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STUDY GUIDE



Prepared by Marta Lipovec and Žan Gulič Nosan

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TOPIC ONE

**FUTURE GENERATIONS AND FINANCIALLY STABLE
ENVIRONMENTAL REGULATION**

By Žan Gulič Nosan

I. INTRODUCTION

Nowadays, our planet is overflowing with numerous issues. Wars are happening all over the globe and have reached the European continent for the first time in several decades. The world is still recovering from a COVID-19 pandemic and famine is killing approximately 25.000 people on daily basis.¹ Yet one must not underestimate a crisis, which has been happening for centuries and has exponentially increased after the industrial revolution, climate change.

In accordance with the Paris Agreement (2015) and the Intergovernmental Panel on Climate Change (IPCC) an ideal goal of 1,5°C and a maximum goal of 2°C was set as an upper limit for global warming in comparison to pre-industrial times. This limit was originally set by William Nordhaus back in 1970s, as he suggested that if the average global temperature increased by more than 2°C, the planet Earth could face grave consequences, such as the rise of the sea level, which would severely impact cities near the coast, extreme weather conditions and severe damages to the eco-system.²

This study guide will introduce numerous policies, which were undertaken by the European Union (EU) in order to tackle climate change. The focus will be on economic policies, which will likely move the EU towards sustainable financing and most importantly, a sustainable future. We will also take a look at historic development of the fight against climate change.

II. HISTORIC BACKGROUND ON A GLOBAL LEVEL

The first major conference, which treated the environment as a priority, was held in Stockholm in 1972. During that conference, United Nations Environmental Programme (UNEP) was established, the Stockholm Declaration was signed and an action plan with three main categories (Global Environmental Assessment Programme; Environmental

¹ John Holmes, "Losing 25,000 to Hunger Every Day", n.d., <https://www.un.org/en/chronicle/article/losing-25000-hunger-every-day>. (accessed July 1st, 2022).

² Lindsay Fendt, "Why did the IPCC choose 2° C as the goal for limiting global warming?", June 22nd, 2021, <https://climate.mit.edu/ask-mit/why-did-ipcc-choose-2deg-c-goal-limiting-global-warming>. (accessed July 1st, 2022).

management activities; International measures to support assessment and management activities) was clearly defined with 109 recommendations.³

Sustainable development was firstly defined back in 1987 by Gro Harlem Brundtland, former Prime Minister of Norway. In his report, *Our Common Future*, which is also simply known as Brundtland Report, he defined it as: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”⁴ Accordingly, he defined three major components of sustainable development, namely economic development, environmental protection, and social inclusion. At that time, economic development was seen as a priority, while the environmental part was usually pushed aside.

A few years later, in June 1992, a United Nations Conference on Environment and Development was held in Rio de Janeiro, where a new blueprint for an environmental action was established. The so-called Earth Summit provided us with Agenda 21, a creation of United Nations Framework Convention on Climate Change (UNFCCC) and Rio Declaration, which consists of 27 universal principles.⁵ The foundation for Earth Summit was laid down in Brundtland Report.

A vital document in the area of sustainable development is the Kyoto Protocol, which was adopted in 1997 and entered into force in early 2005. It was ratified by 192 parties and is operated by the United Nations Framework Convention on Climate Change. The protocol sets targeted emission reduction for 37 industrialized countries and is thus mainly binding only to these developed countries. The document was amended in late 2012 with the Doha Amendment. One of the vital mechanisms established with Kyoto Protocol was the flexible

³ United Nations, “United Nations Conference on the Human Environment, 5-16 June 1972, Stockholm”, n.d., <https://www.un.org/en/conferences/environment/stockholm1972> (accessed July 5th, 2022).

⁴ Gro Harlem Brundtland, *Our Common Future*, (Oxford, Oxford University Press, 1987), page 41.

⁵ United Nations, “United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992”, n.d., <https://www.un.org/en/conferences/environment/rio1992> (accessed July 5th, 2022).

market mechanisms, which enabled effective trade of emission permits. This has become one of the basic foundations for the EU Emissions Trading Scheme.⁶

Before the current programme – the Sustainable Development Goals (SDG) – were adopted, there were so-called Millennium Development Goals (MDG), which were accepted in 2000. They consisted of 8 goals. Despite there being room for improvement, certain goals were accomplished. For example, the number of people living in hunger and extreme poverty declined by 50%, gender parity in primary schools was achieved in a majority of countries, 2,1 billion people received access to improved sanitation, new HIV infections were cut by approximately 40%, maternal mortality fell by 45%...⁷

⁶ United Nations Framework Convention on Climate Change, “What is the Kyoto Protocol?”, n.d., https://unfccc.int/kyoto_protocol (accessed July 9th, 2022).

⁷ United Nations Development Programme, “The Millennium Development Goals Report 2015”, April 17th, 2017, <https://www.undp.org/publications/millennium-development-goals-report-2015> (accessed July 9th, 2022).



Figure 1: Millennium Development Goals⁸

After the conclusion of the MDG project in 2015, all member states of the United Nations agreed upon Sustainable Development Goals, which consist of 17 economic, environmental, and social goals. The 2030 Agenda includes 169 targets, 3503 events, 6439 actions, while 1325 publications were released on the agenda.⁹

⁸ Tom Murphy, “News in the Humanosphere: U.N. issues final report on Millennium Development Goals”, May 7th, 2015, <https://www.humanosphere.org/news-rounds/2015/07/news-in-the-humanosphere-un-issues-final-report-on-millennium-development-goals/> (accessed July 9th, 2022).

⁹ United Nations, “Do you know all 17 SDGs”, n.d., <https://sdgs.un.org/goals> (accessed July 9th, 2022).



Figure 2: Sustainable Development Goals¹⁰

Another major agreement on sustainability, the Paris Agreement, entered into force in November 2016. It was agreed to at the 21st Conference of the Parties (COP 21) and ratified by 196 parties. In comparison to pre-industrial levels, the global warming should not exceed 2°C, a preferable limit being 1,5°C. This agreement is historical, mainly because it is legally binding for all undersigned nations. In addition, a framework is provided to developing countries in the areas of financial, technical, and capacity building support. The main goal for the majority of countries is a reduction of greenhouse gasses.¹¹

III. HISTORIC BACKGROUND ON A EUROPEAN LEVEL

The foundation for the sustainable development is laid down in the third paragraph of the third article of the Treaty on European Union (TEU): *“The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance.”*¹²

¹⁰United Nations, “Sustainable Development Goals”, n.d., <https://www.un.org/en/sustainable-development-goals> (accessed July 9th, 2022).

¹¹ United Nations Framework Convention on Climate Change, “The Paris Agreement”, n.d., <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> (accessed July 9th, 2022).

¹² Treaty on European Union, art. 3, par. 3.

