Part A –
EU Law Framework

European Climate and Energy Transformation Law

Michael Rodi

In this volume, the energy transition laws of selected EU Member States are analyzed in a comparative approach. It also covers the United Kingdom, which has been part of the European Union until recently, so its legislation is still influenced by it to a huge degree. Legal comparison within the European Union is special, as it happens within one legal sphere[1] or one common legal system.[2] European Union law and the laws of its Member States are closely intertwined, and in this context legal comparison is more useful and necessary (to better understand national laws as well as European Union law) than usual.[3] Due to the interconnections, comparison in this area is only possible if European Union law is taken into consideration, as Member States can only legislate within the leeway framed by it.

This contribution deals with those features of European energy transformation law that seem to be especially relevant to the comparison of national energy transformation laws addressing the following aspects: The object of the comparison, climate and energy transformation law, will be outlined in more detail (Chapter A). As the European Union itself is bound by international law, the respective international legal framework will be taken into account (Chapter B). The competences of the European Union in the field of climate policy and energy transformation (Chapter C) and the respective policies have to be addressed (Chapter D). Regarding European climate and energy transformation we will give an overview on the climate and energy transformation objectives (Chapter E), the overall climate and energy governance (Chapter F), and the European climate and energy transformation law *stricto sensu* (Chapter G).

1 Armin von Bogdandy, 'European Law Beyond "Ever Closer Union" Repositioning the Concept, its Thrust and the EJC's Comparative Methodology' (2016) 22 European Law Journal 519–538.

2 Allan Rosas, 'European Law and National Law: A common legal system?' in K. Karjalainen et al. (eds), *International Actors and the Formation of Laws* (Luxembourg 2022) 11–26, under chapter 4.

3 Sabrina Raggone, 'European Comparative Law: Reasons for "enhanced comparison" and the role of the CJZU' (2021) 112 Revista de Derecho Politico 297–325, under chapter 2.

A. Climate and Energy Transformation Law as Objects of Comparison within the European Union

The topic of this volume is comparative energy transition law. If this contribution refers to climate and energy transformation in relation to the European legal framework, this different terminology requires a brief explanation.

On the one hand, this concerns the concept of transformation. Climate protection policy essentially refers to complete decarbonization, which some countries are aiming for by the middle of the century (or even earlier, such as Germany with the date 2045). This implies a complete transformation of the energy system and consequently of society as such, as it is based on the energy system.[4] In sociology, social transformation refers to a "deep and lasting, non-linear systemic change"[5] in a society. The term "transition" is not the opposite of the term "transformation".[6] Rather, transition refers to the process of "passing through" and implies a movement from one state or condition to another.[7] In contrast, the term transformation describes changes that profoundly influence the characteristics of the "things being transformed".[8] It emphasizes more strongly the normative aspect, the dimension of challenge and the political task. Against this background, it becomes clear why it is better to speak of energy transformation and not just energy transition.

For the analysis of the respective laws (be it at the international, EU or national levels), it is important to consider that energy transformation law is an area of law at the intersection of climate law and traditional energy

4 See regarding transformative law Laura Mai, 'Navigating transformations: Climate change and the international law' Leiden Journal of International Law 2024.

5 Björn-Ola Linnér/Victoria Wibeck, 'Conceptualising variations in societal transformations towards sustainability' Environmental Science & Policy (2020), 106:222.

6 Katharina Hölscher/Julia M. Wittmayer/Derk Loorbach, Transition versus transformation: What`s the difference, Environmental Innovation and Societal Transitions 27 (2018), 1 – 3; James Patterson/Karsten Schulz/Joost Vervoort/Sandra van der Hel/Oscar Widerberg/Carolina Adler/Margot Hurlbert/Karen Anderton/Mahendra Sethi/Aliyu Barau, 'Exploring the governance and politics of transformations towards sustainability' Environmental Innovation and Societal Transitions 24 (2017) 1, 3: Laura Mai, 'Navigating transformations: Climate change and the international law' Leiden Journal of International Law 2024 4 f.

7 Laura Mai, 'Navigating transformations: Climate change and the international law' Leiden Journal of International Law 2024 4 f.

8 ibid, with reference to the Oxford Dictionary.

law.[9] On one side, energy law comprises all legal norms that regulate the extraction, production, transportation and use of energy products. It is governed by specific principles like energy security, energy justice, and national sovereignty regarding energy resources; sustainability and resilience are increasingly seen as independent energy law principles. Climate law, on the other side, consists of climate protection (mitigation) law and climate adaptation law (with climate finance law cross-cutting). It is climate protection law that overlaps with energy law: all legal norms that are directed to setting or implementing climate goals thus affect the mitigation of greenhouse gas emissions (GHG). Key principles like common but differentiated responsibility and the precautionary principle are vested in the international climate law framework (UNFCCC), indicating the close relationship to environmental law.

