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Introduction to Energy Law, Climate Change and the Environment

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Published in:

Encyclopedia of Energy Law, Climate Change and the Environment

DOI:

[10.4337/9781788119689.IX.11](https://doi.org/10.4337/9781788119689.IX.11)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2021

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Roggenkamp, M. M., de Graaf, K. J., & Fleming, R. (2021). Introduction to Energy Law, Climate Change and the Environment. In M. M. Roggenkamp, K. J. de Graaf, & R. Fleming (Eds.), *Encyclopedia of Energy Law, Climate Change and the Environment* (pp. 1-5). (Elgar Encyclopedia of Environmental Law; Vol. 9). Edward Elgar Publishing. <https://doi.org/10.4337/9781788119689.IX.11>

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Introduction to Volume IX

Martha M Roggenkamp, Kars J de Graaf and Ruven C Fleming

The editors are very pleased to present the ninth volume of the *Elgar Encyclopedia of Environmental Law* series. This volume is distinguished by its length and its topic, focusing on energy law albeit keeping environmental and climate change concerns in mind. Despite the close relationship between ‘energy’ and ‘the environment’, the focus in this volume has not been on the environmental impact of energy projects, but rather on the way in which the energy sector is regulated, and how regulation can take into account any potential environmental or climate change impacts.

The reason for including ‘energy’ as a topic in this series almost goes without saying. Our modern way of life fully relies on the availability of and access to energy. We cannot warm our houses, use the internet and social media, or travel without easy access to energy. The production, transport, and use of energy thus needs a regulatory framework that provides clarity with regard to matters like resource ownership, access to these resources, and the need to secure a regular and reliable energy supply to all consumers around the clock. States play a crucial role as legislators, resource owners, and as governments, responsible for protecting the rights of citizens regarding affordable and reliable energy. The choice of energy source not only impacts the efficacy of measures to limit climate change and protect the environment, but also has implications regarding the extent to which it can guarantee a regular energy supply. Whereas fossil fuels are reliable energy sources within the framework of supply security, the greenhouse gases emitted as a result of their use contributes to climate change. Meanwhile, the use of renewable energy sources like wind and solar results in a reduced environmental impact, but may negatively impact energy network security and stability because of their intermittency. Energy law – or more broadly phrased the legal framework governing the production, transport, and supply of energy – needs to take these considerations into account. This is what this volume seeks to achieve.

This volume consists of 65 chapters, spread over eight parts. Each part is dedicated to a specific aspect, varying from changes in the energy market to developments relating to the key components of the energy chain: production, transport, and consumption. Sometimes, a further distinction has been made between deep-rooted activities with well-established legal frameworks and new developments for which the regulatory framework often is not yet clear and/or is a work in progress. These new developments have been included as they often directly result from the need to meet climate change objectives and/or the development of new energy sources or supply methods. Individual chapters either focus on the market as a whole or on components of that market, i.e. the energy chain. The interdependency between components of the energy chain and the relevant market is illustrated by the number of cross-references included within the volume. These cross-references have also proven to be beneficial in keeping the chapters concise. The chapters aim to provide insight into a specific development of energy law and, if applicable, how it affects the environment and/or climate change. Each chapter applies the same format: abstract, keywords, table of contents, main text, and bibliography. However, the length

of the bibliographies differs depending on the topic. For obvious reasons, chapters covering new developments usually have shorter bibliographies. Generally, chapter bibliographies should benefit readers who wish to delve deeper into a specific topic, as they provide sources for further reading. On a final note, this volume does not contain a concluding chapter. Such a chapter seems less appropriate for an Encyclopedia, and it would be impossible to provide a satisfying conclusion on such a broad topic, except to state the obvious: that energy law is constantly evolving and that the process of energy transition is led by two main trends, climate change and supply security.

Part 1 of this volume starts by highlighting some general and global energy law concepts and principles. Following an introduction to state sovereignty and jurisdiction over energy resources onshore as well as offshore, it examines the energy chain and its regulatory framework based on a historic approach. Also illustrated is the energy sector's evolution from local initiatives based on renewable energy sources to a more international sector using fossil fuels, before its more recent return to focusing on local 'green' initiatives. The next chapter introduces the energy trilemma and thus how energy market developments need to be balanced with climate change interests and the need to guarantee a regular supply of energy. The final chapter in this part presents key principles of environmental law that are relevant for the energy sector.