In 2000, the European Union formed the so-called Lisbon Strategy, which initially consisted of an economic pillar (smooth transition to a competitive, dynamic and knowledge-based economy) and a social pillar (investment in human resources and combat against social exclusion). Afterwards, in 2001 at the Gothenburg European Council, an environmental pillar was added, meaning that the Lisbon Strategy was compatible with the Brundtland definition of a sustainable development strategy. The goal of the European Council was to make the European Union the most competitive union by 2010.¹³

It must be emphasised that the Lisbon Strategy was not successful in the majority of areas. EU did not become one of the most competitive and knowledge-based economies and was in fact lagging behind major competitors. There was also a large gap in terms of innovation and research, employment, growth. Some of the reasons for the failure include a lack of coordination between the Member States, high magnitude of targets of sustainable development, as well as a 2008 financial crisis, which had a severe impact. Two vital reports analysing the Lisbon Strategy are the Kok and the Sapir Report.¹⁴

In 2010, when the Lisbon Strategy was concluded, there were still numerous problems such as, globalisation, climate change, aging population, immigration, and financial crisis. The so-called Europe 2020 Strategy was confirmed as its replacement. In that strategy, 5 targets were set, which cover employment, research and development, climate change and energy sustainability, education and fight against poverty and social exclusion. It was supposed to include smart, sustainable and inclusive growth. Each Member State was supposed to make its own targets. In the given areas. The strategy was monitored by the Commission and the Council.¹⁵

¹³ Eurostat, “Glossary:Lisbon Strategy”, n.d., https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Lisbon_Strategy (accessed July 15th, 2022).

¹⁴ Jiri Krcek, “Assessing the EU's 'Lisbon Strategy:' Failures & Successes”, *Inquiries Journal*, 2013, <http://www.inquiriesjournal.com/articles/754/2/assessing-the-eus-lisbon-strategy-failures-successes> (accessed July 15th, 2022).

¹⁵ European Commission, “Europe 2020 Strategy”, n.d., https://ec.europa.eu/regional_policy/en/policy/what/glossary/e/europe-2020-strategy (accessed July 15th, 2022).

IV. THE EUROPEAN GREEN DEAL

In December 2019, Ursula von der Leyen became the new president of the European Commission, as she replaced Jean-Claude Juncker. In her agenda, she proposed six vital policies for Europe moving forwards: a European Green Deal, a Europe fit for the digital age, an economy that works for people, a stronger Europe in the world, promoting the European way of life and a new push for European democracy.¹⁶

The European Green Deal is the vital policy among the six for this study guide. It was presented in December 2019, ten days after the new president of the Commission was appointed. The deal is keen to improve the life for Europeans as well as planet Earth. The goal is to provide citizens with:

- fresh air, clean water, health soil and biodiversity;
- renovated and energy efficient buildings;
- healthy and affordable food;
- more public transport;
- cleaner energy and cutting-edge clean technological innovation;
- longer lasting products that can be repaired, recycled and re-used;
- future-proof jobs and skills training for the transition;
- a globally competitive and a resilient industry.¹⁷

Additionally, the European Green Deal strives to make the continent climate-neutral by 2050 and limit the global warming to maximum 1,5°C. In June 2021, the European Parliament adopted the EU Climate Law with goals of reducing emissions by 55% by 2030 and becoming legally binding in regard to the 2050 climate neutrality goal.

¹⁶ Étienne Bassot, *The six policy priorities of the von der Leyen Commission* (Brussels: European Union, 2021).

¹⁷ European Commission, "A European Green Deal", n.d., https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed July 16th, 2022).

Furthermore, the deal focuses on promoting circular economy, with the focus on electronics and information and communications technology, batteries and vehicles, packaging and plastics, textiles, construction and buildings and the food chain. The focus will be on the entire product's life cycle, sustainable consumption will be promoted and less waste should be generated.

Moreover, a sustainable food system should be created. In May 2020, the Commission presented the Farm to Fork strategy, which guarantees a fair, healthy and environmentally friendly food system. Organic farming is to be encouraged, good livelihoods of farmers ensured, while the use of pesticides and antimicrobials is to be decreased. In the same month, the EU Biodiversity Strategy for 2030 was unveiled, which strives for protecting nature, reversing the degradation of ecosystems, and halting the biodiversity loss (one million species are potentially on the brink of extinction).¹⁸

The European Green Deal will be financed with the NextGenerationEU Recovery Plan (one third of the €1,8 trillion is allocated to it) and part of the EU's seven-year budget.¹⁹

Fit for 55

The Fit for 55 package is a part of the European Green Deal and consists of numerous goals and initiatives to reach the mentioned goals by 2030 and 2050, respectively. The package ensures a socially fair and just transition, maintains innovation and competitiveness of EU industry, and is supposed to make the European Union the leading power in combat against climate change. It consists of eleven main components.²⁰

¹⁸ European Parliament, "Green Deal: key to a climate-neutral and sustainable EU", June 22nd, 2022, <https://www.europarl.europa.eu/news/en/headlines/society/20200618STO81513/green-deal-key-to-a-climate-neutral-and-sustainable-eu> (accessed July 25th, 2022).

¹⁹ European Commission, "A European Green Deal", n.d., https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed July 16th, 2022).

²⁰ European Council, "Fit for 55", n.d., <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/> (accessed July 27th, 2022).

The EU emissions trading system (EU ETS) is one of the most important instruments. Originally set up in 2005 and revised in 2021, the EU ETS is based on a cap-and-trade system. Entities which are included in the system can receive and buy allowances for gas emissions (carbon dioxide, nitrous oxide and perfluorocarbons). The total number of allowances is limited, which ensures value. In each period, the total amount is decreasing in order to reduce the emissions and achieve the goal of greenhouse gases reduction. Entities can then use them in the given period, save them for a later period or sell them to other entities. There are hefty fines if emissions exceed the held allowances. The EU ETS consists of all EU countries as well as Iceland, Liechtenstein and Norway and is intended to limit around 10000 installations located in power sector, manufacturing industry and airline industry (until 2023 only flight in European Economic Area are considered). Small installations in some areas are automatically excluded, while certain small installations can be excluded at governments discretion.²¹

Another vital instrument is the the Effort Sharing Regulation. Road transport, agriculture, buildings, small industries, and waste are the sectors, which produce up to 60% of total EU emissions, are not included in the EU ETS and are thus included in this regulation. The regulation recognises the differences between the Member States (in GDP) and thus sets different goals for each state (from 0% to 40% reduction until 2030 compared to 2005 levels).²²

Then there is also land use; the EU adopted the Land Use Change and Forestry (LULUCF) Regulation, which was revised in 2018. The main point of this regulation is the so-called “no debit rule”, meaning that forests must capture at least as much carbon dioxide as it is released in the atmosphere by cropland, settlement, grassland, wetlands, and wood products. The new target for CO₂ capture is 310 million tonnes by 2030. If a Member State released more emissions than it captured, it can use allocations from the Effort Sharing

²¹ European Commission, “EU Emission Trading System (EU ETS)”, n.d., https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_en (accessed July 27th, 2022).

²² European Commission, “Effort sharing 2021-2030: targets and flexibilities”, n.d., https://ec.europa.eu/clima/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en (accessed July 28th, 2022).

