level, multilateral cooperation exists within the framework of ENSREG, WENRA and HERCA. IN its 2017 report to the Convention on Nuclear Safety, Germany stated the existence of bilateral commissions with almost all neighbouring states that operate nuclear installations. Such a bilateral commission has also been initiated by Belgium and Germany. Moreover, there is also a regular bilateral exchange between nuclear experts from Austria and Germany.³⁸⁷

8.5.3.2 International peer review missions³⁸⁸

In the nuclear sector, peer review missions are the most notable international cooperation mechanisms among Member States. These missions are regularly conducted to assess the legal and regulatory frameworks put in place by the states and / or the operators’ nuclear safety performance. There are several peer reviews mechanisms focused either on nuclear safety and security, or nuclear power plants. These peer review schemes are meant to support the independence of national nuclear safety regulators.

8.5.3.2.1 Peer Review Services for Nuclear Safety and Security

Integrated Regulatory Review Service – IRRS

The IRRS is a service provided by the International Atomic Energy Agency at the request of a Member State. During this type of mission, an international team of experts analyzes the legal and regulatory framework of the Member State. The team assesses the extent to which the legal and regulatory framework, national structures and regulators correspond to international standards and guidelines, as defined in the IAEA Safety Standards. Such a peer review mission was conducted in Belgium, particularly at the FANC and its technical subsidiary Bel V from 1 to 13 December 2013. The visit by a team of international experts as part of an IRRS-type assessment mission was organized by the IAEA. A follow-up mission was scheduled from November 27 to December 5, 2017.

International Physical Protection Advisory Service – IPPAS

³⁸⁶ Kingdom of Belgium, Seventh Meeting of the Contracting Parties to the Convention on Nuclear Safety, National Report, August 2016, p. 46.

³⁸⁷ Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Convention on Nuclear Safety, Report by the Government of the Federal Republic of Germany for the Seventh Review Meeting in March/April 2017, p. 23.

³⁸⁸ See in general information from the FANC on: [https://www.afcn.fgov.be/fr/lafcn/relations-internationales/services-dexamen-par-les-pairs-en-matiere-de-surete-et-de-securite](https://www.afcn.fgov.be/fr/lafcn/rerelations-internationales/services-dexamen-par-les-pairs-en-matiere-de-surete-et-de-securite).

An IPPAS mission aims to analyze to what extent the nuclear safety regulations and practices of the host country correspond to international standards. It therefore assists its Member States in strengthening their physical protection regime, i.e. all measures to protect radioactive materials as well as nuclear installations and transports against sabotage, theft or any other malicious act.

8.5.3.2.2 International missions on nuclear power plants

Operational Safety Review Team – OSART

An OSART mission is a review conducted by teams of international experts on the safe and reliable operation of a nuclear power plant. It is a service proposed by the IAEA to advise and assist Member States to improve the safety of nuclear power plants during construction, commissioning and operation. OSART missions were held in 2007 at Tihange NPP and in 2010 at Doel NPP with subsequent follow up respectively in 2009 and 2012. Both sites undergo a peer review by World Association of Nuclear Operators (WANO) on a three year basis with a follow-up in between.

Safety Aspects of Long Term Operation – SALTO

The purpose of a SALTO mission is to assist and advise the IAEA member country, upon request, on the safety aspects of extending the operational life of a nuclear reactor. This mission is generally organized in two stages: a first preparation mission, called "Pre-SALTO", is first conducted in nuclear power plants considering an LTO, and a second mission, called "SALTO", is then carried out in facilities whose operating life will actually be extended.

As part of the Long Term Operation (LTO) of Tihange 1, Doel 1 and 2 until 2025, the FANC asked the IAEA to organise a SALTO mission for these reactors. A Pre-SALTO mission took place in 2012 at Tihange 1. The SALTO mission at Tihange 1 took place from 13 to 22 January 2015. For the Doel 1 and 2 reactors, the SALTO mission took place from 14 to 23 February 2017.

The reports resulting from a SALTO mission contain a clear disclaimer that Members are not exempted from performing a safety assessment: *"Findings, conclusions and recommendations resulting from the IAEA Programme are intended only to assist national decision makers who have the sole responsibility for the regulation and the safe operation of their nuclear power plants. Moreover, they do not replace a comprehensive safety assessment which needs to be performed in the framework of the national licensing process"*.³⁸⁹

It is worth noting that Belgian experts volunteer to participate in IRRS and in other peer review missions such as OSART missions or EU stress test peer review. A Belgian pool of experts available for performing IRRS missions has been established and is maintained.³⁹⁰

8.6 Concluding Remarks

Also as far as enforcement is concerned the nuclear field provides a few remarkable features. Although, as we indicated in chapters 3 and 7, there is substantial international regulation (for example in the Convention on Nuclear Safety and in IAEA safety standards) as well as EU directives (more particularly the Nuclear Safety Directive), enforcement of these norms is entirely a matter of the Member States.

³⁸⁹ IAEA, Report, Peer Review Service on Safe Long Term Operation (SALTO Peer Review Service) SALTO Peer Review Mission for Doel Nuclear Power Plant Unit 1 and 2 in Belgium, Doel, Belgium, 14-23 February 2017.

³⁹⁰ Kingdom of Belgium, Seventh Meeting of the Contracting Parties to the Convention on Nuclear Safety, National Report, August 2016, p. 34.

There are specific reporting obligations imposed upon the Member State, but there is even no mechanism of enforcement or any sanction in case of non-compliance with these reporting requirements. In addition, there is a peer review via the so-called stress tests, but these are also criticised as being a one-time ad hoc exercise. Surprise inspections can take place at the Member State level, but even the way in which inspections or monitoring should take place is not regulated in a very precise manner. Risk-based enforcement does exist in some Member States like Belgium, but the need for a more harmonised approach remains important. Likewise, several regulatory bodies in neighbouring countries (such as Belgium, France, the Netherlands and Luxembourg) are involved in bilateral cooperation. However, there is no compulsory requirement in this regard. Participation of Member States in international cooperation and peer review systems are similarly done on a voluntary basis.

It is striking that there are no further competences awarded to the EU level to directly control nuclear safety within the nuclear power plants. And even if that were not the case, there are examples in EU environmental law where at least the methods of monitoring and inspection are prescribed in a relatively detailed manner which could be the least recommendation for the nuclear safety domain as well.

Also as far as nuclear liability is concerned, the Joint Protocol has apparently not solved all problems, as there still are substantial gaps and discrepancies in the system of judicial cooperation in nuclear liability cases. That therefore would also require further action. Furthermore, the international nuclear liability conventions have no specific provisions to deal with the mass tort litigation that a nuclear accident will undoubtedly cause. Member States have basically deferred decision-making in that respect until the moment that a nuclear accident would really occur. Also that may be largely undesirable for the reason that it may be difficult in the panic of the moment after a nuclear accident to organise an efficient dispute resolution mechanism to award adequate compensation to the victims. It would be recommended to work out such a mechanism of allocating compensation to the victims before an accident occurs.

9. CITIZEN AND NGO INVOLVEMENT IN THE DECISION-MAKING CONCERNING NUCLEAR POWER PLANTS

KEY FINDINGS

- The environmental impact assessment is an important instrument, equally applicable to the nuclear sector.
- In the transboundary context the Espoo Conventions regulates EIA for projects with significant adverse transboundary environmental impacts.
- Questions arise concerning the application of EIA in case of plant lifetime extension.
- . Access to information, public participation and access to justice, also in the nuclear case, is regulated by the Aarhus Convention.
- Notwithstanding a broad interpretation by the CJEU specific problems do arise in the application of Aarhus rights to the nuclear case.
- The interests of full transparency and access to information concerning nuclear risks equally has to be balanced against other risks, such as the undisturbed provision of electricity and safety risks (such as terrorism).

9.1 Introduction

Increasing public participation in the process of decision-making with regard to nuclear safety matters could help appease public concerns and increase credibility and acceptance. In general, nuclear safety provisions involve weighing different policy alternatives, some of which are dealing with highly technical issues. There is currently a tendency to shift away from the traditional view that decisions regarding technical issues should be dealt with by experts and scientists. It is essential to ensure that participatory governance is made meaningful to make sense in a decision-making process, especially when ultra hazardous activities are at stake and specific knowledge is required. The most appropriate method of public involvement will most likely depend on the specifics of any particular situation and more knowledge-based decisions (e.g., technical risk assessments) will require lower levels of involvement than more value-based decisions.³⁹¹ In general, the lowest level of public involvement entails a top-down communication and a one-way flow of information, while the highest level is characterized by dialogue and two-way information exchange.³⁹²

To account for the cross-border nature of nuclear safety, tools that enable and facilitate an inclusive and transboundary discourse are extremely important³⁹³ to ensure a higher acceptance in the countries concerned. Public involvement in the nuclear sector was rather slow, and public participation and transparency were only gradually facilitated by legislative initiatives in the area of environmental law.³⁹⁴

This chapter will address the extent to which civil society, meaning the public at large, individuals but also NGOs could be involved in decision-making concerning nuclear power plants. This to some extent

³⁹¹ Rowe and Frewer 2000, p. 6.

³⁹² *Id.*, p. 6.

³⁹³ Ebbesson 2001, p. 255.

³⁹⁴ Heldt 2015, p. 25.

relates to an involvement in the siting of nuclear power plants, an issue already analysed in chapter 7 where the importance of the instrument of environmental impact assessment was mentioned. However, public participation of course goes beyond an involvement in the plans to site a particular nuclear power plant. The public may also desire access to information and even access to justice, for example related to the nuclear safety at particular power plants.

Access to information, public participation and access to justice have been largely discussed and regulated within the framework of the Aarhus Convention. Environmental impact assessment is, especially in a transboundary context, regulated in the Espoo Convention which was already discussed in section 7.3.1.

This chapter will generally sketch the rules concerning citizen and NGO involvement in environmental matters and of course specifically in the nuclear domain. Questions concerning public participation and access to information have already arisen with respect to the nuclear domain and these cases will therefore be discussed.

This chapter proceeds as follows: first, the rules concerning environmental impact assessment in the domestic and transboundary context will be sketched (9.2); then, we will turn to access to information, public participation and access to justice, in other words, the Aarhus Convention and the related case law (9.3). We sketch specific questions that have arisen concerning the nuclear case (9.4). Section 9.5 concludes.

9.2 Environmental impact assessment and the Espoo Convention

9.2.1 Environmental impact assessment

The EU Directive on Environmental Impact Assessments³⁹⁵ from 1985 provides requirements for public participation. This Directive also applies to the nuclear sector and is a first example of how more procedural rights strengthening the position of the public have been introduced into the nuclear sector by environmental law.³⁹⁶

Article 1 defines the scope of the Directive as follows:

“the Directive shall apply to the assessment of the environmental effects of those public and private projects which are likely to have significant effects on the environment”.

Article 5 requires that measures are adopted by Members to make available necessary information. Regarding transboundary consultations, Article 7 states:

“Where a Member State is aware that a project is likely to have significant effects on the environment in another Member State or where a Member States likely to be significantly affected so requests, the Member State in whose territory the project is intended to be carried out shall send to the affected Member State as soon as possible and no later than when informing its own public, inter alia:

³⁹⁵ Directive 85/337/EEC as amended and codified by Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance , OJ L 26, 28.1.2012, p. 1-21, *also amended by* Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance , OJ L 124, 25.4.2014, p. 1-18.