In Part 2, which is divided into two sections, the focus shifts to international developments. Firstly, it presents examples of international organisations involved in energy cooperation and trade, before discussing several examples of regional energy cooperation. After World War II the focus was initially on safeguarding the secure and peaceful use of nuclear energy and regular oil imports. This safety-driven impetus led to the establishment of the International Atomic Energy Agency in 1957, the Organization of the Petroleum Exporting Countries in 1960, and the International Energy Agency in 1973 (in response to the oil crises of the 1970s). Although the need to safeguard regular oil and gas imports from the former Soviet Union also inspired the conclusion of the Energy Charter Treaty in 1994, the establishment of the International Renewable Energy Agency in 2003 illustrates the increasing role of renewable energy sources in the global energy market. As these energy markets increasingly depend on cross-border energy cooperation, the subsequent chapters present some examples of regional energy cooperation. One of the best-known examples of an institutionalised form of energy cooperation is to be found in the European Union, an organisation which can trace its roots (as the European Coal and Steel Community) back to the trading of energy resources. Other examples of energy cooperation can be found in North America, where the US, Mexico, and Canada have cooperated since the late 1980s, and in South America, where a common market was established in 1991 by the four Mercosur member states. More nascent examples of such cooperation discussed in this book can be found in the chapters on Asia and Africa. The history of South-East Asian energy cooperation, through ASEAN, dates back to 1999 and the first ASEAN Plan of Action for Energy Cooperation. In Africa, however, while various energy cooperation agreements have been concluded, implementation has been slow.

Part 3 builds on the previous parts by presenting the way in which energy markets around the globe are regulated. One common theme is the manner of market organisation, which *de facto* refers to the extent to which the market has been liberalised, the role of the state or state agencies, and climate change considerations in this process. Part 3

provides examples from the EU, Canada, the US, Australia, Russia, China, and Africa, and shows that energy market liberalisation is a worldwide phenomenon, albeit the exact details may differ. Whereas the EU seems to be most advanced in energy market liberalisation, as it aims at a complete market opening (including the retail market), others often limit liberalisation efforts to the wholesale level or to the electricity sector specifically. More liberalisation means more freedom of choice for market participants, i.e. producers, suppliers, and consumers. A second common theme among these chapters is of how and whether this freedom of choice is connected to the need to combat climate change and promote renewable energy sources.

Part 4 centres on the oil and gas sector, and fittingly, begins with a chapter presenting the legal regimes governing the exploration and exploitation of oil and gas. These regimes may be based on the awarding of concessions or licences, the entering into of production sharing agreements, or a combination of both. In practice, these regimes can be applied onshore as well as offshore, and may also take into account environmental considerations. The need to protect health, safety and the environment offshore has been clearly demonstrated by the Piper Alpha accident in the North Sea in 1988 and the Macondo incident in the Gulf of Mexico in 2010, with both accidents strongly influencing the respective legal regimes. All oil and gas activities involve arrangements governing the end of production, i.e. the abandonment of a well and the removal of installations. Licensees and governments are often faced with a dilemma as unused installations must be removed to protect the (offshore) environment, while at the same time considering whether the removal itself can be harmful to the environment. The subsequent chapters in Part 4 discuss recent developments. These range from the possible re-use of installations for purposes other than oil and gas exploration and production (extending the lifespan of installations) to the use of new and innovative techniques enabling fracking and oil and gas developments in the Arctic. These innovative techniques, however, carry major environmental concerns. The last chapter of Part 4 examines the production and use of biomethane and hydrogen as a 'green' alternative to natural gas, and the legal challenges relating to it.

Part 5 discusses the legal frameworks governing the production of electricity, distinguishing between different sources and technologies applied. Firstly, it concentrates on electricity generated from fossil fuels (thermal power stations) and nuclear power stations, with attention paid to their environmental impacts. The generation of electricity from fossil fuels is intrinsically tied to the emission of greenhouse gases, which can be regulated via applying specific emissions standards and/or a regime of CO₂ emissions trading. While nuclear energy does not cause CO₂ emissions, there are concerns regarding the environmental impact of nuclear waste. Given the global trend towards energy transition and the increasing share of renewables in electricity generation, the vast majority of the chapters in Part 5 discuss a particular renewable energy source or a regulatory development affecting renewables in general. To begin with, the policy and regulatory instruments applied in the EU and Latin America to promote the use of renewable energy sources are presented, with consideration given to how the use of these resources impacts security of supply and grid management. Following this, the legal regimes governing the production and use of individual renewables such as hydropower, wind energy, solar energy, geothermal energy, and the use of biomass are analysed. The aim has been to present these developments from different global perspectives,

whilst considering the regions where these sources play a prominent role. Finally, Part 5 looks at two important new developments offshore, both of which require new legal frameworks: (i) the development of offshore wind energy; and (ii) the use of wave, tidal and ocean energy.