Regulation, which gives a state some flexibility. While LULUCF was a topic of the Kyoto protocol, this is the first time it is written in the EU law.²³

Since transport is responsible for almost 25% of all greenhouse emissions in the EU, the goal is to provide alternatives to traditional means of transport and thus alternative fuels infrastructure regulation was adopted. The goal is to build numerous recharging stations (at least every 60 km on the main roads), hydrogen refueling stations (at least every 200 km on main roads by the end of 2030), as well as liquefied methane refueling points. Electricity supply will be available for ports and airports as well.²⁴

Automotive industry accounts for 7% of EU's GDP, 6,6% of all jobs in the EU and, on the other hand, 15% of all greenhouse emissions in the EU. The goal in this sector is to reduce the emissions by 100% until 2035, meaning that in 2035 the sale of vans and cars with internal combustion engines will end. This will increase the research and development for electric cars and cars with alternative fuels, thus making such cars more affordable for the consumer.²⁵

REFUEEU aviation and FUEEU maritime is another action proposed by the Commission. Aviation and maritime produce almost 28% of all transport greenhouse emissions in the EU. In aviation, sustainable fuels, especially synthetic fuels are to replace fossil fuels, which are used almost exclusively in the sector. The share of sustainable aviation fuels is to be around 63% by 2050. In addition, aircrafts should only carry as much fuel as needed for the flight when leaving the EU airports in order to minimize extra emissions. EU airports should have infrastructure for storing delivering and refueling sustainable aviation fuels. Maritime vessels, heavier than 5000 gross tonnes, which produce 90% or all emissions from maritime

²³ European Council, "Infographic - Fit for 55: reaching climate goals in the land use and forestry sectors", n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-lulucf-land-use-land-use-change-and-forestry/> (accessed July 29th, 2022).

²⁴ European Council, "Infographic - Fit for 55: towards more sustainable transport", n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-afir-alternative-fuels-infrastructure-regulation/> (accessed July 28th, 2022).

²⁵ European Council, "Infographic - Fit for 55: why the EU is toughening CO2 emission standards for cars and vans", n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-emissions-cars-and-vans/> (accessed July 29th, 2022).

sector, will be obliged to significantly reduce annual carbon intensity (by 75% in 2050 compared to 2020 levels). Fishing ships are excluded from the calculation.²⁶

Energy sector currently amounts to 75% of all greenhouse emissions. With the new proposal, which is still on the table, the EU plans to further increase the share of renewable energy. The original target was to have 32% share of renewables by 2030, while the new goal is at least 40%. This way renewable energy such as wind power, solar power, hydro power, tidal power, geothermal energy, heat pumps, biofuels and renewable part of waste will decrease the overall carbon emission to the atmosphere. One must mention that each Member State makes its own contribution in accordance with their national energy and climate plans.²⁷

Revision of the energy efficiency directive is also planned in the EU. The main goal is the reduction of both primary consumption (total demand for energy) and final consumption (amount of energy actually consumed by end users). The current goal for both goals is a reduction of 32,5%. The new goals have been proposed, namely reduction of primary consumption by 39% and 36% reduction for final consumption. Final consumption should be reduced by 1,5% on an annual basis, especially in the building, the industry and the transport sector. In the building and transport sectors, further reductions are anticipated with a new EU ETS for these sectors. Moreover, renovating buildings to be more energy efficient is one of propositions to meet the goals.²⁸

Carbon leakage is the act of companies leaving EU in order to produce their products and thus emissions in countries with less strict climate regulations. It is considered a huge issue and as a response, Carbon Border Adjustment Mechanism (CBAM) is to be adopted by the

²⁶ European Council, “Infographic - Fit for 55: increasing the uptake of greener fuels in the aviation and maritime sectors”, n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-refueleu-and-fueleu/> (accessed July 29th, 2022).

²⁷ European Council, “Infographic - Fit for 55: how the EU plans to boost renewable energy” n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-how-the-eu-plans-to-boost-renewable-energy/> (accessed July 31st, 2022).

²⁸ European Council, “Infographic - Fit for 55: how the EU will become more energy-efficient”, n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-how-the-eu-will-become-more-energy-efficient/> (accessed July 31st, 2022).

EU in 2026. CBAM will work in parallel with EU ETS. Foreign companies will have to purchase a CBAM certificate, which will cover the difference to the price of the product with ETS allowance. In the first phase, iron, steel, cement, fertilisers, aluminium, and electricity will be covered by CBAM, while other materials are to be added.²⁹

The Energy taxation directive has been adopted back in 2003, yet it does not reflect the current green agenda of the EU. The revision of it is much in order. The goal is that the tax level reflects the level of pollution of the fuel used. The higher the produced emissions, the higher the tax. There will also be incentives for the usage of sustainable practices. Aviation and maritime fuels are added into equation and there will be no difference between commercial and non-commercial as well as business and non-business use. Minimum rates in this directive will be updated annually. This is yet another directive, which is still in discussion.³⁰

It is obvious that some members of the society such as vulnerable households, micro-enterprises and transport users are to be more harmed by all these regulations than the others. Therefore, the EU has established a social climate fund. Money, which is collected from the sale of allowances is given to the fund, which Member States can use to invest in greener buildings or in temporary and limited direct income support. From 2027 to 2032, the said fund will amount to €59 billion.³¹

V. SUSTAINABLE FINANCE

Sustainable finance has been a vital part of the European Union and is in general integrating environmental, social and governance (ESG) considerations. It is, in accordance with Brundtland report, a way to sustain growth without damaging the society and the environment. It plays a key role in delivering highly ambitious policies of the European Green deal. According to reports, an additional €350 billion needs to be invested per year in

²⁹ European Commission, “Carbon Border Adjustment Mechanism: Questions and Answers”, July 14th, 2021, https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661 (accessed July 29th, 2022).

³⁰ European Council, “Infographic - Fit for 55: how the EU plans to revise energy taxation” n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-energy-taxation/> (accessed July 31st, 2022).

³¹ European Council, “Infographic - Fit for 55: a fund to support the most affected citizens and businesses”, n.d., <https://www.consilium.europa.eu/en/infographics/fit-for-55-social-climate-fund/> (accessed July 29th, 2022).

the 2021-2030 period in comparison to the previous decade in order to meet the desired sustainable goals. At least €1 trillion needs to be raised from sustainable investments.³²

There is still room for improvement in terms of financing the green transition. On a yearly basis, €522 billion per year should be spent for going green (€392 billion for climate objectives and €130 billion for other environmental concerns). €60 billion per year is financed by the EU budget, €67 billion per year via the European Green Deal Investment Plan and €81 billion per year by the European Investment bank. As a result, additional funding in the amount of at least €314 billion more needs to be secured in order to achieve the goals of the European Green deal. The financial sector plays an important role in securing a green future as it can transfer investments into more sustainable businesses and technologies, contribute to circular economy, which will be climate resilient and low-carbon and finance a sustainable growth. It is evident that sector's role should be greater in the future.³³

The EU Taxonomy Regulation

The EU Taxonomy is a sustainable classification system, which establishes a list of sustainable economic activities that help implement the European Green Deal. It was established with the Taxonomy regulation of 2020. In a way it is a transparency tool, which mandates companies and investors to disclose their share in Taxonomy-aligned activities. At the moment, investors and companies do not have to invest in the Taxonomy-aligned projects, but it is strongly encouraged as it is a way to move towards a more sustainable Europe and towards the goals of the European Green Deal. This is a great indicator of the sustainability of a company. It is considered to be an important element of sustainable finance framework.