³⁹⁶ Heldt 2015, p. 29.

(a) a description of the project, together with any available information on its possible transboundary impact,

(b) information on the nature of the decision which may be taken."

The Environmental Impact Assessment Directive also lays down in its Article 11(1) provisions to guarantee access to justice:

"Member States shall ensure that, in accordance with the relevant national legal system, members of the public concerned:

(a) having a sufficient interest, or alternatively;

(b) maintaining the impairment of a right, where administrative procedural law of a Member State requires this as a precondition; have access to a review procedure before a court of law or another independent and impartial body established by law to challenge the substantive or procedural legality of decisions, acts or omission subject to the public participation provisions of this Directive."

Summarising: this Directive is an important instrument, also applicable to the nuclear sector, which imposes an obligation on Member States to organise an EIA for public and private projects that are likely to have significant effects on the environment.³⁹⁷ The EIA system at the EU level also guarantees that information collected should be made available to the public and guarantees access to justice.

9.2.2 The Espoo Convention

The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) was adopted in 1991 and entered into force in September 1997. A first amendment to the Espoo Convention entered into force on 26 August 2014.³⁹⁸ There are currently 45 States that are parties to the Espoo Convention. The EU is also a party to the Convention and has transposed the provisions related to the environmental impact assessment (EIA) procedure in its legislation. As a result, the principles of the Convention are binding on all EU Member States.³⁹⁹

The Espoo Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also establishes the obligation of States to notify and consult each other on all major projects under consideration that are likely to cause a significant adverse transboundary effect.

Article 2 of the Espoo Convention lays down the fundamental obligations on the Contracting States:

'1. The Parties shall, either individually or jointly, take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities.

2. Each Party shall take the necessary legal, administrative or other measures to implement the provisions of this Convention, including, with respect to proposed activities listed in Appendix I that are likely to cause significant adverse transboundary impact, the establishment of an environmental impact assessment

³⁹⁷ For details see Jans and Vedder 2012, p. 346-354.

³⁹⁸ A second amendment which has been adopted by the Meeting of Parties to the Espoo Convention on 4 June 2004 has not yet entered into force.

³⁹⁹ See on the relationship between the Espoo Convention and the EIA Directive which was discussed in the previous section, Jans and Vedder 2012, p. 353-354 and see generally on the Espoo Convention, Sands and Peel 2012, p. 610-613.

procedure that permits public participation and preparation of the environmental impact assessment documentation described in Appendix II."

With regard to the nuclear sector, Appendix I, point 2 defines thermal power stations covered by the Convention:

"Thermal power stations and other combustion installations with a heat output of 300 megawatts or more and nuclear power stations and other nuclear reactors (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load)."

The Espoo Convention was complemented by the Protocol on Strategic Environmental Assessment (SEA) which was adopted in Kyiv in 2003. The SEA Protocol aims at ensuring that individual Parties integrate environmental assessment into their plans and programmes at the earliest stages, so as to contribute to sustainable development. It equally provides for extensive public participation in the governmental decision-making process. The Protocol entered into force on 11 July 2010. The protocol is similar to the EU Directive 2001/42/EC⁴⁰⁰ on SEA.

As was made clear, the Espoo Convention is also applicable to nuclear installations. The Espoo Convention therefore provides rights to neighbouring states in case of a siting of a nuclear power plant. The environmental impact assessment has to take into account the adverse transboundary impacts and public participation has to be guaranteed.

Some problems can, however, arise concerning the application of environmental impact assessment to the nuclear case.

9.2.3 Implementation of environmental impact assessment: the Belgian case

As ageing nuclear power stations have been raising major concerns in many Member States, including Belgium, the question was sent to the Cour constitutionnelle (Constitutional Court, Belgium) as to whether the adoption of a law extending the period of industrial production of electricity by nuclear power stations requires an environmental impact assessment. Two associations whose objective is the protection of the environment and living conditions, brought an action before the Cour constitutionnelle seeking annulment of the Law of 28 June 2015 extending the lifetime of the Doel 1 and Doel 2 nuclear reactors without an environmental assessment and a procedure allowing public participation having first been carried out.⁴⁰¹ In a decision of 22 June 2017 the Constitutional Court decided to ask a preliminary question to the Court of Justice of the EU. The Constitutional Court more particularly wants to know whether European law requires that there should be an environmental impact assessment and a procedure of public participation before adoption of an act aiming at plant lifetime extension. If that would be the case, the Constitutional Court wants to know whether the Belgian statutes would violate European law.⁴⁰²

⁴⁰⁰ Directive 2001/42/EC of the European Parliament and the Council concerning the assessment of the effects of certain plans and programmes on the environment

⁴⁰¹ Written observations have been submitted by Inter-Environnement Wallonie ASBL, Bond BeterLeefmilieuVlaanderen vzw and Electrabel SA, as parties in the main proceedings, the Kingdom of Belgium, the Republic of Austria, the Federal Republic of Germany, the Portuguese Republic, the Republic of Finland, the Czech Republic, the United Kingdom of Great Britain and Northern Ireland and the European Commission. Apart from the United Kingdom, those parties also took part in the hearing on 10 September 2018; see Opinion of Advocate General Kokott, Case C-411/17, para. 38.

⁴⁰² Decision of the Constitutional Court No 82/2017 of 22 June 2017.

In its request for a preliminary ruling to address the issue, the Belgian Court refers to the international Espoo and Aarhus Conventions, the EIA Directive and the Habitats Directive,⁴⁰³ which all provide for an environmental assessment, but lay down different requirements. Essentially, the Court strived to obtain an answer to three main questions: namely, first, whether legislative measures require an environmental impact assessment, second, whether the prolongation of an already authorised activity requires an assessment, and third, whether overriding public interests can justify the continued operation of the power stations concerned in the event of any failure to fulfil assessment duties.

Within the framework of this preliminary ruling, Advocate General Kokott delivered on 28 November 2018 an opinion which is the basis of the present section.

Seven nuclear power stations were brought into service in Belgium, at Doel on the Scheldt and Tihange on the Meuse, between 15 February 1975 and 1 September 1985 for an indeterminate period. These power plants were close to several priority habitat type areas and protected areas with special fish species. Furthermore, the border with the Netherlands is a few kilometres away,⁴⁰⁴ and other Member States are approximately 100 kilometres (Germany and France) or more from the location.

In 2003, the Belgian legislature decided formally to cease production of electricity from nuclear energy. The Law of 31 January 2003 provided that no new nuclear power station was to be built and that the power stations in operation were to be gradually taken out of service after they had been in operation for 40 years, that is to say, between 2015 (Doel 1 and 2 and Tihange 1) and 2025. As the nuclear power stations account for more than half of total electricity production, the Law of 31 January 2003 authorised the Government to derogate from it if security of the electricity supply was threatened.

A Law of 18 December 2013 postponed by 10 years the date on which the Tihange 1 nuclear power station was to be taken out of service. In addition, that law abolished the Government's power to derogate from the timetable for taking the nuclear power stations out of service.

The Doel 1 power station ceased electricity production on 15 February 2015, but was afterwards authorized to resume its activities until 15 February 2025. Doel 2 was granted another 10 years operation as well. These lifetime extensions were granted on the condition that an agreement between the Belgian State and Electrabel AG ("Electrabel") would be concluded. That agreement was concluded on 30 November 2015 and contains an investment plan totalling around EUR 700 million "for the extension of the operating life."⁴⁰⁵

The planned investments underwent screening in respect of an EIA, but it was concluded that "an environmental impact assessment was unnecessary because the modifications would not result in any negative radiological impacts or significant changes to the existing radiological environmental impacts."⁴⁰⁶ That decision was challenged before the Raad van State (Council of State, Belgium).⁴⁰⁷

⁴⁰³ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ 1992 L206, p.7), as amended by Council Directive 2013/17/EU of 13 May 2013 (OJ 2013 L158, p.193).

⁴⁰⁴ More particularly the nuclear power plants at Doel (close to Antwerp) are just a few kilometres away from the Dutch border.

⁴⁰⁵ The measures envisaged include the changes to be made under the Fourth Periodical Safety Review and the resistance tests carried out following the accident at Fukushima.

⁴⁰⁶ Opinion of Advocate General Kokott, Case C-411/17, para. 33.

⁴⁰⁷ To the best of our knowledge there has not yet been a final decision of the Belgian Council of State concerning that administrative appeal. There have, however, been various other decisions of the Council of State of several NGOs (including Greenpeace) against the Federal Agency for Nuclear Control (FANC) with respect to the nuclear facilities in Belgium. See for example Decision 235105 of 16 June 2016 No. A217.829/VII-39.556 of Association Benegora against the Belgian State and the

9.3 Access to information; public participation and access to justice

Provisions to ensure transparency and effective public participation are enshrined in a broad perspective of environmental protection. Although practices and responsible organisations vary in different countries, national legislations are based either on international conventions or on EU legislation. The main international convention in this respect is the Aarhus Convention.

9.3.1 The Aarhus Convention

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) was adopted in June 1998 and entered into force on 30 October 2001. It was approved by the EU in 2005,⁴⁰⁸ and the EC is a party to the Convention since May 2005. The Aarhus Convention has been described as having a significant impact on procedural rights in the field of environmental law.⁴⁰⁹ Due to its capacity for considering complaints by members of the public, the Aarhus Convention Compliance Committee has received more cases concerning non-compliance than any other compliance committee under any international environmental agreement.⁴¹⁰

Based on three pillars, the Aarhus Convention establishes rights for the public (individuals and their associations) with regard to the environment:

- the right of everyone to receive environmental information that is held by public authorities (“access to environmental information”). The relevant provisions are laid down in Articles 4-5 of the Convention which defines a very broad scope. Pursuant to Article 4, any person has the right to request environmental information without the need to state a specific interest. This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. Public authorities should make the information available in the form requested unless it is reasonable to proceed otherwise, or the information is already publicly available in another form. Applicants are entitled to obtain this information within one month of the request. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession;
- the right to participate in environmental decision-making (“public participation in environmental decision-making”). This right is dealt with under Articles 6-8 of the Aarhus Convention. Arrangements are to be made by public authorities to enable the public affected and environmental non-governmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment. These comments must be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it;

Federal Agency for Nuclear Control and Decision 235104 of 16 June 2016 No. A217.693/VII-39.546 of Greenpeace Belgium against the Belgian State and the Federal Agency for Nuclear Control.

⁴⁰⁸ Council Decision 2005/370/EC of 17 February 2005 on the conclusion, on behalf of the European Community, of the Convention on access to information, public participation in decision-making and access to justice in environmental matters.

⁴⁰⁹ Wates 2005, p. 2.

⁴¹⁰ Ebbesson 2011, p. 75.

- the right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general ("access to justice"), which is laid down by Article 9 of the Convention.

Annex I to the Aarhus Convention lists the activities which are subject to mandatory public participation under Article 6(1)(a). The fifth indent of point 1 mentions "nuclear power stations and other nuclear reactors including the dismantling or decommissioning of such power stations or reactors."

The Parties to the Convention are required to make the necessary provisions so that public authorities (at national, regional or local level) will contribute to the effectiveness of these rights.