Part 6 delves further down the energy chain, with an eye on transportation. As with the previous parts, it begins by presenting some general issues. Firstly, it examines the role of energy networks such as pipelines and cables and the extent to which these networks need to be regulated, given their classification as natural monopolies. This is followed by a chapter on maritime transport, which looks specifically at transport of energy by sea, the type of contracts involved, and the environmental impact of marine transportation. In the following chapter, a new development – the ‘greening’ of the transport sector by promoting ‘zero emissions vehicles’ – is discussed. Given that cables and pipelines are crucial for transporting electricity and gas (and, to a lesser extent, oil), the focus of Part 6 shifts to these networks, which as identified above, are natural monopolies. It thus examines the regulatory frameworks governing the use of these networks in liberalised energy markets, and contemplates how the reliability of these networks (and especially the electricity grid) in liberalised markets can be ensured while the share of renewable energy is increasing. As damage to oil and gas pipelines may harm the environment, and given the need to regulate high voltage power lines in relation to the detrimental effects of electromagnetic fields and safety issues, Part 6 also contains chapters on pipeline and network safety. Following on from this, Part 6 moves on to some important recent developments, all of which are connected to the increase of the share of renewable energy in the energy system. There is an examination of the emergence of a new legal framework governing an offshore grid enabling the transport of electricity from offshore wind farms to shore, and on the concept of smart grids and micro-grids, which both aim to provide innovative and smart solutions for grid management whilst integrating large volumes of renewable energy. The concluding chapters present the emerging regulatory framework for electricity storage, and pore over the issue of which body should be responsible for or entitled to such storage.

Part 7 focuses squarely on the end consumer, and begins with an analysis of the important issue of energy poverty and the need for households to have access to energy. This assessment takes into account developments in international law, regional (EU) law, and national laws, acknowledging that this issue is particularly relevant for developing countries. Nonetheless, end consumers in developed countries still require some forms of protection. One chapter in Part 7 examines concerns relating to the continued supply of energy to customers in the event of a supplier bankruptcy in liberalised markets, while another looks at consumer protection via the regulation of supply tariffs, with an analysis of the US and EU regimes. A new development involving consumers is the current trend in liberalised markets that residential consumers can be enabled and allowed to produce electricity, primarily via installing solar panels on their properties. These ‘prosumers’, or active consumers, can also organise themselves into energy communities, which might require a new regulatory approach.

The final part of this volume – Part 8 – presents some key legal issues relating to energy efficiency and energy savings. These chapters analyse those issues relevant for the production and use of energy, and do not provide a full overview of all legal issues relating to energy efficiency. The first chapter provides a broad analysis of the regulation

of energy efficiency in the EU based on a historic approach. This is followed by a chapter on combined heat and power in Europe, which *de facto* combines elements of electricity production and heat supply and is also considered as an important instrument of energy transition. This is followed by two chapters that look at the US's example, albeit relevant to the EU and elsewhere. Firstly, there is an analysis of demand-response measures, which could lead to lower levels of electricity production and as such could function as an important tool to combat climate change. The final chapter of this volume specifically discusses energy efficiency measures at the consumer level in the US, including the use of building codes and appliance standards.

We hope that this volume in the Encyclopedia meets the needs of many researchers and practitioners, and that it adequately illustrates the complexity of providing energy (and preferably clean energy) at all times of the day and to all users. Although we have tried to publish up-to-date chapters, we may not have always succeeded. Be that as it may, all material in this volume is correct as of 1 September 2020 and does not reflect any changes made after that date.

First and foremost, we are grateful to the IUCN Academy of Environmental Law and the publisher for providing us with the opportunity to spread interest in energy law. We would like to thank all the authors for their chapters and for their patience with us, as it has taken more time to put together this manuscript than originally anticipated. We are proud of the diverse backgrounds of this volume's authors, from members of the Academic Advisory Group (AAG) of the Section of Energy, Environment, Resources and Infrastructure Law (SEERIL) of the IBA, to researchers and former researchers of the Groningen Centre of Energy Law and Sustainability (GCELS) of the University of Groningen, to staff and alumni of the Advanced Masters in Energy Law offered by the North Sea Energy Law Partnership (NSELN), and including other specialists in the specific areas required for this volume. Finally, we would like to thank those who helped us in preparing the book: Kasper Edelbroek, who aided us in the first phase of the project; Irene Ravenhorst, who prepared the list of abbreviations; Éadbhard Pernot, who assisted in the language editing; and in particular to Louis Sandiford, who has been brilliant in editing and refining all the chapters to eliminate language errors and unify the style, as well as combing through and formatting references, and reducing the number of words where necessary. Without this assistance, we would not have been able to produce this book.