Considering different options to reach decarbonization clarifies the importance of energy transformation law: (1) reducing energy consumption (energy efficiency) or/and transforming a fossil-based energy system into a decarbonized one, by installing renewable energy (or other non-fossil sources like nuclear); (2) implementing carbon management (Carbon Capture and Storage (CCS) or Carbon Capture and Utilization (CCU)) and negative emission technologies (Direct Air Capture and Carbon Storage (DACCS), peatland restoration etc.); and (3) reducing GHG emissions by a change in transport or land use. Overall, the change in production and use of energy towards decarbonization in service of an energy transition forms the main pathway to decarbonization; the law regulating this, the energy transformationlaw, thus forms the main legal field regarding decarbonization.

At the heart of climate law is the goal of decarbonization, which serves as a central point of orientation for energy transformation law and policy. In turn, energy transformation law and policy are (an extremely important) part of climate (mitigation) policy. Alongside energy efficiency, decarbonization requires a shift towards carbon free energy sources or technologies to capture, store or use greenhouse gases produced by burning fossil fuels (other areas of climate protection policy comprise e.g. land use changes or a mobility transformation beyond avoiding fossil fuels).

9 For the relationship between these fields of law see Kaisa Huhta/Seita Romppanen, 'Comparing Legal Disciplines as an Approach to Understanding the Role of Law in Decarbonizing Societies' (2023) 12 Transnational Environmental Law 649–670; Seita Romppanen/Kaisa Huhta, 'The Interface between EU Climate and Energy Law' (2023) 30 Maastricht Journal of European and Comparative Law 45–62.

Thus, energy transformation and climate protection law are extremely intertwined, which becomes apparent for example, when analyzing the scope of competences which the EU treaties provide for the European legislator (see Chapter C).

B. European Climate and Energy Transformation Under the International Umbrella

Thus, as in European Union law and national law, two areas of international law are relevant: international energy law and international climate law.

1. International Energy Law

International energy law comprises all norms dealing with energy as a real phenomenon and important part of economies and societies. Energy can be seen as an object of law from three perspectives: as a resource (stocks like fossil fuels), as a product (like electricity) or as an activity (like production or trade)[10].[11] Energy law is not aligned with one overarching objective, but plays a role within manifold regulatory objectives (like energy security and sustainability) relevant to different legal areas like trade law, investment law or environmental law.[12]

Apparently, states are reluctant to give up sovereign rights regarding energy as a crucial national economic factor. Thus, a real international energy law with specific goals, principles and instruments never came into existence. Rather, states followed other (common) interests like liberalizing trade or securing energy supply, applying these to energy topics and in some cases concretizing them. The Energy Charter Treaty (ECT) of 1994 (in force since 1998), dealing mainly with specific trade and investment protection issues, is the most relevant example of this. Apparently, investment protection, with a historic focus on fossil fuels, appeared to be in conflict with necessary climate action. Reforms of the ECT could not really

10 See e.g. the "Energy Cycle" described in Article 19(3)(a) ECT.

11 Jorge E. Viñuales, *The International Law of Energy* (Cambridge University Press 2022) 14 ff., who sees "energy technologies" as a fourth important aspect (e.g. regarding the law of intellectual property rights).

12 Viñuales (n 11) 21 ff.

solve them[13], and thus the European Union – like other countries with committed climate policy – quit the treaty.[14]

Climate protection has appeared as an independent objective which is more and more relevant for regulating the objectives of energy policies, leading to an international law of energy transformation as a new area of law.[15]

2. International Climate Law

Accordingly, international energy transformation law as a shared legal area of (traditional) international energy law and (general) international climate law can also be analyzed from the climate policy perspective.

In 1992, international climate law gained a solid foundation with the United Nation Framework Convention on Climate Change (UNFCCC).[16] This established a general objective (Article 2) and guiding principles (like the principle of common but differentiated responsibilities); these were formulated quite abstractly and vaguely but had the potential to strive for concretization through subsequent treaties and protocols. As a "regional economic integration organization", the European Union is a member of the UNFCCC (Article 22 UNFCCC), the Kyoto Protocol[17] (Article 24 Kyoto Protocol), and the Paris Agreement[18] (Article 20 (1) 1). Thus, as Article 20 (2) 1 of the Paris Agreement expressly states, it is "bound by all the obligations under the Agreement".