9.3.2 The EU dimension

In 2003, Directives 2003/4/EC⁴¹¹ and 2003/35/EC⁴¹² respectively transposed the first and second "pillars" of the Aarhus Convention. These were to be implemented in the national law of the EU Member States by 14 February and 25 June 2005 respectively. The access to justice pillar has not yet been transposed.⁴¹³

9.3.2.1 First pillar: access to environmental information within the EU

The relevant provisions are to be found in Directive 2003/04/EC which stated in its first article:

The objectives of this Directive are:

(a) to guarantee the right of access to environmental information held by or for public authorities and to set out the basic terms and conditions of, and practical arrangements for, its exercise; and

(b) to ensure that, as a matter of course, environmental information is progressively made available and disseminated to the public in order to achieve the widest possible systematic availability and dissemination to the public of environmental information. To this end the use, in particular, of computer telecommunication and/or electronic technology, where available, shall be promoted.

"Environmental information", is rather broadly defined in the Directive as information in any form on the state of the environment or on the state of human health and safety. Such a broad approach has been supported in Case C-266/09⁴¹⁴ where the CJEU included a procedure for authorisation of a plant protection product within the definition of "environmental protection".

Similarly, "public authorities" is defined in article 2(2) of the Directive in a broad and functional way, including bodies performing public administrative functions, having public responsibilities or functions or providing public services. There is no general rule to decide whether an entity falls within the scope of article 2(2), and the question has to be decided on a case by case basis.⁴¹⁵ Examples of entities that

⁴¹¹ Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC, OJ L 041 , 14/02/2003, p. 0026-0032.

⁴¹² Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC, OJ L 156, 25.6.2003, p. 17-25.

⁴¹³ See further on the importance of the Aarhus Convention for environmental governance, Jans and Vedder 2012, p. 368-378. See on the difficulties to implement access to justice at the EU level Faure and Philipsen 2014.

⁴¹⁴ Case C-266/09 *Stichting Natuur en Milieu and Others v. College voor de toelating van gewasbeschermingsmiddelen en biociden* (2010).

⁴¹⁵ The second subparagraph of Article 2(2) allows Member States not to include in the definition "bodies or institutions when acting in a judicial or legislative capacity." In its judgment of 14 February 2012 in Case C-204/09 on a reference for a preliminary ruling from the Bundesverwaltungsgericht (Germany), *FlachglasTorgau GmbH v. Federal Republic of Germany*, the Court gave a

individual Member States have considered to be “public authorities” in some cases following rulings by national courts include heat generation, water or waste management companies and local environmental foundations.⁴¹⁶ A broad definition of both terms is further supported by other cases before the CJEU.⁴¹⁷

It is worth noting that subject to specific conditions, access to environmental information may in some cases be restricted.⁴¹⁸

9.3.2.2 Second pillar: public information

The provisions on public participation are laid down in Directive 2003/35/EC. The Directive has a twofold objective stated in its first Article:

“The objective of this Directive is to contribute to the implementation of the obligations arising under the Århus Convention, in particular by:

(a) providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment;

(b) improving the public participation and providing for provisions on access to justice within Council Directives 85/337/EEC and 96/61/EC.”

It can be easily inferred from the objective that Directive 2003/35/EC also addresses access to justice.

Provisions for public participation in environmental decision-making are also contained in other environmental directives, such as Directive 2001/42/EC on the assessment of certain plans and programmes on the environment⁴¹⁹ and Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy.⁴²⁰

9.3.2.3 Third pillar: access to justice in environmental matters

Access to justice in environmental matters is intrinsic to EU environmental law, and draws on fundamental principles of EU law that are reflected in the provisions of the EU Treaties, the Aarhus Convention and secondary legislation as interpreted in case-law of the CJEU.⁴²¹

The rule of law includes an effective judicial protection of rights conferred by EU law. The right to an effective remedy is guaranteed by Article 19(1) of the Treaty on European Union, which states that *“Member States shall provide remedies sufficient to ensure effective legal protection in the fields covered by*

broad interpretation of the derogation in the second subparagraph of Article 2(2), which allows Member States not to consider “bodies or institutions when acting in a judicial or legislative capacity” as “public authority”. In its ruling, the Court held that ministries participating in the legislative process may be exempt for the duration of the process.

⁴¹⁶ Report from the Commission to the Council and the European Parliament on the experience gained in the application of Directive 2003/4/EC on public access to environmental information, COM/2012/0774 final Report from the Commission to the Council and the European Parliament on the Experience gained in the Application of Directive.

⁴¹⁷ Case C-321/96 *Mecklenburg v. KreisPinneberg* (1998); Case C-210/97 *Commission v. Germany* (1999).

⁴¹⁸ See in this regard, two examples from the Netherlands and Belgium in sections 9.3.4 and 9.4.3 below.

⁴¹⁹ Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment, OJ L 197, 21.7.2001, p. 30-37.

⁴²⁰ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327, 22.12.2000, p. 1-73.

⁴²¹ C(2017) 2616 final, para. *supra* 18.

Union Law." This right is further stressed in Article 47(1)⁴²² of the Charter of Fundamental Rights of the EU "Everyone whose rights and freedoms guaranteed by the law of the Union are violated has the right to an effective remedy [...]."

Even though the third pillar of the Aarhus Convention has not been fully transposed into EU law, provisions on access to justice are found in both Directives 2003/4/EC and 2003/35/EC. For instance, Article 6 of Directive 2003/4/EC applies the right to an effective remedy with regard to environmental information. It provides for two levels of appeal: administrative review and review before a court of law or another independent and impartial body established by law. Similarly, Article 13(1) of the Environmental Liability Directive⁴²³ stipulates that access should be granted to a court or other independent and impartial public body competent to review the procedural and substantive legality of the decisions, acts or failure to act of the competent authority. It is for the legal system of each Member State to designate the courts and tribunals having jurisdiction and to lay down the detailed procedural rules governing actions for safeguarding rights which individuals derive from EU law.⁴²⁴

The ultimate goal of access to justice provisions is to ensure that individuals and their associations can exercise the rights conferred on them by EU law. There are mainly two kinds of environmental rights: procedural and substantive rights. Procedural rights usually relate to public participation, and include the practical arrangements whereby a public authority informs the public of a proposed decision, receives any submissions, takes these into account and publicly announces its decision.⁴²⁵ Substantive rights refer to individual interests such as human health, protection of property and entitlement to use the environment for a specific purpose, or rights arising from EU nature conservation laws, in particular to allow environmental associations to act in the general interest.⁴²⁶

The Commission proposed in 2003 a Directive on access to justice in environmental matters⁴²⁷ that was unsuccessful due to the reluctance of Member States. The Directive has been qualified as "politically speaking" "dead".⁴²⁸ However, the third pillar has been partly implemented in the EU with regard to the access of justice activities falling under the IPPC and the EIA Directive.

On 28 September 2006, the Regulation (EC) N° 1367/2006⁴²⁹ on the application of the provisions of the Aarhus Convention (Aarhus Regulation) entered into force and into application on 17 July 2007. The Aarhus Regulation addresses the "three pillars" of the Aarhus Convention where those are of relevance to EU institutions and bodies and lays down related requirements.

With regard to access to environmental information, the Aarhus Regulation extends Regulation (EC) No 1049/2001⁴³⁰ regarding public access to European Parliament, Council and Commission documents to all Community institutions and bodies. This is in line with Article 15(3) of the TFEU that gives EU citizens,

⁴²² This article corresponds to Article 6 (right to fair trial) and Article 13 (right to an effective remedy) of the European Convention on Human Rights (ECHR).

⁴²³ Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage, OJ L 143, 30.4.2004, p. 56-75.

⁴²⁴ Case C-71/14 *East Sussex*, paragraph 52; see also Case C-72/95 *Kraaijeveld*, para. 56.

⁴²⁵ C(2017) 2616 final, para. 45.

⁴²⁶ European Commission, Citizen's guide to access to justice in environmental matters, 2018, p. 6.

⁴²⁷ Commission of the European Communities, Proposal for a Directive of the European Parliament and of the Council on access to justice in environmental matters, COM(2003) 624 final.

⁴²⁸ Jans and Vedder 2012, p. 236.

⁴²⁹ Regulation (EC) 1367/2006 of the European Parliament and of the Council on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies, OJ L 264, 25.9.2006, p. 13.

⁴³⁰ Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents, OJ L 145, 31.5.2001, p. 43-48.

residents and businesses the right of access to documents of the EU institutions, bodies, offices and agencies subject to certain principles and conditions. Regulation 1049/2001 lays down the general principles and limits on access to ensure that citizens can exercise their right of access in the easiest possible way. Access can be requested to all documents drawn up or received by an institution, in all areas of EU activities.

The admitted exceptions are laid down in Article 4.

'1. The institutions shall refuse access to a document where disclosure would undermine the protection of:

(a) the public interest as regards:

- public security,

- defence and military matters,

- international relations,

- the financial, monetary or economic policy of the Community or a Member State;

(b) privacy and the integrity of the individual, in particular in accordance with Community legislation regarding the protection of personal data.

2. The institutions shall refuse access to a document where disclosure would undermine the protection of:

- commercial interests of a natural or legal person, including intellectual property,

- court proceedings and legal advice,

- the purpose of inspections, investigations and audits, unless there is an overriding public interest in disclosure.

3. The institutions shall refuse access to a document where disclosure would seriously undermine the protection of the institution's decision-making process, unless there is an overriding public interest in disclosure."

For documents drawn up by third parties, the EU institution must, in case of doubt, consult the third party in order to assess whether an exception applies.

It is worth mentioning that the Aarhus Regulation also enables environmental NGOs meeting certain criteria to request an internal review under environmental law of acts adopted, or omissions, by Community institutions and bodies.

Summarising, the Aarhus Conventions is in principle of great importance also for awarding the Aarhus rights to the public at large for environmental matters. However, as we will illustrate below, there may be practical difficulties in effectuating those rights in practice.

9.3.3 Litigation costs

To ensure that litigation costs do not have a deterrent effect on access to justice, Article 9(4) of the Aarhus Convention provides that the review procedures shall not be prohibitively expensive. In the same line, Article 11(4) states that review procedures shall be fair, equitable, timely and not prohibitively expensive.

In practice, there is no threshold to determine when the costs become prohibitive, and the assessment depends on the circumstances of each case. Under the case law of the CJEU, the assessment of the cost of judicial proceedings "cannot be a matter for national law alone", and, in the interest of uniform application of EU law and the principle of equality, the notion of "prohibitive costs" must be given an autonomous and uniform interpretation throughout the EU.⁴³¹ Member States should ensure for the claimant a reasonable predictability as regards both whether the costs of the judicial proceedings in which he becomes involved are payable by him, and their amount.⁴³² In addition, account must be taken of the costs at all stages of proceedings, i.e. not only at the stage of first-instance proceedings, but also at the stages of an appeal or second appeal.⁴³³ The assessment must also include all the costs borne by the party concerned, such as legal representation costs, court fees, the cost of evidence and experts' fees,⁴³⁴ as well as any financial guarantees that a claimant is asked to provide.

9.3.4 Case law

According to the procedural autonomy, Members have a certain freedom to decide how their national court system should operate. National courts are "the ordinary courts" for implementing EU law within the legal systems of the Members.⁴³⁵ These courts are empowered to review decisions that are not compliant with EU law and order financial compensation for the damage caused.⁴³⁶

The power for Members to fix their own detailed procedural requirements has been recognised by the CJEU.⁴³⁷ The CJEU has played an important role in confirming the autonomous and distinct character of the EU legal order, developing general principles such as those of equivalence and effectiveness⁴³⁸ that define and support the EU law while recognising the procedural autonomy of Member States.