³² European Commission, "Overview of sustainable finance", n.d., https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/overview-sustainable-finance_en (accessed July 31st, 2022).

³³ European Commission, "Overview of sustainable finance", n.d., https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/overview-sustainable-finance_en (accessed July 31st, 2022).

EU Taxonomy defines six main environmental objectives:

1. climate change mitigation,
2. climate change adaptation,
3. sustainable use and protection of water and marine resources,
4. transition to a circular economy,
5. pollution prevention and control,
6. protection and restoration of biodiversity and ecosystems.

In order for an activity to be aligned with the EU Taxonomy, it also has to fulfil all four of the following conditions:

1. making a substantial contribution to at least one environmental objective;
2. doing no significant harm to any other environmental objective;
3. complying with minimum social safeguards;
4. complying with the technical screening criteria.³⁴

These conditions are based on science-based criteria. First two conditions are Commission delegated regulations, while the third one is based on the Guidelines for Multinational Enterprises and UN Guiding Principles on Business and Human Rights. The EU Taxonomy is present in the following sectors:

- Arts, entertainment, and recreation,
- Construction and real estate,
- Education,
- Energy,
- Environmental protection and restoration activities,
- Financial and insurance activities,
- Forestry,
- Human health and social work activities,
- Information and communication,

³⁴ European Commission, *FAQ: What is the EU Taxonomy and how will it work in practice?* (Brussels: European Commission, n.d.).

- Manufacturing,
- Professional, scientific, and technical activities,
- Transport,
- Water supply, sewerage, waste management and remediation.³⁵

VI. CONCLUSION

Sustainable development has been a priority of the new European Commission, which is evident by the European Green Deal, one of its priorities. Main goal of the deal is to reduce emissions by 55% until 2030 and achieve climate neutrality by 2050, meaning that there is balance in carbon emissions and carbon absorbance. Additionally, Green Deal also provides citizens with a better and more sustainable life.

Fit for 55 is an important element of the European Green Deal. The package establishes or revises the EU emissions trading system, effort sharing regulations, land use and forestry, alternative fuels infrastructure, the carbon border adjustment mechanism, the social climate fund, REfuelEU aviation and FuelEU maritime, CO₂ emissions standards for cars and vans, energy taxation, renewable energy, and energy efficiency. The goal of all eleven sets of legislation is obvious – a reduction of greenhouse gasses.

The main issue of the European Green Deal is financing. While an enormous financial package from NextGenerationEU and the EU budget is considered, there is still a deficit, which may be an obstacle towards reaching the goal. Sustainable finance is aligned with ESG considerations. Another part of it is also the EU Taxonomy, which is an important indicator for investors, when it comes to investing and supporting green projects. If the activity is aligned with the EU Taxonomy, it is making a sustainable contribution and at the same time no significant harm to at least one environmental objective of EU Taxonomy. It also complies with minimum social safeguards.

³⁵ European Commission, “EU Taxonomy Compass: List of sectors”, n.d., https://ec.europa.eu/sustainable-finance-taxonomy/activities/sectors_en.htm (accessed July 31st, 2022).

VII. ISSUES TO ADDRESS

- Is the current Fit for 55 package acceptable or should it be further revised?
- How should the EU handle the current lack of funding for the European Green Deal?
- Should there be additional incentives for companies in order for them to follow the European Green Deal?
- How can the European Green Deal be made more resilient to energy shocks after the Crisis in Ukraine?

VIII. FURTHER READING

- Brundtland, Gro Harlem: Our Common Future (1987).
- European Commission: Towards a sustainable Europe by 2030 (2019).



TOPIC TWO

EU'S APPROACH TO NUCLEAR ENERGY

By Marta Lipovec

I. INTRODUCTION

The urgency of climate change demands that the international community be willing to consider all possible options for coping, one of them being a profound transformation in the ways we generate and consume energy. In examining each option, we must take into consideration its impact on public health, safety and security, the time required for large-scale deployment, and its costs. This study guide, in particular, examines nuclear energy, its historic background in global and European framework, its role in energy security, external relations, sustainability movement, safety standards, and economics, with a focus on the EU's approach to the said topic.

Nuclear power has always had two conflicting identities. On the one side there was the super-bomb that could obliterate civilization and on the other, the promise of clear, abundant power, without the need to import burnable hydrocarbons from other countries. It has the potential to be an ideal solution to mankind's growing problems with climate change and energy production, but it is accompanied by a number of disincentives, uncertainties, regulations and misinformation.

II. HISTORIC REVIEW

“It is in human nature to test, observe and dream. The history of nuclear energy is the story of a centuries-old dream becoming a reality.”³⁶

Ancient Greek philosophers first developed the idea that all matter is composed of invisible particles called *atomos*, meaning uncuttable. The Greek term was shortened to *atom*, and it remains the expression for the smallest component of an element.³⁷ Scientists in the 18th and 19th centuries revised the concept based on their experiments. The first big revelation that would later lead to the great power that we now call nuclear power was John Dalton's Atomic theory in 1808, which introduced the theory of indestructible atoms. Years later in

³⁶ U.S. Department Of Energy, *The History of Nuclear Energy* (Washington D.C.: Office of Nuclear Energy, Science and Technology, 2001).

³⁷ James Mahaffey, *Atomic Awakening* (New York: Pegasus Books, 2009).

1895 Röntgen reported the discovery of artificially produced electromagnetic rays, later called X-rays, caused by only one substance, uranium. Joseph J. Thompson, a British physicist, also described as a "man who split the atom", added a big discovery, one that would revolutionize nuclear physics as a whole. He proved that the atom indeed could be disassembled and release part of its energy as heat, a process that would be later known as *fission*. The Curies made the next big step in 1898. They concluded that radioactivity was not something unique to uranium as previously thought, but rather an atomic property. They were later able to identify two new radioactive elements existing in the same mineral as uranium – polonium, and radium. Although they did not fully realize it, the Curies had discovered products of the decay chain of uranium – an abundant source of concentrated energy used in nuclear power generation. The Discovery of radiation led to a series of more in-depth investigations. Ernest Rutherford also called "the father of nuclear science" began by studying the rays and thus in 1899 he identified two types of distinct radiation, alpha, and beta, coming from uranium. In his contribution to the theory of atomic structure he wrote: "*If it were ever possible to control at will the rate of disintegration of the radio elements, an enormous amount of energy could be obtained from a small amount of matter.*"³⁸ The turning point was a single experiment, designed by Italian physicist Enrico Fermi in 1934. He proved that a self-sustaining chain reaction of uranium disintegration was possible, producing energy directly from *mass conversion*, also known as fission. By November 1942 a group of scientists led by Fermi were ready for the construction of the world's first nuclear reactor.