The Paris Agreement drew the conclusion that the policy of binding top-down targets has failed. Instead, it set up a procedural governance mechanism with Nationally Determined Contributions (NDCs) as its central pillar. The EU started with the first NDC, with the objective, among

13 See e.g. Mattia Colli Vignarelli, 'Making the Energy Charter Treaty Climate-Friendly: An (Almost) Impossible Leap' (2022) European Yearbook of International Economic Law, 267–293.

14 Notification by the Council and the Commission of 28 June 2024 based on Council Decisions of 30 May 2024, entry into force on 28 June 2025. Please note that according to Article 47(3) of the ECT, all investments covered by the treaty at the time of the withdrawal takes effect will continue enjoying protection for 20 years from such date.

15 Viñuales (n 11) 395 ff.

16 Adopted 9 May 1992, entry into force on 21 March 1994, S. Treaty Doc No. 102–38, 1771 U.N.T.S. 107.

17 Adopted 11 December 1997, entry into force 16 February 2005, 2303 U.N.T.S. 162.

18 Adopted 12 December 2015, entry into force 4 November 2016, T.I.A.S. No. 16–1104.

others, of reducing greenhouse gas emissions by at least 40 % below 1990 levels by 2030.[19] On the 11 December 2020 the European Council endorsed a new and more ambitious EU climate target for 2030, applicable to the EU and its 27 Member States, of "a net domestic reduction of at least 55 % in greenhouse gas emissions by 2030 compared to 1990", and submitted it to the UNFCCC Secretariat as an updated and enhanced NDC on 18 December 2020. On 5 March 2021 the goal of greenhouse gas neutrality in 2050 was submitted, as had been decided by the European Council in December 2020. An updated NDC of the European Union and its Member States followed on 16 Oct. 2023.[20] Next to components of the Fit for 55 Package it included a more ambitious 55 % reduction target for 2030 (compared to 40 % before). In September 2025 a post-2030 NDC has been due presenting a 2040 target and outlining an emissions reduction plan up to 2035.

The EU has a long tradition of leading international climate policy by example. Against this background, the EU has always submitted its newest set of climate regulations to the UNFCCC as NDCs. As the focus of this chapter lies on the EU legal framework for national climate and energy transformation laws, it is important to consider the legal and political consequences of these NDCs (for the European Union, but also for the Member States). There are good reasons to qualify them as legally non-binding; in any case, they are non-enforceable.[21] But they clearly have political functions, like providing transparency and trust, or acting as a yardstick for assessing progress towards climate neutrality.[22] Especially for the EU, which still tries to provide an international example, they are, if not legally so, at least de facto binding. To a certain extent this can be seen as an internal measure against withdrawal: the EU is willing to provide strong NDCs to bind itself (present and future institutions) and Member States.

19 Estelle Brosset/Sandrine Maljean-Dubois, 'The Paris Agreement, EU Climate Law and the Energy Union' in Eliantonio/Peeters (eds), *Research Handbook on EU Environmental Law* (Edward Elgar 2020) for the history of EU international climate politics 412–427.

20 European Commission, 'Update of the NDC of the European Union and its Member States' <https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf> accessed 20 August 2024.

21 For details see Sharaban Tahura Zaman, 'Exploring the Legal Nature of Nationally Determined Contributions (NDCs) under International Law' (2015) 26 Yearbook of International Environmental Law 98.

22 Maria Järnnäs, 'Governing through the Nationally Determined Contribution (NDC): Five functions to steer states' climate conduct' (2024) 33 Environmental Politics 530–551.

This international climate law framework obliges the European Union as well as its Member States. Comparative (climate and) energy transformation law will definitely have to take notice of it.

C. Competences of the European Union

As shown above, climate law and policy are closely intertwined with energy law and policy, as the transformation of the energy system is a vital part of it (renewables, energy efficiency etc.). Thus, this policy field centrally relies on two competences, which are shared ones according to Article 4 (2) lit. e (environment) and i (energy) TFEU: environment (Article 192 TFEU)[23] and energy (Article 194 TFEU). Beyond this *lex specialis*, general competences with relevance for energy policies remain applicable, especially the market harmonization competences (as the wording "without prejudice to the application of other provisions of the Treaties" in Article 194 TFEU makes clear; Article 192 (2) explicitly mentions Article 114 TFEU).[24] Some regulations, for example the RED III Directive, have been based on several competences.[25] As the EU doesn't have exclusive competences in these areas, the policies necessarily lead to a multi-level governance.[26]