As far as participatory governance is concerned, the involvement of the public has been envisaged as covering not only the role of individuals but also that of their associations. CJEU case-law recognises that environmental associations are essential in ensuring compliance with obligations under EU environmental law. The conditions for bringing a case before a national court, may, however, vary depending on who is deemed to be concerned. Whether the claimant is an individual, an environmental NGO or another entity is determinative of the conditions that pertain to the particular case.

Under Article 9, paragraph 1, of the Aarhus Convention "any person" who has requested information is entitled to use the review procedures. In other words, any person who is not satisfied with the response

⁴³¹ Case C-260/11 *Edwards and Pallikaropoulos*, paras. 29-30.

⁴³² Case C-530/11 *Commission v. United Kingdom*, para. 58.

⁴³³ Case C-260/11 *Edwards and Pallikaropoulos*, paras. 45 and 48.

⁴³⁴ C(2017) 2616 final, para. 183.

⁴³⁵ Opinion 1/09, Creation of a Unified Patent Litigation System, EU:C:2011:123, ground 80.

⁴³⁶ C(2016)8600, p. 4.

⁴³⁷ Case C-416/10 *Križan*, para. 106.

⁴³⁸ See for example Case C-115/09 *Bund für Umwelt und Naturschutz*, para. 43 and case C-570/13 *Gruber*, para. 37.)

to or handling of his or her request for information must be granted “standing” before the reviewing body to challenge decisions made under Article 4.⁴³⁹

Individuals must demonstrate either a sufficient interest or, alternatively, the impairment of a right.⁴⁴⁰ By contrast, the Non-Governmental Organisations (NGOs) are exempt from the pre-conditions to legal standing: a sufficient interest or impairment of a right are deemed to be fulfilled. In the *Djurgården* case, for example, the Court ruled that the requirement of a minimum of 2000 members for an NGO cannot be a pre-condition for access to justice. National rules must ensure wide access to justice for NGOs, and “must not be liable to nullify Community provisions which provide that parties who have a sufficient interest to challenge a project and those whose rights it impairs, which include environmental protection associations, are to be entitled to bring actions before the competent courts.”⁴⁴¹ While the Court found it conceivable that a minimum number of members may be relevant to justify that an environmental protection does in fact exist and that it is active, it ruled that “the number of members required cannot be fixed by national law at such a level that it runs counter to the objective of facilitating judicial review of relevant projects.”⁴⁴²

In *Trianel*, the Court ruled against a German law limiting the right to challenge decisions to cases where individual rights would be violated. The CJEU held that national legislation is in breach of Article 11 of the EIA Directive, where it does not permit NGOs in the sense of Article 1(2) of that directive “to rely before the courts, in an action contesting a decision authorising projects *“likely to have significant effects on the environment”* for the purposes of Article 1(1) of that directive, on the infringement of a rule flowing from EU environment law and intended to protect the environment, “on the ground that that rule protects only the interests of the general public and not the interests of individuals.”⁴⁴³

However, a Member State may require that the protection of the environment constitutes a dominant or substantial objective of an NGO.⁴⁴⁴ This is in line with the ruling of the CJEU in *Djurgården*, where the Court stated that a national law may require that an association, which intends to challenge a project covered by the EIA Directive through legal proceedings, “has as its object the protection of nature and the environment.”⁴⁴⁵

It is worth mentioning that Article 3(9) of the Aarhus Convention prohibits discrimination against foreign NGOs. It stipulates that “*the public shall have access to justice in environmental matters without discrimination as to citizenship, nationality or domicile and, in the case of a legal person, without discrimination as to where it has its registered seat or an effective centre of its activities.*”

In the *Slovak Brown Bears* case, the CJEU ruled on the direct effect of Article 9(3) of the Aarhus Convention. While the direct effect was denied, the Court stated that “*it is for the referring court to interpret, to the fullest extent possible, the procedural rules relating to the conditions to be met in order to bring administrative or judicial proceedings in accordance with the objectives of Article 9(3) of that convention and the objective of effective judicial protection of the rights conferred by European Union*

⁴³⁹ Aarhus Implementation Guide, p. 191.

⁴⁴⁰ Article 11(1) of the EIA Directive.

⁴⁴¹ Case C-263/08 *Djurgården-Lilla Värtans Miljöskyddsörening v. Stockholmskommunen om dess marknämnd*, 2009, para. 45.

⁴⁴² Case C-263/08 *Djurgården*, para. 47.

⁴⁴³ Case C-115/09 *Bund für Umwelt und Naturschutz*, para. 59.

⁴⁴⁴ C(2017) 2616 final, para. 79.

⁴⁴⁵ Case C-263/08 *Djurgården*, para. 46.

law."⁴⁴⁶ This case could be regarded as extending the access to justice requirement throughout the entire field of environmental law in the EU through pro-active judicial interpretation.⁴⁴⁷

With regard to access to environmental information, the question arises whether public authorities may in some events find reasonable grounds to deny access to a requesting party. To find answers to this question, we refer to the Case C-442/14 on 23 November 2016.⁴⁴⁸ In this case, a judgement was rendered by the fifth Chamber of the Court in the Netherlands. The request for a preliminary ruling concerns the interpretation of some articles in a few Directives,⁴⁴⁹ among which Article 4(2) of Directive 2003/4/EC on public access to environmental information. "The request has been made in proceedings between Bayer CropScience BV ("Bayer") and Stichting De Bijenstichting ("Bijenstichting") and the College voor de toelating van gewasbeschermingsmiddelen en biociden (the Plant Protection Products and Biocides Approval Board, "the CTB") concerning the decision of 18 March 2013 by which the CTB, in essence, partially upheld Bijenstichting's request for disclosure of documents submitted by Bayer during procedures for the authorisation of the placing on the Dutch market of certain plant protection products and biocides based on the active ingredient imidacloprid."⁴⁵⁰

The Court of Justice of the EU recalled the rules on access to information contained in the Directives. With regard to Directive 2003/4, the Court referred, *inter alia*, to recital 16 which stipulates:

"The right to information means that the disclosure of information should be the general rule and that public authorities should be permitted to refuse a request for environmental information in specific and clearly defined cases. Grounds for refusal should be interpreted in a restrictive way, whereby the public interest served by disclosure should be weighed against the interest served by the refusal. ..."

As a general rule, Article 3 (1) requires Members "to make available environmental information held by or for them to any applicant at his request and without his having to state an interest."

However, Article 4(2) of Directive 2003/4 entitled "Exceptions", provides:

"Member States may provide for a request for environmental information to be refused if disclosure of the information would adversely affect:

...

(d) the confidentiality of commercial or industrial information where such confidentiality is provided for by national or Community law to protect a legitimate economic interest, including the public interest in maintaining statistical confidentiality and tax secrecy"

⁴⁴⁶ Case C-240/09 *LZ I*, para. 51.

⁴⁴⁷ Heldt 2015, p. 31.

⁴⁴⁸ This judgment was a request for a preliminary ruling under Article 267 TFEU from the College van Beroep voor het bedrijfsleven (Administrative Court of Appeal for Trade and Industry, Netherlands), made by decision of 12 September 2014, received at the Court on 24 September 2014, in the proceedings *Bayer CropScience SA-NV, Stichting De Bijenstichting v. College voor de toelating van gewasbeschermingsmiddelen en biociden*. Makhtesim-Agan Holland BV was third party in the proceedings.

⁴⁴⁹ Article 14 of Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market (OJ 1991 L 230, p. 1), Article 19 of Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market (OJ 1998 L 123, p. 1), Articles 59 and 63 of Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (OJ 2009 L 309, p. 1) and Article 4(2) of Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ 2003 L 41, p. 26).

⁴⁵⁰ Case C-442/14, para. 2.

...

The grounds for refusal mentioned in paragraphs 1 and 2 shall be interpreted in a restrictive way, taking into account for the particular case the public interest served by disclosure. In every particular case, the public interest served by disclosure shall be weighed against the interest served by the refusal. Member States may not, by virtue of paragraph 2(a), (d), (f), (g) and (h), provide for a request to be refused where the request relates to information on emissions into the environment.

...'

A number of questions (9) were addressed to the Court. In this analysis, we particularly focus on the 8th question which states:

“Do the words “information on emissions into the environment”, as referred to in the second subparagraph of Article 4(2) [of Directive 2003/4], mean that, if there are emissions into the environment, the information source must be disclosed in its entirety and not be limited to the (measurement) data which may, where applicable, be derived therefrom?”⁴⁵¹

After considerations, the Court answer to that question was:

“In the light of the above considerations, the answer to the eighth question is that the second subparagraph of Article 4(2) of Directive 2003/4 must be interpreted as meaning, in the event of a request for access to information on emissions into the environment whose disclosure would adversely affect one of the interests referred to in points (a), (d) and (f) to (h) of the first subparagraph of Article 4(2) of that directive, that only relevant data which may be extracted from the source of information concerning emissions into the environment must be disclosed where it is possible to separate those data from the other information contained in that source, which is for the referring court to assess.”⁴⁵²

By extension, one can conclude that when the protection of specific interests is at stake, the right of access to environmental information can be restricted under specified conditions.⁴⁵³

9.4 The nuclear case

Specific problems have arisen concerning the possible application of the Aarhus rights to the nuclear case. A few cases also applied the nuclear sector.

9.4.1 An Taisce

An example is the case law dealing with An Taisce’s (National Trust for Ireland) challenge to the legality of the UK’s decision to grant the permission to build and operate a new nuclear power station (Hinkley Point C) on the west coast of England. An Taisce is seeking a judicial review at the High Court on the grounds that there was a failure to undertake “transboundary consultation” with the Irish people beforehand as required by Article 7 of the Environmental Impact Assessment Directive. The Case was dismissed at the High Court. A letter from the Espoo Implementation Committee underlined a “profound suspicion of non-compliance” of the UK, arguing that “notification is necessary unless a significant adverse transboundary impact can be excluded.”⁴⁵⁴ An Taisce took the case to the Court of

⁴⁵¹ *Id.*, para. 44.

⁴⁵² *Id.*, para. 106.

⁴⁵³ See further on this issue an example in the nuclear sector in section 9.3.4 below.

⁴⁵⁴ EIA/IC/INFO/12.

Appeal. The appeal was denied by judgment rendered on the 1st of August 2014. The main issue in this case was the interpretation of the wording of Article 7 of the EIA Directive on the likelihood of a nuclear accident. A restrictive approach was adopted by both judges and the case was dismissed.

9.4.2 Borssele

Another example concerns the lifetime extension of the Borssele Nuclear Power Plant (Borssele NPP) in the Netherlands. The operating licence reference No. 373/1132/EEK of the power plant was issued on 18 June 1973 for an indefinite period under the Dutch Nuclear Energy Act. The licence included a safety report based on a design lifetime for the NPP of 40 years.⁴⁵⁵ On 17 July 2006, The "Covenant Kerncentrale Borssele" was concluded between the Dutch Government and Borssele NPP to continue the life span up to and including 31 December 2033 at the maximum.⁴⁵⁶

On 24 October 2012, the Dutch Minister of Economic Affairs announced the preliminary decision to grant the extension of the design lifetime in several newspapers and on the internet. The announcement stated that "an advance assessment had determined that the intended activity should not be subject to a compulsory environmental impact assessment because it did not concern an extension to or modification of the design, but rather the formalisation of amendments to the safety report, which could not be expected to have any further environmental consequences".⁴⁵⁷ The relevant documents were made available for a month and comments could be made until 6 December 2012. This preliminary decision was challenged by Stichting Greenpeace Netherlands (hereinafter Greenpeace) on 4 December 2012.