In the years just before and during World War II, US nuclear research, partnered with French and British scientists, focused mainly on the development of nuclear weapons. This work was done under the code name *Manhattan Project*. The public's first introduction to nuclear energy was the dropping of two atomic bombs on Japan, solidifying its role as a city-destroying weapon.

³⁸ U.S. Department Of Energy, *The History of Nuclear Energy* (Washington D.C.: Office of Nuclear Energy, Science and Technology, 2001).

After the war, the US government, with President Eisenhower's "Atoms for Peace" program, encouraged the development of nuclear energy for peaceful civilian purposes, the major goal being for people to see it as economical, environmentally clean, and safe.³⁹

France and Britain rapidly developed their nuclear weapons, and many European countries had their own military nuclear ambitions, though energy security was a more prominent political discourse amongst these states following the ending of WWII. On one hand, they needed access to reliable energy to support massive post-war reconstruction, on the other, there was a strong desire for peaceful cooperation with their neighbors.

Energy policy cooperation appeared as an attractive solution for several economic and political goals. It began during the 1950s. It was specifically and sectorally focused on coal when six European states (Germany, France, Italy, Belgium, the Netherlands, and Luxemburg) formed European Coal and Steel Community in 1951 (ECSC).⁴⁰

Years later in 1957, the European nuclear energy policy was formed in The Treaty and European Atomic Energy Community (EURATOM). The primary objective was to promote conditions for speedy establishment and growth of the nuclear industries so that all would benefit (Article 1 of Euratom Treaty, 1957). Newly supported nuclear energy was presented as a way to overcome import dependency, which would "rise to intolerable heights"⁴¹, further highlighted by the Suez Crisis in 1956. Europe's dependency on politically unstable regions was seen as a "political weapon" and only nuclear power could provide energy self-reliance. The aim was that by working together and sharing costs, member states would benefit from achievements and raise living standards for their people (Article 2 of Euratom Treaty, 1957). Though further integration in the field of nuclear energy, as proposed by Jean Monet the "founding father of EU" was quickly stalled. There were two main issues: *lack of access to cheap uranium and scientific expertise* and second, national governments were not

³⁹ James Mahaffey, *Atomic Awakening* (New York: Pegasus Books, 2009).

⁴⁰ Pamela M. Barnes and Ian Barnes, *The Politics of Nuclear Energy in European Union* (Toronto: Barbara Burch Publishers, 2018).

⁴¹ Louis Armand and Franz Etzel and Francesco Giordani, *A Target for Euratom* (n.p., 1957).

prepared to “*surrender*” their decision-making about national energy policy resources to a supranational authority.⁴²

In the same year, the six signatory states formed European Economic Community (EEC) and it was the integration of these three communities (ECSC, EURATOM, EEC) that formed the roots of the EU as we know it today. Distinct from the integration, the Euratom Treaty continues as a separate legal entity.

France had the most advanced nuclear sector of the ECSC member states, but their “willingness” for cooperation involved the establishment of the *facto* French monopoly, thus Germany denied the opportunity for closer cooperation and reinforced its agreements with the US to obtain cheap supplies of enriched uranium. Dutch and Italian electronuclear energy was still in the experimental stages. Belgium has considerable potential for nuclear energy because of access to uranium deposits in the Belgian Congo.⁴³

III. NUCLEAR ENERGY IN EU MEMBER STATES

Since the Chernobyl disaster started unfolding, there have been only four nuclear construction projects started in the western part of the EU27 alliance, two of which are still under construction, that being Olkiluto-3 (OL3) in Finland since 2005 and Flamanville-3 (FL3) in France since 2007. In Eastern Europe, only two reactors are still under construction in Slovakia. The Finnish and the French construction sites were meant to be an industrial demonstration of superior technology and engineering capacities leading to the first European Pressurized Water Reactors (EPR) ever built, as part of the nuclear renaissance movement⁴⁴. The Finnish was meant to start generating power in 2009, the French in 2012, but the projects turned into an industrial disaster and a financial fiasco, facing numerous technical, conceptual, and financial issues.⁴⁵ On March 12, 2022, OL3, the first European Pressurized Water Reactor was connected to the grid, nearly 17 years since construction

⁴² Barnes, *The Politics of Nuclear Energy*, 37.

⁴³ *Ibid.*, 38.

⁴⁴ Mycle Schneider, Heinrich Böll Stiftung, <https://eu.boell.org/en/2021/04/26/nuclear-power-european-union> (accessed July 18, 2022).

⁴⁵ *Ibid.*

started and it is projected to generate approximately 14% of Finland's electricity. FL3 on the other hand is facing new delays and higher costs with the company stating that industrial progress and preparations were made more difficult by the pandemic.⁴⁶

Following the Fukushima nuclear disaster, the countries' bloc positions regarding nuclear power only further precipitated, intensifying the anti-nuclear movement. Germany has, as part of its ongoing transition (*Energiewende*) to low-carbon energy supply and mainly relying on renewables, permanently shut down eight of its reactors and pledged to close the rest by 2022. Italy, Spain, and Belgium are following the same path, choosing to keep their country non-nuclear⁴⁷. Nevertheless, this large-scale phase-out has turned out to be more difficult and costly than first imagined.

As of November 2021, 5 member countries (Germany, Austria, Portugal, Denmark, Luxembourg) urged the European Commission to keep nuclear power out of the EU's green finance taxonomy. This comes a month after European Commission presented a draft to include nuclear energy and gas within the EU's green finance taxonomy, intended to influence direct investment in clean energy for the next decade and help reach net zero by 2050. In a bid to compromise between pro-nuclear France and pro-gas Germany contingents in Brussels, the Commission's proposal coupled gas and nuclear together in one legal act, the Taxonomy Delegated Act, set to enter into force on 1 January 2023, unless 20 out of 27 member states decide to oppose the move.⁴⁸

⁴⁶ World Nuclear News, Olkiluoto 3 test production to continue until December, <https://www.world-nuclear-news.org/Articles/Olkiluoto-3-test-production-to-continue-until-Dece> (accessed on July 17, 2022).

⁴⁷ Matt Reynolds, Europe is in the middle of messy nuclear shutdown?, <https://www.wired.com/story/europe-nuclear-power-plants/> (accessed on July 17, 2022).

⁴⁸ Martina Iginì, Gas and Nuclear Turn Green as EU Parliament Approves New Taxonomy, <https://earth.org/gas-and-nuclear-turn-green-eu-taxonomy/> (accessed on July 17, 2022).

IV. GENERAL PRINCIPLES OF EU ENERGY POLICY

The main EU objectives are import-export independency, diversification of energy sources, aversion to the fluctuation of energy prices, keeping up with the growing global energy demands, addressing climate change, decarbonization, energy efficiency, renewable energy, and further integration and interconnection in the energy markets.⁴⁹

The legal basis for the EU's energy policy is Article 194 of the Treaty on the Functioning of the EU (TFEU, 1957). It established the aim of member states to:

- ensure the functioning of the energy market,
- ensure the security of energy supply in the Union,
- promote energy efficiency and energy saving and the development of new and renewable forms of energy and
- promotion of interconnection of energy networks.⁵⁰

Said Article makes some areas of energy policy a shared competence thus moving towards a common energy policy, all the while each Member State maintains its right to determine the conditions for exploiting its energy resources and general structure of its energy supply.