Moreover, the EU legislator is restricted by significant unanimity requirements regarding environmental measures significantly affecting a Member State's choice between different energy sources and the general structure of its energy supply (Article 192 (2) lit. c TFEU). Correspondingly, without prejudice to this, energy measures shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply (Article 194 (2) TFEU). The fact that the EU has refrained from

23 It is not disputed that climate is part of environment in that sense.

24 See Saurer, in this volume, 51 (54) and Michael Fehling, 'Energy Transition in the European Union and its Member States: Interpreting Federal Competence Allocation in the Light of the Paris Agreement' (2021) 10 Transnational Environmental Law 339–363, for state aid control.

25 See Saurer, in this volume, 51 (55 f.)

26 See e.g. Michèle Knodt, 'Instruments and modes of governance in EU climate and energy policy: from energy union to the European Green Deal', in Knodt (ed), *Handbook on European Union Climate Change Policy and Politics* (2023) 202–215.

setting RES targets beyond 2030 for Member States could be seen in this light.[27]

D. EU Climate and Energy Transformation Policy

Climate and energy transformation policies began in the 1990s, the first decade of clear-cut policy measures in this regard.[28] At the international level, this has been triggered by the UNFCCC in 1992, a turning point in international climate policy. Since the insertion of the Environmental Chapter into the European Treaties in 1987, the European Union has had quite a strong legal base for climate competences; the Energy Chapter following in 1992 did not change this situation fundamentally.

But the 1990s saw limited progress, marked by the failed carbon/energy tax proposal of the Commission.[29] The 2000s (2nd decade) were marked by an expanding climate policy toolbox making the Emission Trading Scheme (ETS) a key policy measure. The first half of the 2010s (as 3rd decade) was a period of a slowed-down climate policy development. The second half showed new policy efforts, especially regarding target setting, with the European Green Deal (EGD) as a crowning highlight. Overall, in 2021 a 29 % reduction of GHG compared to 1990 levels has been reached (2023: 37 %[30]).[31]

Three decades of development in climate and energy transformation policy have led to several main patterns of climate governance:

- increasingly adequate decade-wise target setting;
- comprehensive policy packages that integrate more policy fields and multi-level governance;

27 See Saurer, in this volume, 51 (56 ff.).

28 For an empiric analysis of EU (and Member States) climate policies regarding policy density, sectoral coverage, and policy mix thickness see Margherita Bellanca, `What, how and where: an assessment of multi-level European climate mitigation policies´, npj climate action 3 (2024) 119 <https://doi.org/10.1038/s441168-024-00200-7> accessed 18 July 2025.

29 For a historic overview reflected in the following see Claire Dupont et al., 'Three Decades of EU Climate Policy: Racing towards climate neutrality?' (2024) WIREs Climate Change 2024:15:e863.

30 European Commission, 'Communication 'EU-wide assessment of the final updated national energy and climate plans: Delivering the Union's 2030 energy and climate objectives' COM (2025) 274 final 2.