On 20 March 2013, the Ministry of Economic Affairs of the Dutch Government published the decision "Amendment of the Nuclear Energy Act Licence granted to N.V. ElektriciteitsProduktiemaatschappij Zuid-Nederland (NvEpz) for the extension of the design lifetime of the Borssele Nuclear Power Plant". The decision was available for the public and interested parties could lodge an appeal with the Council of State until 2 May 2013. Greenpeace appealed this decision to the Council of State, the highest administrative court of the Netherlands, on the grounds that a full EIA, covering all environmental aspects of the lifetime extension was necessary. By decision of 19 February 2014, the court rejected Greenpeace's claims.

Having exhausted the available national legal procedures, Greenpeace submitted a communication to the Compliance Committee under Aarhus Convention on 6 May 2014, alleging a failure by the Netherlands to comply with its obligations under Article 6 of the Convention in relation to the design lifetime extension of the Borssele NPP. More specifically, Greenpeace alleged that the Party concerned failed to provide for public participation to the extent required by Article 6 prior to its decision to extend the period of operation of the Borssele NPP until 31 December 2033.

The Espoo Implementation Committee stated:

⁴⁵⁵ United Nations 2018, para. 24.

⁴⁵⁶ In its report, the Implementation Committee summarized in paragraph 26 that "Since 1973, the operating licence of the Borssele NPP has been amended several times. In 1994, the licence was revised to include all previous modifications and an environmental impact assessment procedure was carried out. In 1996, 2004 and 2013, changes to the licence concerning the fuel usage of the NPP were introduced (entitled POS 1996, POS2 2004 and MOX 2013), each time with an environmental impact assessment report and public participation. The NPP was also required to undergo mandatory 10-year periodic safety evaluations in 1993, 2003 and 2013. The 1993 and 2003 safety reviews, which included public participation, resulted in further amendments to the licence. The 2013 procedure was ongoing at the time the present communication was submitted.

⁴⁵⁷ United Nations 2018, para. 29.

*“The Committee considers that the permitted duration of an activity is clearly an operating condition for that activity, and an important one at that. Accordingly, any change to the permitted duration of an activity, be it a reduction or an extension, is a reconsideration or update of that activity’s operating conditions. It follows that any decision permitting the NPP to operate beyond 2014 amounted to an update of the operating conditions”.*⁴⁵⁸

The Committee therefore concluded that:

*“the decision of 18 March 2013, by amending the licence to extend the design lifetime of the NPP until 31 December 2033, updated the operating conditions of the NPP. Accordingly, under Article 6, paragraph 10, of the Convention, the Party concerned was obliged to ensure that the provisions of Article 6, paragraphs 2 to 9, were applied, mutatis mutandis,⁴⁵⁹ and where appropriate to that decision.”*⁴⁶⁰

The Committee considered that,

*“except in cases where a change to the permitted duration is for a minimal time and obviously would have insignificant or no effects on the environment, it is “appropriate” for extensions of duration to be subject to the provisions of Article 6. In this regard, the Committee considers it inconceivable that the operation of a nuclear power plant could be extended from 40 years to 60 years without the potential for significant environmental effects. The Committee accordingly concludes that it was “appropriate”, and thus required, to apply the provisions of Article 6, paragraphs 2-9, to the 2013 decision amending the licence for the Borssele NPP to extend its design lifetime until 2033.”*⁴⁶¹

This case also enabled the Committee to shed some light on public participation issues under the Aarhus Convention.

*“In order to meet the requirements of Article 6, paragraph 4, public participation must take place “at an early stage of the decision-making process, when all options are open and when due account can be taken of the outcome of the public participation”.”*⁴⁶²

As the Committee held in its findings on communication ACCC/C/2007/22 (France),⁴⁶³ *“this implies that when public participation is provided for, the permit authority must be neither formally nor informally prevented from fully turning down an application on substantive or procedural grounds. If the scope of the permitting authority is already limited due to earlier decisions, then the Party concerned should have also ensured public participation during the earlier stages of decision-making”.*

Moreover, “participation in closed advisory groups cannot be considered as public participation meeting the requirements of the Convention.”⁴⁶⁴

⁴⁵⁸ *Id.*, para. 65. In the analysis, it was underlined that : “The Committee cannot agree with the position of the Party concerned that the fact that 1973 licence was for an “indefinite” period means that the 2013 licence amendment extending the design lifetime until 2033 was not a change in the NPP’s operating conditions. Indeed, the Party concerned itself states: “At the time of the original design and construction of the Borssele NPP, it was assumed that it would have a design lifetime of 40 years, i.e. until 2014.” It is also clear from the documentation that, without the 18 March 2013 decision, the NPP was not permitted to operate beyond 2014.

⁴⁵⁹ “With the necessary changes”. (See United Nations 2018, para. 70).

⁴⁶⁰ United Nations 2018, para. 66.

⁴⁶¹ *Id.*, para. 71.

⁴⁶² *Id.*, para. 76 (findings on communication ACCC/C/2008/26 (Austria); ECE/MP.PP/C.1/2009/6/Add.1, para. 66).

⁴⁶³ ECE/MP.PP/2009/4/Add.1, para. 38.

⁴⁶⁴ United Nations 2018, para. 80 (findings on communication ACCC/C/2010/51 (Romania), ECE/MP.PP/C.1/2014/12, para. 109).

Considering the facts submitted to it and the responses of the Parties, particularly the Dutch Minister, the Committee is of the view that "the Minister's repeated statements on this point clearly demonstrate that the duration of the NPP until 2033 was already set prior to the 2012 public participation procedure. [...]"

"by not having at any stage provided for public participation, meeting the requirements of Article 6, where all options were open, in regard to setting the end date of 31 December 2033 for the operation of the Borssele NPP, the Party concerned failed to comply with Article 6, paragraph 4, in conjunction with Article 6, paragraph 10, of the Convention with respect to the licence amendment of 18 March 2013."

The Committee "recommends that the Party concerned take the necessary legislative, regulatory and administrative measures to ensure that, when a public authority reconsiders or updates the duration of any nuclear-related activity within the scope of Article 6 of the Convention, the provisions of paragraph 2 to 9 of Article 6 will be applied."⁴⁶⁵

Although non-compliance has been identified, the example of the Borssele NPP highlights the reduced role played by international initiatives and Committees if their decisions are not formally binding. The Committee's work could have enabled more public involvement and potentially a better scrutiny of environmental impacts of the longer operation of the Borssele NPP.⁴⁶⁶

9.4.3 FANC: a case on access to nuclear information

The Commission decided in 2011 on a case related to access of information in Belgium.⁴⁶⁷ FANC refused access to the requesting party to the "LTO short-list" containing the primary risks, in the context of the extended operation of nuclear power plants. The FANC relied on the grounds for exception of public security (Article 27, § 1, 2 °), the confidential nature of the advice from a third party (Article 27, § 1, 8 °) and the uncompleted character of the information (Article 32, § 1).

The Commission examined the possibility of invoking exceptional grounds to deny the disclosure. The exception motive was mentioned in Article 32, § 1 of the Act of 5 August 2006, which stipulates that the environmental authority "*may deny an application if the request is for an environmental information which is incomplete or being developed, and the disclosure of which may be misleading. In each particular case, the public interest served by the disclosure is weighed against the specific interest served by the refusal to disclose.*"

For this exception to be invoked, several conditions must cumulatively be satisfied. First, the relevant information must be incomplete or under development. Secondly, the disclosure must give rise to misunderstanding. Finally, the general interest that is served by disclosing cannot outweigh the protected interest. The Court further underlined that this exceptional reason is not a compulsory exception motive but offers the possibility of refusing the disclosure. In the light of the obligation to balance the interests, that ground accordingly implies an obligation of enhanced motivation.

In fact, the terms "incomplete" and "being developed" must be interpreted in a restrictive way. Information that is transmitted from one organisation to another must be considered complete, even

⁴⁶⁵ United Nations 2018, para. 80.

⁴⁶⁶ Heldt 2015, p. 35.

⁴⁶⁷ Rechtspraak Federale Beroepscommissie inzake de toegang tot milieu informatie 18 november 2011, no. FBC/2011/4, D and C t. FANC.

if it is updated at a later stage. The status of the resulting “new” document will have to be evaluated at that time.

As far as the Act of 5 August 2006 is concerned, Article 27, § 1, 8^o stipulates that an environmental authority must refuse a request for advertising when the public interest of the advertisement does not prevail on the protection of “a notice or opinion communicated voluntarily and confidentially by a third party to an environmental authority, for which the former has explicitly asked for confidentiality, unless he consented to advertising.” Also in this case, this ground of exception can be invoked only to the extent that several cumulative conditions are met. The information must firstly bear on a notice or opinion from a third party. Secondly, this information must have been voluntarily communicated to an environmental authority, and lastly, the confidentiality of the information must have been explicitly requested at the moment the information was provided.

In the case under consideration, the Commission deemed that some information contained in the questioned “LTO-shortlist” must be exempted from advertising for reasons of protection of public order or public security – including the physical protection of radioactive material, or defense of territory, as provided in Article 27. Indeed the “LTO-shortlist” contained some information regarding the possible existence of problems concerning the protection against intrusion and the guarantee of the access to a clearly designated building of Doel 1 and Doel 2. This could enable some individuals to use this information in an abusive manner to detect potential access deficiencies, so that public security could be compromised if location elements were to be disclosed. The Commission therefore considered that, for this information, the public interest that is served by disclosing does not prevail on the interest that the ground of exception of Article 27 wants to protect.

In that respect, the Commission considered that information which cannot be divulged on the basis of Article 27, § 1, 2^o can without any problem be separated from the other information contained in the requested document.

In conclusion, the Commission decided that the requested document, which is environmental information within the meaning of the law of 5 August 2006, must be disclosed, with the exception of the designation of the building and the “Kring” in point (13) of the LTO-shortlist “Beveiliging van gebouw [...] tegen indringing & verzekering van toegang” with regard to the Doel 1 and Doel 2 nuclear power plants. The trigram that designates the building and the “Kring” must, twice, be obscured from the version of the document that will be sent to the applicant. [...]

9.5 Concluding Remarks

Involving civil society (the public at large, individuals or NGOs) in decision-making concerning nuclear power plants is of great importance. Nuclear energy is highly debated and contested. It is therefore of great importance to increase support for decisions concerning nuclear power plants to have a transparent decision-making, involving the public at large. That is precisely what the environmental impact assessment and the related Espoo Convention aims at. And of course this democratic accountability can equally be promoted via the rights contained in the Aarhus Convention.

EU environmental law confers rights on natural and legal persons not only to request, but also to receive environmental information. The relevant provisions have been transposed by Members in their national legislation. The Aarhus and Espoo conventions are important tools that strengthen public involvement legislation in the EU.