V. NUCLEAR ENERGY AND ENERGY SECURITY

Energy security has been a known narrative in the energy discourse throughout history. It is defined as “*access to energy resources providing uninterrupted supply to all consumers.*”⁵¹ It has become a key objective of EU energy policy. The ideal situation is *energy self-reliance*, meaning that all energy sources should be indigenous and large-scale, minimizing reliance on other (politically unstable) countries. The EU's security of supply is laid out in the 2015 European Energy Security Strategy: “*EU prosperity and security hinges on a stable and abundant supply of energy.*”⁵² In the pursuit of securing the EU's energy supply at affordable

⁴⁹ Matteo Ciucci, *Fact Sheets on European Union*, <https://www.europarl.europa.eu/factsheets/en/sheet/62/nuclear-energy> (accessed July 19, 2022).

⁵⁰ Ibid.

⁵¹ Barnes, *The Politics of Nuclear Energy*, 94.

⁵² European Union, European Parliament, *European Energy Security Strategy*, 2015, European Union: EPRS, 2015.

prices, especially in the current geopolitical context, and to phase out dependency on Russian gas, the EU Energy Platform was established. It ensures cooperation in areas where it is more effective to act in a coordinated way at the EU level rather than at the national level.

In 2020, the EU produced around 42% of its energy (up compared to 40% in 2019) while 58% was imported (down compared to 60% in 2019). The decrease is partially due to the COVID-19 economic crisis. The energy mix was mainly made up of five different sources: petroleum products 35%, natural gas 24%, renewable energy 17%, nuclear energy 13%, and solid fossil fuels 12%. Renewables have the highest share in Sweden (49%) and Latvia (40%), while nuclear energy makes up more than 41% of energy available in France and 25% in Sweden and Slovakia respectively. The biggest shares of solid fossil fuels come from Estonia 53% and Poland 41%.⁵³

Supporters of nuclear energy emphasize its role in achieving energy independence, thus energy security and lowering the risk of supply interruption, a trait fossil fuels do not possess. Their favorable arguments are:

- the cost: the cost natural uranium represents only a small portion of the overall costs of generating nuclear energy,
- the quantity: only a small amount of natural uranium is needed, compared to large amounts of fossil fuels,
- energy security: once in running order, a nuclear reactor is capable of producing a constant and reliable volume of energy,
- stability of energy sources: there is enough uranium to support the existing and continued use of nuclear power, for the next 135 years at current consumption rates and
- energy independence: 90% of inputs in terms of value may be sourced domestically.⁵⁴

⁵³ EUROSTAT, Shedding light on energy in the EU, <https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-2a.html> (accessed July 19, 2022).

⁵⁴Barnes, The Politics of Nuclear Energy, 94.

Concerns about access to supplies of natural uranium and nuclear materials have existed ever since the six original Euratom members began to develop their nuclear industries. To counterbalance the perceived scarcity, the members sought to create a common nuclear market, where all quantitative restrictions were to be removed. *The common supply policy* conferred in Article 2 of the Euratom treaty, was established to ensure ownership and supply of needed materials at stable prices. In 1960 Euratom Supply Agency was established. ESA's strategic objective is the short, medium, and long-term security of the supply of nuclear materials, particularly nuclear fuel, employing the common supply policy and diversification of sources in line with the European Commission's policies.⁵⁵ Quantitative analysis has shown that EU utilities are well covered until 2025 under existing contracts, in terms of both natural uranium and enrichment services. ESA remains concerned by the oversupply of uranium in the market, which depressed prices and delayed investments in key segments. ESA does not negotiate directly on behalf of the parties to a contract, but it does hold the exclusive right to conclude and refuse contracts if the contract would jeopardize the security of access to supply.⁵⁶

VI. NUCLEAR ENERGY AND EU'S EXTERNAL RELATIONS

EU energy mix is integral to the EU's relationship with neighboring states. Most of the natural uranium comes from politically stable areas such as Canada and Australia, though 2.5 thousand metric tons of uranium are still being imported from Russia, a geopolitically problematic country. EU established an information exchange mechanism in 2012 to facilitate coordination between EU countries and non-EU countries and to ensure that EU law is respected. Following this decision, EU countries must submit all existing international energy agreements to the Commission for assessment.⁵⁷

⁵⁵ European Union, Euratom Supply Agency, *60 Years of ESA*, 2021, Luxembourg: Publications Office of European Union, 2021.

⁵⁶ Ibid.

⁵⁷ Matteo Ciucci, Fact Sheets on European Union, <https://www.europarl.europa.eu/factsheets/en/sheet/62/nuclear-energy> (accessed July 20, 2022).

The EU states and Russia have been engaging in a mutual energy cooperation for some time. In the beginning, it was underpinned by a potential mutual benefit to both parties, however, tensions have since increased as Russia has adopted a more "aggressive" policy approach seeking to use energy resources as means to retain influence amongst EU states. Many experts, including International Energy Agency, believe that the expansion of nuclear power is an ideal solution to minimize the EU's dependence on Russia. Additionally, in most 1.5 degrees Celsius pathways considered by the Intergovernmental Panel on Climate change (IPCC), the share of nuclear energy is modeled to increase.⁵⁸ REPowerEU, a draft plan for reducing the named dependence has recently been released by the European Commission, making it a goal to make Europe independent from Russian fossil fuels well before 2030. It however does not mention nuclear energy and alternatively proposes partnering with other countries to diversify its gas supply.⁵⁹

Russia's war in Ukraine has led to the hardening of countries' long-held positions for and against expanding nuclear power, but a major shift would not be an easy one. Russia has been very aggressive in building nuclear power plants abroad, including the construction of new reactors in Finland and Hungary and it remains this way.⁶⁰

Table 5:3. Question. Who is building new reactors? Answer. Russia is building 37% of the global total.

Russia	37%
China	28%
Korea	10%
France	8%
USA	7%
India	4%
Rest of the world	6%

⁵⁸ IPCC, *Sixth Assessment Report*, https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_TechnicalSummary.pdf (accessed July 20, 2022).

⁵⁹ EU Press Release, REPowerEU: Joint European Action for more affordable, secure and sustainable energy, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511 (accessed on July 20, 2022).

⁶⁰ Barnes, *The Politics of Nuclear Energy*, 99.