31 European Environmental Agency (EEA), 'Trends and projections in Europe 2022' (2022) 10 EEA Report, 15.

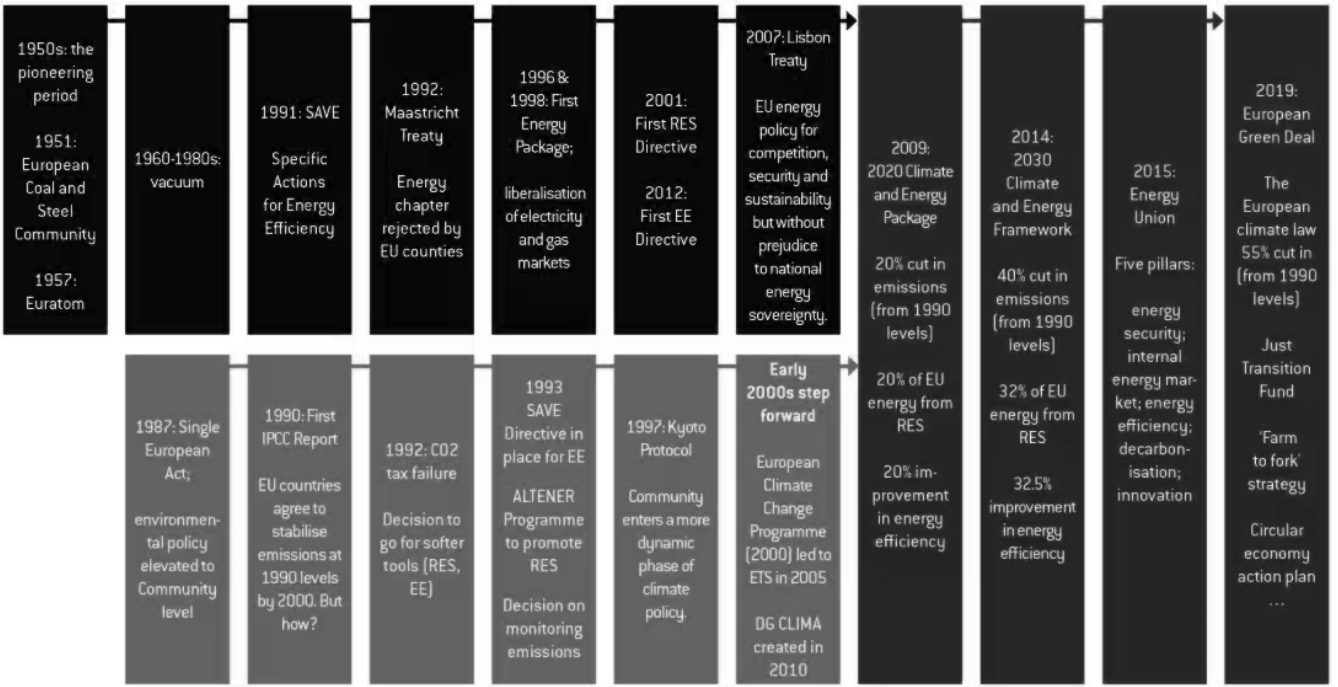
– setting pillar instruments (like ETS) and revising them in several rounds; this allows entry in a "soft" way (regarding Member States and citizens) and a predictable, path-dependent pattern of development.

The EGD, as the starting point of the 4th decade from 2020 on, can be seen as a highlight of this development: It sets extremely ambitious targets (climate neutrality in 2050 and a 55 % reduction in 2030). It comprises more policies than ever (including e.g. agriculture, social policy, finance and food). It strengthens the procedural multi-level governance approach. It establishes new pillar instruments, such as the Carbon Border Adjustment Mechanism (CBAM) or the Social Climate Fund.

Following the election of a new Commission, the mid-2020s could mark a turning point in the development of European climate law. Recognizable trends lie in the areas of de-bureaucratization or deregulation, climate-oriented competition and industrial policy as well as climate adaptation.[32] It is currently unclear whether this will jeopardize the climate law acquis.

32 See for that e.g. European Commission, 'A Competitiveness Compass for the EU' COM 2025) 30 final; European Commission, 'The Clean Industrial Deal' COM (2025) 85 final; a Climate Adaptation Plan has been announced for 2026, see European Commission, `Joint Communication on the European Preparedness Union Strategy´ JOIN (2025) 130 final 7 f.

Figure: The Long Journey of EU Energy and Climate Policy



Source: Bruegel[33]

E. Climate Objectives of the European Union and Burden Sharing

1. General Climate Targets

As described above, the EU climate targets started modestly (a stabilization target for 2000, a 8 % reduction target for 2008–2012 and a 20 % reduction target for 2020). Ambition grew only in the 3rd decade of climate policies. Now, starting with the 4th decade, the European Climate Law of 30 June 2021 (ECL)[34] sets a binding climate neutrality objective in Article 2 (1): "Union-wide greenhouse gas emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050, thus reducing emissions to net zero by that date, and the Union shall achieve negative emissions thereafter". Intermediate Union climate targets are, according to Article 4 (1), a domestic reduction of net greenhouse gas emissions by 2030 of at least 55 % compared to 1990 levels. The contribution of net removals shall be limited to 225 million tons of CO2 equivalent. Regarding a 2040 goal in the framework of the European Climate Law, the Commission proposed in February 2024 a 90 % net greenhouse gas reduction (compared to 1990 levels) but left the legislative initiative to the newly elected Commission.[35]

Regarding national climate targets, the Effort Sharing Regulation was amended in 2023.[36] The 2030 targets range from 10 % to 50 % reductions in 2030 (compared to 2005 levels), based mainly on Gross Domestic Product (GDP) per capita. An obligation for Member States to achieve climate neutrality in 2050, as proposed by the European Parliament, has not been

33 Bruegel, 'The Long Journey of EU Energy and Climate Policy'<https://www.bruegel.org/policy-brief/new-governance-framework-safeguard-european-green-deal> accessed 21 August 2024.