As emphasized by case law of the CJEU, information should be available on request, but the public is also entitled to receive information through active dissemination by the competent public authorities. This active dissemination may, *inter alia*, be important for safeguarding the right to have one's health protected.⁴⁶⁸ Yet, public participation in environmental decision-making also reveals, if not an actual distrust in government, cognisance that the public administration cannot effectively or legitimately carry out these functions without due transparency and control, and the participation of members of the public in decision-making procedures.⁴⁶⁹

While legal standing is expressly recognized in some EU environmental directives,⁴⁷⁰ express provisions on access to justice, including standing, are absent in most EU secondary environmental legislation, and legal standing has to be interpreted in the light of the principles established in the case-law of the CJEU.⁴⁷¹

The question to what extent rights of information, public participation or access to justice also can be awarded to the public in the nuclear case is clearly highly contested. A few years ago, Heldt argued in his dissertation that in the nuclear sector, despite the far-reaching interpretations in case law of the CJEU, the existing tools for access to information and access to justice do not really serve as adequate means to enhance environmental scrutiny, because the threshold to invoke them seems to be too high.⁴⁷² Looking at the results in the cases of *An Taisce* and *Borssele*, that conclusion certainly seems to be justified. But the recent conclusion from Advocate-General Kokott (of 28 November 2018) provides interesting openings as he argues that excluding plant lifetime extension from environmental impact assessment could only be justified under very strict conditions and still requires information to the public. Advocate-General Kokott also argues that a decision concerning plant lifetime extension should include public participation. Of course it is at the time of writing (December 2018) not yet known how the CJEU will decide on this issue, but it clearly shows that the Aarhus rights may increasingly be applied to the nuclear sector as well.

That also leads to interesting questions with respect to the application of transparency, public participation and access to justice to the topic discussed in the previous chapter, enforcement. Individuals could for example call on their Aarhus rights to ask reports of inspection visits executed by a nuclear agency. In the light of Article 2(1)(b) of Directive 2003/4 nuclear radiation is undoubtedly a factor having an effect on the environment. However, the freedom to seek information does not go so far as to allow the public to call on administrative agencies, either to force them to carry out specific controls or to get full disclosure of the results of inspection reports. Article 4(4)(b) of the Aarhus Convention allows the refusal of a request for information if the disclosure would adversely affect public security. It could be argued that releasing inspection reports could be detrimental to public security in as much as it could for example make it easier for people with bad intent (like terrorists) to plan an attack on these facilities. Moreover, the inspection reports could potentially also adversely affect the course of justice, the ability of a person to receive a fair trial or the ability of a public authority to conduct an inquiry of a criminal or disciplinary nature.⁴⁷³ Moreover, as Advocate-General Kokott also rightly

⁴⁶⁸ In this regard, the EU's document C(2017) 2616 final gives the following notable examples: Article 12(1)(e) of the Bathing Water Directive, 2006/7/EC, which requires the public to be informed whenever bathing is prohibited or advised against; and Article 8(3) of the Drinking Water Directive, 98/83/EEC, which requires consumers to be promptly informed of health-endangering drinking water Contamination.

⁴⁶⁹ Ebbesson 2011, p. 73.

⁴⁷⁰ See, for examples, Art. 6(2) of the Access to Environmental Information Directive, 2003/4/EC; Art. 13 of the Environmental Liability Directive, 2004/35/EC; Article 25 of the Industrial Emissions Directive, 2010/75/EU; Art. 11 of the Environmental Impact Assessment Directive, 2011/92/EU; and Art. 23 of the Seveso III Directive, 2012/18/EU.

⁴⁷¹ European Communities 2018, para. 59.

⁴⁷² Heldt 2015, p. 36.

⁴⁷³ Art. 4(4)(c) of the Aarhus Convention.

stressed, there is equally a public interest in ensuring a minimum supply of electricity. As a result, a reasonable balancing of different interests has to take place as a result of which a full application of all Aarhus rights to the nuclear sector, for example equally including disclosure of inspection reports, may not be a viable option.

10. CONCLUDING REMARKS

10.1 Focus of the study

The objectives of the study identified in the introduction⁴⁷⁴ were, inter alia, to assess the legal framework on nuclear safety and liability in the EU, especially with a focus on cross-border issues. The objective was equally to develop a new (EU) scheme of liability and insurance and to examine possibilities to develop common criteria concerning the siting, design, construction and operation of nuclear power plants.⁴⁷⁵ Particular petitions that were launched were taken as a starting point. These petitions raised serious concerns with respect to the safety at particular power plants, expressing fears of transboundary impacts. The petitions also pointed at substantial differences between liability schemes in the Member States and therefore pleaded for a European approach.⁴⁷⁶ At the same time it was also mentioned in the introduction that this study could obviously not provide any technical answers with respect to the claims that particular nuclear power plants would be problematic from the safety perspective. The idea was more to provide an overview of the applicable regulations and look broadly at the academic literature in order to indicate points which either merit further EU action or further research. Now, a few of the main conclusions of the study will be summarized and finally a few recommendations will be formulated.

10.2 Legal framework for nuclear safety

Chapter 3 introduced the Euratom Treaty, also making clear that this had as main goal to promote nuclear energy. Safety standards are provided via various sources, such as the Convention on Nuclear Safety, the International Atomic Energy Agency (IAEA) and Euratom. At EU level the Nuclear Safety Directive provides the general framework. Notwithstanding the existence of a broad framework, nuclear safety regulation is criticised in the literature for still relying very largely on the sovereignty of the Member States. There is no possibility for the EU level to verify nuclear safety directly at the nuclear power plants within the Member States. Many of the safety features also depend on general principles such as ALARA which has also been criticised in the literature.

10.3 Cross-border nuclear risk management

A variety of arrangements exist aiming at disaster risk management. On the one hand there are many tools aiming at emergency preparedness and response, also at EU level which do, however, not directly focus on the nuclear sector. Specifically for the nuclear, particular features have been put in place, such as ECURIE, organising information exchange, aiming at a rapid and coordinated response. However, even though there are arrangements to deal with transboundary disaster risk management, also in this domain sovereignty of the Member States remains important as a result of which it are still the Member States that take the basic decisions. Legally binding arrangements at the European level are lacking.

10.4 Legal framework of liability

Chapter 5 indicated that an elaborate legal framework to deal with liability and insurance related to nuclear accidents has been worked out since the 1960s within the framework of on the one hand the NEA and on the other hand the IAEA. Nuclear liability is based on similar principles, such as strict liability, channelling of liability to the operator, limitation of liability in amount and in time and mandatory

⁴⁷⁴ See 1.2.

⁴⁷⁵ See *supra* 1.3.

⁴⁷⁶ See 2.4.

financial coverage. In addition to the liability of the operator public funding also largely intervenes. The international conventions have been criticised in the literature, more particularly for the financial limits on liability as well as for the exclusive legal channelling. Those features can have devastating effects. They cannot only lead to a limited compensation for the victims of a nuclear accident; they can potentially also reduce the incentives to take preventive measures of operators. The Fukushima case underscored the seriousness of those distortive effects.

10.5 Need to develop an EU framework for liability and insurance

Chapter 6 indicated that there are possibilities to improve the currently existing international framework. Four examples were provided of liability and compensation mechanisms in Member States to show that there are currently substantial differences which may justify a need for harmonisation. Examples were provided from the US Price-Anderson Act, the legislation in Japan and the regulation concerning the compensation for natural catastrophes to show that it is possible to improve the compensation for victims of nuclear accidents. The case of marine oil pollution showed a proactive stance of the EU whereby the threat of unilateral EU action (to create a supplementary compensation fund) led to a change at the international level. It was equally shown that the EU does have competence to regulate liability and compensation for nuclear accidents. The initiatives that are currently already on their way in this domain can therefore be fully supported from this analysis.

10.6 Common criteria for siting, designing and constructing nuclear power plants

Chapter 7 referred to the importance of environmental impact assessment, to the Convention on Nuclear Safety and the IAEA safety standards. The general framework of the European regime can largely be found within the Nuclear Safety Directive, but specific rules concerning siting, design and operation are reliant upon the Convention of Nuclear Safety. These rules still remain relatively vague and based on broad principles, providing a large leeway to the Member States with respect to the implementation. There is at this moment therefore certainly not a mandatory legally binding regime concerning the siting or design and construction of nuclear power plants.

10.7 Enforcement of nuclear safety standards

Chapter 8 indicated that also, as far as the public enforcement of nuclear safety regulation is concerned, EU law largely relies on the implementation and enforcement by the Member States. There are no powers awarded to the EU level to directly inspect or monitor nuclear power plants. There are, however, reporting obligations, but those are not supported by sanctions in case of non-compliance. Moreover, there are stress tests, but those are considered ad hoc and one time, and therefore not comparable to structural and systematic inspections. A comparison was made with other domains in EU law where either (rather exceptional) inspection powers are awarded directly to the EU level or where specific indications are provided for the way in which inspection and monitoring should take place.

There are initiatives at Member States level for bilateral cooperation, as well as voluntary participation in international peer review systems. The lack of formal binding rules does not encourage cross-border inspections to reinforce nuclear safety in the EU.

Chapter 8 equally made clear that also with respect to civil liability, there may still be problems as far as the enforcement is concerned. There are still considerable gaps and discrepancies concerning judicial cooperation in nuclear liability cases and mass tort litigation with respect to nuclear accidents has simply been deferred by most legislators to the moment that a nuclear accident would occur.

10.8 Citizen and NGO involvement in decision-making concerning nuclear power plants

Chapter 9 pointed at the importance of environmental impact assessment and of the Espoo Convention in the transboundary context. Problems arise especially in case of plant lifetime extension whereby the question arises whether an environmental impact assessment should be applied. A recent opinion of Advocate-General Kokott holds that the exemption from the obligation to undertake an EIA can only be permitted in very limited circumstances.

Access to information, public participation and access to justice is regulated through the Aarhus Convention and the implementing European directives and is applicable to the nuclear case as well. However, attempts of civil society to exercise their Aarhus rights within the nuclear sector have so far not been very successful, neither in the An Taisce case nor in the Borssele case. However, there seems to be a tendency towards more transparency and public accountability, also in the nuclear area. Even though this should as a matter of principle certainly be welcomed, undoubtedly a balancing of interests need to be taken into account as information with respect to nuclear safety can be very sensitive and could equally be abused by persons with wrong intentions (like terrorists). The EU Commission decided in this regard in a case involving the Belgian FANC that certain information may be only partly disclosed to preserve public security.

10.9 Recommendations

At the concluding sections of each chapter usually a few recommendations were formulated. Some of those recommendations can be summarized as follows:

1. It could be considered to create an independent agency with specific powers to regulate in the nuclear domain. Euratom may be less suited to fulfil this task as the historical overview made clear that Euratom was created with the goal of promoting nuclear power,⁴⁷⁷ whereas, also to gain public confidence, an agency should have the necessary independence.
2. More precise common rules should be designed concerning the siting, construction and operation of nuclear power plants. These should go beyond the currently applicable (rather vague) standards and contain legally binding rules.
3. The EU level should gain competence to directly inspect and monitor compliance with nuclear safety rules at the level of the power plants within the Member States.
4. Specific rules concerning the risk-based inspections should be worked out, mandating how and when inspections at nuclear facilities should take place.
5. To the extent that no other interests are harmed by this (to be judged by the independent agency) inspection reports should be made available to the public.
6. The EU should take an initiative (with a view towards harmonisation) with respect to liability and insurance for nuclear accidents. The model should have the following features"
 - a. Unlimited liability

⁴⁷⁷ See 6.7.2.