VII. NUCLEAR ENERGY AND SUSTAINABILITY

The amendments to the TEU and TFEU have firmly embedded sustainable development as a core objective of the Union and an aspect of EU energy policy. *Brundtland's model for Sustainable Development* has set up the three pillars of sustainability: economic growth, social justice, and environmental protection.⁶¹

The current policy agenda is driven by the comprehensive integrated climate and energy policy adopted by the European Council in 2014, revised in December of 2018, which sets out to achieve the following targets by 2030:

1. a reduction of at least 40% greenhouse gas emissions,
2. an increase to 32% of renewable energies,
3. an improvement on 32.5% in energy efficiency and
4. an interconnection of at least 15% of the EU's electricity systems.⁶²

In February 2015 the European Commission published *the Energy Union strategy*. Said strategy aims to support a fundamental transformation of the EU energy system, to ensure a secure supply of sustainable energy that is competitive and affordable for consumers. Particular focus was placed on the role of nuclear energy, the EU's technical leadership in the nuclear domain, including through the fusion-based *ITER initiative*.⁶³ In November 2016, the Commission proposed the "*Clean energy for all Europeans package*," consisting of eight legislative proposals. The last element of the package was the *Governance of the Energy Union Regulation*, adopted in 2019. Under the Regulation, EU Member States must submit a progress report every two years and develop consistent national long-term strategies to meet the goals of the Paris Agreement.⁶⁴

⁶¹ Barnes, *The Politics of Nuclear Energy*, 119.

⁶² Matteo Ciucci, Fact Sheets on European Union, <https://www.europarl.europa.eu/factsheets/en/sheet/62/nuclear-energy> (accessed July 20, 2022).

⁶³ *Ibid.*

⁶⁴ *Ibid.*

In July 2021, the Commission adopted a package of proposals titled "*Delivering the European Green deal*", to reduce emissions by at least 55% by 2030 and make the EU carbon-neutral by 2050. This large package meant a revision of all existing EU acts on climate change and energy and some new proposals:

- *The Renewable Energy Directive,*
- *The Energy Efficiency Directive,*
- *The Energy Taxation Directive,*
- *The ReFuelEU Aviation Initiative and*
- *The FuelEU Maritime Initiative.*

The main legal framework for nuclear energy – The Euratom Treaty, which has stayed substantively unaltered throughout the history of the EU – does not include any commitment to sustainable development and thus constrains the EU's ability to include the nuclear sector in the sustainable development objectives.

The energy sector continues to be the largest contributor to GHG emissions globally, with a share of 40% and rising. To avoid increasingly dangerous levels of climate change, a large-scale shift to low-carbon energy is needed. This entails a substitution of fossil fuels for those emitting low levels of carbon, more efficient use of resources and better management of the available resources, and control of waste.⁶⁵

Electricity is a fundamental energy source for the development of decarbonized economy and as nuclear energy provides 50% of the EU's low carbon electricity, it has gained credibility as a contributor to a low carbon economy. Support for it was increased when it became apparent that demand for low carbon electricity in the EU could not be quickly or cheaply met by the alternative renewable technologies, which made up a 22% share of consumed energy in 2020. The supporters of nuclear energy make several arguments:

⁶⁵ IAEA, Adapting the Energy Sector to Climate Change, https://www-pub.iaea.org/MTCD/Publications/PDF/P1847_web.pdf (accessed on July 20, 2022).

- nuclear energy could be considered a low carbon resource as it is dependent on small amounts of natural raw materials. Out of that large amounts of spent fuels are stockpiled, and can be re-processed and used in the future,
- nuclear power plants produce no greenhouse gas emissions during operation and throughout their life cycle. It produces about the same amount of CO₂ as wind and one-third of emissions per unit of electricity, compared to solar and
- any waste management and disposal problem will be resolved with future technological developments.⁶⁶

On the other hand, many believe it is feasible to phase-out nuclear energy and still meet sustainability targets. They persist that previously mentioned arguments don't take into account the full analysis of the nuclear life cycle, namely the emissions produced during reactor construction, uranium mining, and milling and de-commissioning of reactors.⁶⁷ They also highlight that the focus on nuclear energy as a transition resource with large-scale capital investment has the potential to undermine investment in the development of renewable sources. Another factor to take into account regarding greenhouse gas emissions is the age of reactor technology since older reactor types produce more carbon during the operation than the newer ones.⁶⁸

VIII. NUCLEAR ENERGY AND SAFETY

The fact that nuclear power has not come to dominate electricity generation is seen as being due to a combination of public opposition and dealing with safety issues raised by historic nuclear accidents.

1. *Three Mile Island* was the most serious nuclear accident in US history, that took place at the Three Mile Island plant in Pennsylvania on March 28, 1979. It began when a pressure valve in one of the reactors failed to close, allowing radioactive steam to begin pouring out of the plant. The plant's parent company

⁶⁶ Barnes, *The Politics of Nuclear Energy*, 123.

⁶⁷ *Ibid*, 125.

⁶⁸ World Nuclear Association, *Economics of Nuclear Power*, <https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx> (Accessed on July 20, 2022).

downplayed the event, claiming that no radiation had been detected off plant grounds. Pregnant women and pre-school-age children were advised to leave the area until further notice. At the height of the crisis, plant workers were exposed to unhealthy levels of radiation, but no one outside had their health adversely affected by the accident. Nonetheless, the incident greatly eroded the public's faith in nuclear power.

2. *Chernobyl plant* was one of the largest and oldest nuclear power plants in the world, built in the late 1970s, north of Kyiv, Ukraine. Its explosion and subsequent meltdown happened in April 1986 as a result of a bungled experiment that created a sudden power surge, leading to events of blasts that blew the steel top off the reactor. A lethal cloud of radioactive material gathered over the nearby town of Pripyat, spreading over large parts of Europe, claiming thousands of lives and as many as 70,000 poisonings. The radiation was equivalent to several times that produced by the atomic bombs dropped on Hiroshima and Nagasaki. It took years for the full story behind the catastrophe to emerge as the Soviet government created a nature reserve and prohibited unauthorized access to it.
3. *The Fukushima accident* was caused by an earthquake and consequential tsunami on March 11, 2011, which damaged the backup generators at the Fukushima Daiichi plant. All three reactors that were operating were successfully shut down, but the loss of power caused cooling systems to fail, causing fuel rods in the core's reactor to overheat and partially melt down, leading to the release of radiation. The government officials established a no-fly zone and a large land area around the plant was evacuated. Three people were reportedly taken to the hospital after high-level exposure, one of them facing fatality. The World Health Organisation released a report in 2013 stating that the disaster will not cause any observable increase in cancer rates in the region.

Nuclear safety deals with the safe operation of nuclear installations, complemented by radiation protection and radioactive waste management. “*The role of EU should be to develop a most advanced framework for nuclear energy, meeting highest standards of safety, security and non-proliferation,*” as declared by Heads of Government of the Member States.⁶⁹ These commitments were instrumental in the development of the Nuclear Safety Directive and Radioactive waste Directives.

The basic safety standards are laid down in *the Basic Safety Standards Directive* (Directive 2013/59 Euratom), following the lessons learned from the Fukushima accident. This directive established standards for the protection of the health of workers, members of the public, and patients.

The Simplified Council Directive (Council Directive 2013/59) laid down basic safety standards for radiation protection. It introduced requirements for protection against indoor radon, the use of building materials, and an environmental impact assessment of discharges of radioactive effluents from nuclear installations.