34 Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European Climate Law) [2021] OJ L 243/1:.

35 European Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions, 'Securing our future. Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society' COM (2024) 63 final.

36 Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, and Regulation (EU) 2018/1999 [2023] *OJ L 111/1.*

accepted.[37] Thus, at the moment, only about 50 % of the Member States have set national net-zero targets.[38]

2. Targets for Renewables

The EU has set binding targets for renewable energy from the beginning (e.g. a 12 % objective for 2010 set in 1997).[39] The 20 % target for 2020 set by RED I has been reached.[40] With RED III the ambition for 2030 was raised from 32 % (RED II) to 42.5 % (with an "endeavor" to reach 45 %); in 2023 24 % have been reached.[41] As mentioned above, there are now no more binding national targets for Member States with regard to 2030.

RED III instead specifies various sub-targets. These include a 49 % share of the energy taken from the grid for consumption in the building sector in 2030 (Article 15a (1) RED III); a 29 % share of renewable fuels or renewable electricity in the transport sector in 2030, and 60 % in 2035; and a 5.5 % share of advanced biofuels and biogas in 2030 (Article 25 (1) RED III). Regarding renewable fuels of non-biological origin, the target is 42 % of the hydrogen used in industry in 2030, and 60 % in 2035 (Article 22a (1) RED III).[42]

37 Kati Kulovesi et al., 'The European Climate Law: Strenghening EU Procedural Climate Governance?' (2024) 20 Journal of Environmental Law 1, 7.

38 As of spring 2022, see Marjan Peeters et al., 'Towards an EU Climate Governance Framework to Deliver on the European Green Deal' (2023) 7 ff.

39 See Saurer, in this volume, 51 (56 ff.).

40 European Commission, 'Report to the European Parliament and Council, '2022 report on the achievement of the 2020 renewable energy targets' COM (2022) 639 final, under 2.

41 European Commission, 'Report to the European Parliament and Council, '2022 report on the achievement of the 2020 renewable energy targets' COM (2022) 639 final, under 2.

42 For details see Talus/Penttinen, in this volume, 71 ff.

3. Energy Efficiency Targets

As part of the energy and climate package, the EU has set in Article 3 of the Energy Efficiency Directive 2012/27/EU (EED)[43] a 20 % reduction target in the EU's primary and final energy consumption by 2020; although influenced by the COVID-19 pandemic, both targets were exceeded.

Article 4 (1) of the revised Energy Efficiency Directive[44] sets a target of reducing final energy consumption by at least 11.7 % compared to projections of the expected energy use for 2030 according to the 2020 reference scenario.

F. Overall Energy and Climate Governance

According to Article 2 (2) ECL, it is a common responsibility of relevant Union institutions and the Member States to take the relevant measures (at Union and national level) to enable the collective achievement of the climate neutrality objective. At the EU level, the ECL contains the main topics of procedural climate governance (target setting, monitoring, evaluation, scientific expert advice, access to justice, inclusiveness and public participation). In parallel, the Governance Regulation[45] sets up a governance process to assure adequate contributions of the Member States.[46]

43 Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 [2023] OJ L 231/1 (Energy Efficiency Directive).

44 Energy Efficiency Directive: "Member States shall collectively ensure a reduction of energy consumption of at least 11,7 % in 2030 compared to the projections of the 2020 EU Reference Scenario.".

45 Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council [2018] OJ L 328/1 (Governance Regulation).

46 For a (positive) evaluation of the Governance Regulation see European Commission, 'Report of the Commission to the European Parliament and the Council on the Review of the Regulation on the Governance of the Energy Union and Climate Action' COM (2024) 550 final.

This legislative technique shall ensure coordination of Member States' policies to align them with a common European goal. It stems back to the "Open Method of Coordination" (OMC), which originates from policy areas where the Union had no or only few competences (e.g. employment policy, general economic policy etc.). It is mainly built on formal reporting obligations of the Member States, an assessment by the Commission, recommendations to the Member States and, once again, reporting obligations of Member States on how to cope with them. This "iterative process"[47] is very appropriate for climate policies as it sets up a similar process as framed by the Paris Agreement. In its "soft" variant it is solely built on a "blaming and shaming" mechanism. But in reality, it always has "harder" (enforceable) elements, especially in the area of climate and energy policies where the Union possesses quite some competences. Ultimately, to enforce binding Member State obligations under EU law, the infringement procedure (Articles 258, 259 and 260 TFEU) can be used.[48] Here, especially, there is an ongoing debate on further "hardening" soft governance.[49]