- b. A limitation of the duty to seek financial cover for an insurable amount of at least EUR 20 billion
 - c. Additional state guarantee should be provided by the state as reinsurer of last resort against payment by the nuclear operators.
7. The EU initiative can be an independent action (aiming at harmonisation at EU level) or could promote a fundamental revision of the international legal framework with respect to liability. However, revisions of the international legal framework may not slow down initiatives at EU level.
 8. Further rules should be issued aiming at the promulgation of legally binding rules concerning the siting, construction and operation of nuclear power plants at the EU level.
 9. Measures should be taken to harmonise judicial cooperation in civil matters with respect to nuclear liability.
 10. Measures should be taken to work out scenarios under which compensation to victims of a nuclear accident will be provided whereby adequate compensation should be provided via a fast and low-cost procedure.

10.10 Final thoughts

Nuclear accidents are, understandably given their large impact, heavily debated. Whereas 40 years ago the likelihood of a nuclear accident was merely considered hypothetical, after Chernobyl and Fukushima it cannot be excluded that another nuclear accident might happen. It is therefore of utmost importance to focus most attention on nuclear safety in order to prevent the likelihood of such an accident. So far, the nuclear safety has often been based on rather vague principles and standards, often also relying on the expertise within industry. It is important, also with a view on public confidence that more precise, legally enforceable rules are worked out and that also powers are allocated to the EU level to verify compliance with those precise rules at the plant level.

Finally: in the 1960s international conventions were created with the main aim to protect the interest of the nuclear industry.⁴⁷⁸ The results were a deviation from the ordinary rules of tort law with very low limits on liability and state intervention providing a subsidy to the nuclear industry. Now that nuclear power has, also in Europe almost a history of 60 years, it is important that the international conventions would be revised in order to provide more realistic amounts of compensation and to do away with state subsidies. And if someone will prevent those revisions at the international level, the EU should take unilateral action in order to guarantee effective compensation to victims of a nuclear accident. That is not what the international legal framework currently does.

⁴⁷⁸ See 5.4.

LIST OF REFERENCES

- Ameye, E., 'Legal Study on Nuclear Third Party Liability for DG TREN of the European Commission', in Pelzer, N. (ed.), *European Nuclear Liability Law in a Process of Change* (Berlin, Tagungsbericht der AIDN/INLA-Regionaltagung, 2009), Baden-Baden, Nomos, 2010, 147-156.
- Bergkamp, L. and Goldsmith, B.J. (eds.), *The EU Environmental Liability Directive. A Commentary*, Oxford, Oxford University Press, 2013.
- Brown, O.F., 'Recent Developments from the Perspective of the United States', in Horbach, N.L.J.T. (ed.), *Contemporary Developments in Nuclear Energy Law: Harmonising Legislation in CEEC/NIS*, Alphen aan den Rijn, Kluwer Law International, 1999.
- Bruggeman, V. and Faure, M.G., *The Compensation for Victims of Disasters in Belgium, France, Germany and the Netherlands*, The Hague, Wetenschappelijke Raad voor het Regeringsbeleid (WRR), 2018.
- Bruggeman, V., Faure, M.G. and Fiore, K., 'The Government as Reinsurer of Catastrophic Risks?', *Geneva Papers on Risk & Insurance*, 2010, Vol. 35, 369-390.
- Bruggeman, V., Faure, M. and Heldt, T., 'Insurance Against Catastrophe: Government Stimulation of Insurance Markets for Catastrophic Events', *Duke Environmental Law & Policy Forum*, 2012, Vol. 23, 185-241.
- Carrol, S., 'Perspective on the Pros and Cons of a Pooling-type Approach to Nuclear Third Party Liability', *Nuclear L. Bull.*, 2008, Vol.81, 75-97.
- Cenevska, I., *Euratom as 'the Outsider Within': The Specificity of the European Atomic Energy Community Examined in the Light of the Health and Safety and the Safeguard Regimes*, Nijhoff Studies in European Union Law, 2015.
- Dangelmaier, P., 'Nuclear liability insurance in the Federal Republic of Germany', in *Nuclear Accidents: Liabilities and Guarantees*, Paris, Nuclear Energy Agency of the OECD (NEA): Organisation for Economic Co-Operation and Development, 1993, 426-433.
- Dari-Mattiacci, G. and Faure, M.G., 'The Economics of Disaster Relief', *Law & Policy*, 2015, Vol. 37(3), 180-208.
- Ebbesson, J., 'A modest contribution to environmental democracy and justice in transboundary contexts: The combined impact of the Espoo Convention and Aarhus', *Review of European Community & International Environmental Law*, 2011, Vol. 20(3), 248-257.
- Ebbesson, J., 'Public Participation and Privatisation in Environmental Matters: An Assessment of the Aarhus Convention', *Erasmus Law Review*, 2011, Vol. 4(2), 71-89.
- Epstein, R., 'Catastrophic responses to catastrophic risks', *Journal of Risk and Uncertainty*, 1996, Vol. 12, 287-308.
- Faure, M.G., 'Economic Models of Compensation for Damage Caused by Nuclear Accidents: Some Lessons for the Revision of the Paris and Vienna Conventions', *European Journal of Law & Economics*, 1995, Vol. 2, 21-43.

Faure, M.G., 'In the Aftermath of the Disaster: Liability and Compensation Mechanisms as Tools to Reduce Disaster Risks', *Stanford Journal of International Law*, 2016, Vol. 52(1), 95-178.

Faure, M.G. and Fiore, K., 'An economic analysis of the nuclear liability subsidy', *Pace Environmental Law Review*, 2009, Vol. 26(2), 419-447.

Faure, M. and Hartlief, T. (eds.), *Financial compensation for victims of catastrophes. A comparative legal approach*, Vienna, Springer, 2006.

Faure, M.G. and Liu, J., 'The Tsunami of March 2011 and the Subsequent Nuclear Incident at Fukushima: Who Compensates the Victims?', *William & Mary Environmental Law & Policy Review*, 2012, Vol. 37, 129-218.

Faure, M. and Liu, J., 'Distortions of competition in the nuclear liability regime', METRO Working Paper, 2013.

Faure, M.G. and Liu, J., 'Pooling Mechanisms for Offshore Liability', in Faure, M.G. (ed.), *Civil Liability and Financial Security for Offshore Oil and Gas Activities*, Cambridge, Cambridge University Press, 2017, 197-235.

Faure, M.G. and Philipsen, N. (eds.), *Access to Justice in Environmental Matters*, The Hague, Eleven International Publishing, 2014.

Faure, M.G. and Van den Bergh, R., 'Restrictions of competition on insurance markets and the applicability of EC antitrust law', *Kyklos*, 1995, Vol. 48(1), 65-85.

Faure, M.G. and VandenBorre, T., 'Compensating nuclear damage: a comparative economic analysis of the US and international liability schemes', *William & Mary Environmental Law & Policy Review*, 2008, Vol. 33, 220-232.

Faure, M. and VandenBorre, T., *The influence of Nuclear Plant Lifetime Extension (PLEX) on nuclear liability*, 2013.

Faure, M.G. and Wang, H., 'Economic Analysis of Compensation for Oil Pollution Damage', *J. Mar. L. & Com.*, 2007, Vol. 37, 179-217.

Faure, M.G. and Wang, H., 'Potential of Financial and Insurance Instruments to Cover Liability Following a Major Offshore Accidents', in Faure, M. (ed.), *Civil Liability and Financial Security for Offshore Oil and Gas Activities*, Cambridge, Cambridge University Press, 2017, 266-302.

Garribba, M., Chirte, A. and Nauduzaite, M., 'The Directive Establishing a Community Framework for the Nuclear Safety of Nuclear Installations: The EU Approach to Nuclear Safety', *Nuclear Law Bulletin*, 2009, Vol. 2, 23-33.

Gomez-Acebo and Pombo Abogados SCP, 'Legal Study for the Accession of EURATOM to the Paris Convention on Third Party Liability in the Field of Nuclear Energy', Final Report, TREN/CC/01-2005, Brussels, European Commission, available at: www.mng.org.uk/gh/private/2009_12_accession_euratom.pdf.

Heldt, T., *A European Legal Framework for Nuclear Liability. Rethinking Current Approaches*, Antwerp, Intersentia, 2015.

Jans, J.H. and Vedder, H.H.B., *European Environmental Law. After Lisbon*, 4th edn., Groningen, Europa Law Publishing, 2012.

Kaplow, L., 'Incentives and government relief for risk', *Journal of Risk and Uncertainty*, 1991, Vol. 4, 167-175.

Lamm, V., 'Reflections on the development of international nuclear law', *Nuclear Law Bulletin*, No. 99, vol. 2017/1, NEA No. 7366, OECD, 2017, 31-44.

Landes, W. and Posner, R., 'The positive economic theory of tort law', *Georgia Law Review*, 1981, Vol. 15, 851-924.

Landes, W. and Posner, R., 'Tort law as a regulatory regime for catastrophic personal injuries', *Journal of Legal Studies*, 1984, Vol. 13(3), 417-434.

Lazo, T. and Kaufer, B., 'A global approach to risk management: Lessons from the nuclear industry, Facts and opinions', NEA News 2003 – No. 21.1.

Liu, J., *Compensating Ecological Damage: Comparative and Economic Observations*, Antwerp, Intersentia, 2013.

Magnus, U., 'Germany', in Faure, M. and Hartlief, T. (eds.), *Financial Compensation for Victims of Catastrophes. A Comparative Legal Approach*, Vienna, Springer-Verlag, 2006, 119-144.

Majerus, P., 'Focus on more consistency in responding to nuclear emergencies', "Nuclear Transparency Watch" Paris, 6th February 2013, HERCA – WG "Emergencies" (WGE).

Nakamura, M., '11 March Japanese earthquake, tsunami and nuclear emergency: how insurance responded in post-disaster recovery', in Courbage, Chr. and Stahel, W. (eds.), *Extreme events and insurance: 2011 annushorribilis*, Geneva, the Geneva Association, 2012, 65-79.

Novotna, M. and Varga, P., 'The Relation of the EU Law and the Nuclear Liability Legislation: Possibilities, Limits and Mutual Interaction', *Societas et Jurisprudencia*, 2014, Vol. II(3), 96-123.

OECD, 'Indemnification of Damage in the Event of a Nuclear Accident', Workshop Proceedings Paris, France, 26-28 November 2001, OECD 2003.

OECD/NEA, *The Strategic Plan of the Nuclear Energy Agency: 2017-2022*, Paris, OECD/NEA, 2016.

Pascucci-Cahen, L. and Momal, P., 'Les Rejets radiologiques massifs diffèrent profondément des rejets contrôlés', Institut de Radioprotection et de Sûreté Nucléaire, 2012, available at: [www.irsn.fr/FR/Actualites_presse/Actualites/Documents/FR Eurosafe-2012 Rejets-rad ioactifsmassifs-vs-rejets-controles_Cout_IRSN-Momal.pdf](http://www.irsn.fr/FR/Actualites_presse/Actualites/Documents/FR_Eurosafe-2012_Rejets-rad_ioactifsmassifs-vs-rejets-controles_Cout_IRSN-Momal.pdf).

Pelzer, N., 'Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear Accident Contribute to Improving Nuclear Law?', in *International Nuclear Law in the Post-Chernobyl Period*, Paris, OECD-NEA, 2006, 114.