Council Directive (Council Directive 2006/17) laid down several strict criteria, definitions, and procedures that need to be applied, when transporting radioactive waste and spent fuel both within and out of the EU. Member States are obligated to report every three years to the Commission on the implementation of the directive.

Council Directive (Council Directive 2011/70) established a Community framework for the responsible and safe management of spent fuel and radioactive waste. It postulated monitoring of national construction of repositories programs, as well as set up legally binding safety standards.

⁶⁹ Barnes, *The Politics of Nuclear Energy*, 135.

Several regulations have been adopted to ensure that nuclear materials are being used only for the purposes declared by their users and that international obligations are in compliance with, e.g., Commission Regulation (Euratom 2005/302)⁷⁰, establishing a system of safeguarding nuclear materials. These standards cover the entire nuclear fuel cycle, from the extraction of materials to their import/export.

European Repository Development Organisation (ERDO) members, Austria, Ireland, the Netherlands, Poland, Slovakia, Bulgaria, Italy, Lithuania, Romania, and Slovenia have been working since 2009 to address common issues on nuclear waste storage. France is still the only EU state to reprocess waste.

The European Commission confidently concluded that the EU has the most effective safety regime and system of control of nuclear materials in the world. It also highlighted the need for further updates to ensure better consistency among the Member States and to catch up with international best practices.⁷¹ All of this said, such standards and efforts can only be observed in an open and transparent nuclear industry that relies on strong cooperation and appropriate regulatory regimes, effectively implemented.

IX. THE ECONOMICS OF NUCLEAR ENERGY

Economic analysis is essential to determine the feasibility of any energy project. Over the past decades, it has become clear that transforming centrally controlled energy systems into liberalized markets can create the right conditions to direct investment and facilitate competition.⁷²

A convenient economic measure used in the power industry is known as *Levelized cost of electricity* (LCOE), a measure of the average net present cost of electricity generation over a lifetime of a generator. LCOE is determined by:

⁷⁰ Matteo Ciucci, Fact Sheets on European Union, <https://www.europarl.europa.eu/factsheets/en/sheet/62/nuclear-energy> (accessed July 21, 2022).

⁷¹ European Union, European Commission, Nuclear safety A global Engagement, 2020, European Union: 2020.

⁷² IAEA, *International Atomic Energy Agency*, <https://www.iaea.org/topics/economics> (accessed July 27, 2022).

1. capital/investment costs of construction,
2. fuel costs,
3. operation and maintenance and
4. decommissioning and waste disposal costs.⁷³

Capital costs make up a large share of total nuclear electricity generation costs, and special safety measures add to these costs. They can make up more than 70% of the LCOE. Fuel costs are on the other hand, relatively small, amounting to less than 20%. With that said, the pricing of electricity from nuclear energy is relatively sensitive to construction costs and interest rates and insensitive to the price of uranium. This can make the initial investments a capital-intensive activity, but thanks to the low variable fuel costs, the final unit cost of nuclear energy is still lower than the cost of fossil energy. That in addition to a sharp increase in fossil fuel prices makes nuclear energy competitive in terms of production costs.⁷⁴

The regulatory and planning issues associated with the commencement of any projected nuclear plant add uncertainty to the final cost. The actual cost will vary depending on the rate at which regulatory issues can be put aside and a concrete start date of construction can be set. Construction delays and therefore revenue undermines the profitability, meaning that private investors in a liberalized market, that values rapid returns, are reluctant to invest in the sector, especially when there are safer short-term investments available. One of the ways of overcoming this issue is by state funds.⁷⁵

All reactors currently operating in the EU were developed by state-owned or regulated utilities and as such were subject to high levels of state support, often leading to intense political debate largely because of the level of funding required. State aid is a legal concept,

⁷³ William Martin, *Britannica*, <https://www.britannica.com/technology/nuclear-power/Economics> (accessed on July 27, 2022).

⁷⁴ IFIEC, *ifiec europe*, https://www.ifieceurope.org/fileadmin/Downloads/Electricity/IE_nuclear_position_31_10_08.pdf (accessed July 27, 2022).

⁷⁵ Barnes, *The Politics of Nuclear Energy*, 149.

and it is governed by the rules of competition and policy, namely possible distortions of competition through state subsidies, as set forward by Article 107 TFEU.⁷⁶

The operation and maintenance costs tend to be higher because of the complexity of the nuclear plant, safety measures, and regulatory issues. Operational costs begin to increase as reactor units age, but even more significant costs are associated with decommissioning and waste management.⁷⁷ Decommissioning a nuclear facility is the final phase in its lifecycle. It involves shutdown, removal of nuclear material to site restoration, and the complete elimination of radiological hazards.⁷⁸ In 2018 Commission adopted a proposal for a Council regulation establishing a dedicated program for decommissioning of nuclear facilities and management of radioactive waste. In 2021 Council Regulation entered into force. Spent nuclear reactor fuel and the waste stream must be conditioned for permanent disposal. Nuclear waste is highly radioactive thus careful steps must be taken to ensure that it is stored safely and securely, deep in underground permanent geologic repositories.⁷⁹

All of these factors raise questions about safety of nuclear power plants and their feasibility in the process of climate change mitigation and are being debated in the policy arena and considered by regulators. It is safe to say that the future of building new nuclear plants in highly uncertain. However, should nuclear power policies become more restrictive, one potential option in achieving carbon-neutral society, separated from reliance on Russian energy, is forfeited. A systemic analysis of nuclear power, its policies and interactions in different fields, and standpoints of each individual country is needed, thus delegates should consider:

⁷⁶ Ibid, 149.

⁷⁷ Ibid, 146.

⁷⁸ Matteo Ciucci, Fact Sheets on European Union, <https://www.europarl.europa.eu/factsheets/en/sheet/62/nuclear-energy> (accessed July 27, 2022).

⁷⁹ European Commission, Council Regulation establishing a dedicated financial programme for decommissioning, 2018, Brussels: Publications Office, 2018.

X. ISSUES TO ADDRESS

1. What should be EU's approach towards energy policy? Should energy policy be part of the EU supranational-decision making agenda or should it stay in Member states' jurisdiction? What should be the position of nuclear energy in the EU energy mix?
2. Could nuclear power, with increased electricity generation, help EU achieve energy security? Could nuclear energy cut EU's dependence on Russian energy?
3. Should EU institutions attempt to achieve political consensus and public acceptance of nuclear energy? If yes, how? Are existing robust safety standards adequate to reassure the public?
4. Is nuclear energy assuredly safe? Are and will there ever be conditions of safety necessary to eliminate the hazards to the life and health of the public? How could EU institutions improve nuclear safety standards? What should be EU's role in international collaboration in nuclear waste management? What about decommissioning?
5. Is nuclear energy in fact a sustainable source of energy? Could EU achieve the sustainability goals with renewables alone? How could EU promote nuclear technology development?
6. Is nuclear energy "too cheap to meter"? Should EU co-fund nuclear power plant construction? Are nuclear new-build projects a good investment or is nuclear phase-out more feasible option in long term? Is EU single market and its standards compatible with nuclear energy? How do EU law provisions regarding competition apply to a single nuclear energy market?

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