The Governance Regulation is an integrated climate and energy instrument and addresses five Energy Union dimensions: (1) decarbonization of the economy, (2) energy efficiency, (3) energy security, (4) the internal energy market, and (5) research, innovation and competitiveness. Article 3 requires EU Member States to prepare medium-term National Energy and Climate Plans (NECPs) every 10 years and to update them every 5 years. Importantly, NECPs must specify the national contributions not only to the EU's overall decarbonization target, but also to its renewables and energy efficiency targets. Every 10 years Member States must submit Long-Term Strategies (LTS) covering at least the next 30 years, which are demanded in Article 4.19 of the Paris Agreement ("should strive for"). LTSs comprise national objectives and targets, alongside policies or instruments to reach them; thus, they serve as important guidance.[50] The procedural character of the Governance Regulation is underlined by transparency (report and

47 See Saurer, in this volume 51 (56 ff.).

48 For further details see European Parliamentary Research Service (EPRS), `Briefing: Roadmap to EU climate neutrality – Scrutiny of Member States´ May 2025, 2 f. <https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/772887/EPRS_BRI(2025)772887_EN.pdf> accessed 28 July 2025.

49 Michèle Knodt/Marc Ringel/Rainer Müller, '"Harder" soft governance in the European Energy Union' (2020) 22 Journal of Environmental Policy & Planning 787–800.

50 See Marjan Peeters/Sebastian Oberthür/Brendan Moore/Ólöf Söebech, 'Towards an EU Climate Governance Framework to Deliver on the European Green Deal' (2023)14 ff.

review) features, participation requirements (regarding experts and civil society) and access to justice.

For national legislatures this means that, at first glance, they have quite a lot of leeway in defining pathways to decarbonization. Additionally, they are not strictly bound to the contents of their NECPs. But there is something of path-dependency: in the course of the decarbonization process, it will get increasingly difficult to change the path taken. Additionally, implementation can be fostered by national courts ("access to justice"), infringement proceedings of the Commission according to Articles 258 and 260 TFEU and increasingly by funding instruments (including conditionality criteria).[51]

G. European Climate and Energy Transition Law

Apart from the governance process regarding national climate and energy policies, there is material European legislation. This may be directly applicable (regulations) or at least contain obligations to implement (directives).

As mentioned above, climate is a cross-cutting field of law affecting various other fields of law. Thus, today we are confronted with a huge number of different EU acts. For legal comparison at the national level, it is important to describe and define the scope of regulatory leeway of the EU Member States. In the case of directly applicable regulations, this can only concern supplementing and administering them .

1. Emission Mitigation

The European Emissions Trading Scheme (ETS)[52] is the most powerful greenhouse gas reduction instrument at the European level.[53] It covers

51 ibid 27 ff.

52 For the regulatory design of the EU ETS see e.g. Edwin Woerdman, 'Emissions Trading: Design, diffusion, and drawbacks' in: Kenneth R. Richards/Josephine van Zerben (eds), *Policy Instruments in Envrironmental Law* (2020) 261–278.

53 According to recent studies it is responsible for a 10 % reduction of greenhouse gases, while having a positive effect on the economic record of the regulated companies, see e.g. Antoine Dechezleprêtre et al., 'The Joint Impact of the European Union Emissions Trading System on Carbon Emissions and Economic Performance' (2023) 118 Journal of Environmental Economics and Management 102758.

around 45 % of greenhouse gases (mainly industrial plants, as well as aviation since 2012). According to EU NDC of 16 October 2023, no. 12, these emissions shall be reduced by 62 % by 2030, compared to 2005 levels (nearly 50 % have been achieved in 2024). While Member States had great leeway in designing the scheme at the beginning (2005), it is now nearly fully harmonized. A central problem of ETS has always been international competition. Up to now, the answer has been massive reliefs for energy-intense industry; with the introduction of a Carbon Border Adjustment Mechanism (CBAM), this disadvantage might disappear.[54] In 2023 a new ETS (called ETS2) was created covering fuel combustion from buildings, road transport and small industry not yet covered by the existing ETS. It will be fully operational in 2027.

While the ETS is a market-based instrument, the EU relies on command-and-control regulation in other fields. The Industrial Emissions Directive (Directive 2010/75/EU) aims to lower emissions from industrial production (including e.g. energy industry) through an integrated approach prescribing the best available technology; but it leaves a lot of leeway to Member States especially regarding exemptions (most relevant for power plants). Much more powerful is the European regulation regarding transport emissions. Regulation (EU) 2019/631 sets CO_2 emission performance standards for new passenger cars and vans. In line with the EU's ambition to reach climate neutrality in 2050, this has been amended on 19 April 2023[55], introducing a 100 % CO_2 emission reduction target for all cars and vans registered from 2035 onwards.