Pelzer, N., 'Facing the challenge of nuclear mass tort processing', *Nuclear Law Bulletin*, No. 99, Vol. 2017/1, NEA No. 7366, OECD, 2017, 45-69.

Pelzer, N., 'International Pooling of Operators' Funds: An Option to Increase the Amount of Financial Security to Cover Nuclear Liabilities', *Nuclear L. Bull.*, 2007, Vol. 79, 37, 43.

Prêtre, S., 'Decision Making in Complex Radiological Situations', in *The Societal Aspects of Decision Making in Complex Radiological Situations, Proceedings of the International Workshop*, Villigen, Switzerland, 13-15 January 1998, NEA/OECD, 1998.

Raetzke, C., 'Nuclear law and environmental law in the licensing of nuclear installations', *Nuclear Law Bulletin* No. 92/Vol. 2013/2, ISSN 0304-341X, OECD 2013, 55-88.

Ramseyer, J.M., 'Why power companies build nuclear reactors on fault lines: the case of Japan', *Theoretical Inquiries in Law*, 2011, Vol. 13(2), 457-486.

Reymers, P., 'Liability Problems associated with the Current Patchwork Nuclear Liability Regime within the EU States', in Pelzer, M. (ed.), *European Nuclear Liability Law in a Process of Change*, Baden-Baden, Nomos, 2009, 93-104.

Rowe, G. and Frewer, L.J., 'Public participation methods: A framework for Evaluation', *Science, Technology & Human Values*, 2000, Vol. 25(1), 3-29.

Sands, Ph. and Peel, J., *Principles of International Environmental Law*, 3rd edn., Cambridge, Cambridge University Press, 2012.

Shavell, S., 'Strict liability versus negligence', *Journal of Legal Studies*, 1980, Vol. 9, 1-25.

Stanič, A., 'EU Law on Nuclear Safety', *Journal of Energy & Natural Resources Law*, 2010, Vol. 28(1), 145-158.

Stoiber, C., Baer, A., Pelzer, N. and Tonhauser, W., *Handbook Nuclear Law*, IAEA, Vienna, 2003.

Tietenberg, T., 'Indivisible toxic torts: the economics of joint and several liability', *Land Economics*, 1989, Vol. 65(4), 305-319.

Trebilcock, M. and Winter, R.A., 'The economics of nuclear accident law', *International Review of Law and Economics*, 1997, Vol. 17, 215-243.

True, C., 'Legislative competences of Euratom and the European Community in the energy sector: The Nuclear Package of the Commission', *European Law Review*, 2003, Vol. 28(5).

VandenBorre, T., 'Channelling of liability: a few juridical and economic views on an inadequate legal construction', in Horbach, N.L.J.T. (ed.), *Contemporary developments in nuclear energy law. Harmonizing legislation in CEEC/NIS*, Alphen aan den Rijn, Kluwer Law International, 1999, 13-39.

Vanden Borre, T., *Efficiënte preventie en compensatie van catastrofes risico's – Het voorbeeld van schade door kernongevallen*, Antwerp, Intersentia, 2001.

VandenBorre, T., 'Shifts in governance in compensation for nuclear damage. 20 Years after Chernobyl', in Faure, M. and Verheij, A. (eds.), *Shifts in Compensation for Environmental Damage*, Vienna, Springer, 2007, 261-311.

VandenBorre, T., 'Nuclear Liability: An anachronism in EU energy policy?', in Roggenkamp, M. and Hammer U. (eds.), *European Energy Law Report VII*, Antwerp, Intersentia, 2010, 177-218.

Veuchelen, L., 'The Legal Value of General Principles, Technical norms and Standards in European Nuclear Safety Law: The Imbalance between soft and hard law and the need for global regulatory governance', *European Energy and Environmental Law Review*, 2009, Vol. 18(4), 215-228.

Veuchelen, L., 'Nuclear Energy Law and Environmental Law in the EU, Allies or Enemies? The Duty of the European Commission to Regulate Nuclear Safety', SCK•CEN, 2012.

Wang, H., *Civil Liability for Marine Oil Pollution Damage: A Comparative and Economic Study of the International, US and Chinese Compensation Regime*, The Hague, Kluwer Law International, 2011.

Wang, H., 'Shifts in Governance in the International Regime of Marine Oil Pollution Compensation: A Legal History Perspective', in Faure, M.G. and Verheij, A. (eds.), *Shifts in Compensation for Environmental Damage*, Vienna, Springer, 2007, 197-219.

Weitzdörfer, J., 'Die Haftung für Nuklearschäden nach Japanischem Atomrecht – Rechtsprobleme der Reaktorkatastrophe von Fukushima I (Liability for Nuclear Damages, pursuant to Japanese atomic law – legal problems arising from the Fukushima I nuclear accident)', *Zeitschrift für Japanisches Recht* (Journal of Japanese Law), 2011, Vol. 31, 61-115.

Wils, W., 'Is Criminalisation of EU Competition Law the Answer?', *World Competition*, 2005, Vol. 28, 117-159.

Wu, C., *Pollution from the Carriage of Oil by Sea: Liability and Compensation*, 1996.

Legislation

Convention, 20(3), *Review of European Community & International Environmental Law*, 2011, p248-257.

Council Decision 2005/370/EC of 17 February 2005 on the conclusion, on behalf of the European Community, of the Convention on access to information, public participation in decision-making and access to justice in environmental matters.

European Commission, Communication from the Commission of 28/04/2017, Commission Notice on Access to Justice in Environmental Matters, C(2017) 2616 final.

Judgment of 15 October 2009, *Djurgården* C-263/08, EU:C:2009:631.

Judgment of 12 May 2011, *Bund für Umwelt und Naturschutz* C-115/09, EU:C:2011:289.

Judgment of 11 April 2013, *Edwards and Pallikaropoulos* C-260/11, EU:C:2013:221.

Judgment of 13 February 2014, *Commission v United Kingdom* C-530/11, EU:C:2014:67.

Judgment of 6 October 2015, *East Sussex* C-71/14, EU:C:2015:656.

Opinion of Advocate General Kokott, delivered on 29 November 2018, Case C-411/17 , *Inter-EnvironnementWallonie ASBL, Bond BeterLeefmilieuVlaanderen v Conseil des ministres*, Intervener: Electrabel SA (Request for a preliminary ruling from the Courconstitutionnelle (Constitutional Court, Belgium)).

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE, *The Aarhus Convention: An implementation guide*, Second edition, 2014.

United Nations, *Findings and recommendations with regard to communication ACCC/C/2014/104 concerning compliance by the Netherlands*, adopted by the Compliance Committee on 4 October 2018.

APPENDIX 1: LAW OF 22 JULY 1985 ON THIRD PARTY LIABILITY IN THE FIELD OF NUCLEAR ENERGY (EXTRACTS) (M.B., AUGUST 31, 1985 (BELGIUM))

Title 1: Implementing measures of the Paris Convention and the Brussels Supplementary Convention on Third Party Liability in the Field of Nuclear Energy

Article 3: "An operator for the purposes of this Act is any person who owns or implements in a nuclear installation nuclear fuels, radioactive products or waste or who takes charge of nuclear substances intended for his installations. The responsibility lies with the operator until the complete closure of the nuclear installation. Taking into account the criteria it determines, the King, by a decree deliberated in the Council of Ministers, fixes the date on which the closure of each nuclear installation can be considered as granted."

Article 5 lays down that the nuclear operator is liable for the nuclear damage caused by a nuclear incident in accordance with the provisions of the Paris Convention, the Supplementary Convention and the law on Third Party Liability in the Field of Nuclear Energy. This liability also holds for an accident which directly results from natural cataclysms of exceptional character. The admitted exceptions are accidents resulting from acts of armed conflict, hostilities, civil war and insurrection.

Article 7: "The maximum amount of the nuclear damage for which the operator's liability is incurred amounts to € 1.2 billion for each nuclear accident. The King may, by decree deliberated in the Council of Ministers, increase or reduce the amount referred to in paragraph 1 for one of the following reasons:

- (1) keep the amount constant in real terms;
- (2) take into account the capacity and the nature of the nuclear installation or the importance of the transportation;
- (3) to meet the international obligations of the Kingdom and the international recommendations addressed to it by the competent bodies under the Paris Convention.

The amounts fixed under paragraph 2, (2), may not be less, for the transport, to € 80 million and, for nuclear installations, to € 70 million."

Article 18(1): If the nuclear damage involves the liability of several operators in accordance with this law, they are jointly and severally liable.

Chapter VIII. Procedural rules relating to actions based on the Paris Convention and the Supplementary Convention

Article 26: Actions based on the Paris Convention, the Complementary Convention and this Act shall be brought, in the first instance, before the Brussels Court of First Instance, sitting in civil matters.

1 [This] is a public order.

Article 27: A victim of a nuclear damage resulting from a nuclear incident shall have a direct action against the insurer or any other person who has granted another financial security and, in the cases referred to in Articles 22 and 22 / 1, against the State.

Article 28 (1): Actions based on the Paris Convention or the Supplementary Convention and this Law, are formed at the request of:

1. The victims of nuclear damage resulting from a nuclear accident;
2. The State;
3. A foreign State acting in the name and on behalf of persons who are nationals of that State or who have their domicile or residence in its territory and who have consented to be represented by that State; and
4. Any person who may assert, by virtue of the Paris Convention, the Supplementary Convention or this Law, rights acquired by subrogation or assignment.

Article 28(2) The Belgian State may act in the name and on behalf of persons who have their domicile or residence in its territory and who have consented to be represented by that State, when those persons are victims of a nuclear accident not covered by the jurisdiction of a Belgian court. The King may lay down the forms and conditions which the victims of a nuclear incident falling within the jurisdiction of a foreign court must satisfy in order for the Belgian State to act on their behalf before that court.

Article 29: The King organizes the control of the settlement of the compensation by the insurers and the persons having granted another financial guarantee. It shall also determine the conditions under which the persons entitled to compensation under the Paris Convention, the Supplementary Convention or this Law may become acquainted with the insurance or financial guarantee contracts.

Article 30: The King may, for the settlement of compensation in accordance with Article 19, 22 or 22/1, organise an administrative or judicial conciliation procedure which must, in any case, precede any debate in court.

Article 34: The King may, according to the rules that He determines, decide that he will take charge of the compensation for nuclear damage suffered on Belgian territory and caused by a nuclear accident for which the operator of nuclear installation is located on the territory of a non-Contracting State, where the victim cannot obtain compensation for that damage in that State.

This study, commissioned by the European Parliament's Policy Department for Citizens' Rights and Constitutional Affairs at the request of the PETI Committee, aims at gaining deeper insights into the legal aspects of cross border nuclear safety and cooperation in the European Union. It analyses the legal framework of nuclear safety as well as the liability and insurance schemes for nuclear accidents. The study examines the current liability and insurance framework and formulates possibilities for a further involvement of the EU in the liability regime. Specific attention is paid to citizen and NGO involvement in decision-making concerning nuclear power plants. The study analyses the case law in that respect and formulates various recommendations to improve the regime concerning cross-border nuclear safety, liability and corporation in the EU.

DISCLAIMER

This document is addressed to the Members and staff of the European Parliament to assist them in their parliamentary work. The content of the document is the sole responsibility of its author(s) and should not be taken to represent an official position of the European Parliament.