In these fields of direct emission mitigation, the regulatory leeway of Member States is restricted.

54 For CBAM and its role as a green industrial policy instrument see Mehling, in this volume, 91 (111 ff.).

55 Regulation (EU) 2023/851 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition [2023] OJ L 110/5.

2. Renewable Energy Law

From the 2nd decade of climate policies, the EU started with renewable energy regulation (Directive 2001/77/EC).[56] The scope of this policy approach has meanwhile broadened, putting more emphasis on hydrogen and infrastructure.[57] The renewable energy law framework deals with definitions and structures for national policies, but leaves basic policy choices to Member States.

3. Energy Efficiency Law

Energy efficiency is an important approach towards decarbonization. Since 2018, this has been reflected in the Energy Efficiency First Principle (Article 3 of the Energy Efficiency Directive).[58] Actually, energy efficiency policies stem back to the oil crisis in the 70s and thus have a longer history than climate policies.[59]

The range of instrument mix that the EU applies in the field of energy efficiency is huge.[60] It starts with general financial instruments like the ETS. The main pillars of product energy efficiency policies are energy labeling, minimum energy performance standards and eco-design. Regarding buildings, the Energy Performance of Buildings Directive (EPBD) paves the way to all new buildings being zero-emission by 2030, and to a zero-emission building stock by 2050.[61]

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56 Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market [2001] OJ L 283/33.

57 See in detail Saurer, in this volume, 51 (65 ff.).

58 See e.g. Tim Mandel/ Zsuzsanna Pató, 'Towards Effective Implementation of the Energy Efficiency First Principle: A theory-based classification and analysis of policy instruments' (2024) 115 Energy Research & Social Science 103613.

59 For the history of EU energy efficiency policies see Maria Gonzales-Torres et al., Review of EU Product Energy Efficiency Policies: What have we reached in 40 years?' (2023) 421 Journal of Cleaner Production.

60 For an overview categorized according to market-failure criteria see Mandel/Pató (n 58).

61 For a review of 50 years of EU energy efficiency policies in buildings see e.g. Marina Economidou et al., 'Review of 50 Years of EU Energy Efficiency Policies for Buildings' (2020) 225 Energy and Buildings 110322.

The EU energy efficiency framework is the weakest of the areas of law described. Member States have a great deal of leeway to design their energy efficiency instruments.

4. Further Net-Zero Technologies

There is, of course, a great variety of emerging technologies that can contribute to the net-zero goal. Promoting them is part of an emerging European green industry policy based on the European Green Deal Industrial Plan.[62] The Net-Zero Industry Act of June 2024 (NZIA)[63] strives to enhance manufacturing capacities and increase the competitiveness of the net-zero sector. It expressly mentions in Article 3 (1) (a), alongside renewables and other technologies, "carbon capture, utilization, and storage technologies" and "energy from nuclear processes with minimal waste from the fuel cycle".

This shows that nuclear power can play an important role on the way to decarbonization in the form of small modular reactors (SMRs). It is up to the Member States to include them in their Long-Term Strategies (LTS) or NECPs. It must be emphasized here that this does not mean that classical nuclear power plants may be included.

Industrial Carbon Management (ICM) will also play an important role in achieving the net-zero goal. The EU's ICM Strategy was published on 6 February 2024.[64] The Net Zero Industry Act (NZIA) sets an EU-wide CO_2 storage objective to make 50 million tons of annual CO_2 injection available by 2030. How it is to be stored is regulated by the CCS Directive of 2009.

H. Conclusions

This contribution is only able to give an overview of a very comprehensive and still growing European framework for climate and energy transition

62 See Mehling, in this volume, 91 (107 ff.).

63 Entered into force on 29 June 2024; European Commission, 'Proposal for a Regulation of the European Parliament and the Council on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act)' COM (2023) 161 final.

64 European Commission, 'Towards an ambitious Industrial Carbon Management for the EU' COM (2024) 62 final.

law. Also, while some important instruments - especially the ETS as the centerpiece of EU climate policy – are nearly fully regulated at the European level, the European legal framework is designed for being supplemented and implemented by Member States. As a result, in the European Union, national and European climate and energy law are closely intertwined. As far as Member States are the object of legal comparison, the corresponding EU law framework must also be considered.

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