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# The role of energy communities for thermal networks: An EU legal perspective

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## Abstract

Decarbonising heating and cooling systems, significant contributors to the EU's (European Union) energy consumption, is a complex and urgent matter. This article discusses the potential coupling of energy communities and district heating and cooling systems, particularly fourth- and fifth-generation models, in the local energy transition. The integration of new-generation district heating and cooling systems into renewable energy generation is crucial for sustainability, circular economy practices, and community-based solutions. An examination of the EU legal framework within the Fit-for-55 package elucidates how provisions from the new Energy Efficiency Directive and Renewable Energy Directive facilitate the implementation of energy communities in the heating and cooling sector. The existing enabling legislation underscores the suitability of energy communities for heating and cooling sector activities, acknowledging their transformative potential in advancing the energy transition and fostering community empowerment.

## 1 | INTRODUCTION

The climate emergency and the geopolitical energy crisis have raised the profile of heating and cooling (HC) issues in the European Union (EU).[1] In 2022, HC accounted for half of the total gross final energy consumption in the Union.[2] Additionally, HC systems contribute to almost a third of the EU's energy-related carbon dioxide ($CO_2$) emissions while fossil fuels still predominate in the sector. The transition from fossil fuels to renewable or zero-carbon alternatives has been slower in HC than in electricity generation: presently, renewables only account for 24.8% of total energy consumption in the HC sector, compared with 41.2% for gross electricity consumption.[3]

As climate change causes more frequent and intense heatwaves and hotter summers, HC patterns will change. Demand for cooling in buildings is expected to surge, necessitating higher energy consumption; otherwise, it would be difficult to protect the peoples' health and wellbeing.[4] Europe stands out as a climatic hotspot.[5] If these problems are to be overcome, effective measures must be taken to reduce emissions from HC as a matter of urgency.[6]

[1]On the energy crisis also due to the weaponisation of Russian fossil resources, see J Osička and F Černoch, 'European Energy Politics After Ukraine: The Road Ahead' (2022) 91 Energy Research and Social Science 102757.

[2]F Gerard et al, 'Policy Support for Heating and Cooling Decarbonisation: Roadmap' (Publications Office of the European Union 2022).

[3]See Eurostat, 'Renewable Energy for Heating & Cooling up to 25% in 2022' (21 February 2024) <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240227-2> .

[4]European Environmental Agency (EEA), 'Cooling Buildings Sustainably in Europe: Exploring the Links between Climate Change Mitigation and Adaptation, and Their Social Impacts' (26 April 2023) <https://www.eea.europa.eu/publications/cooling-buildings-sustainably-in-europe>.

[5]E Rousi et al, 'Accelerated Western European Heatwave Trends Linked to More-Persistent Double Jets Over Eurasia' (2022) 13 Nature Communications 3851.

[6]EEA, 'Decarbonising Heating and Cooling – A Climate Imperative' (EEA 2023) <https://www.eea.europa.eu/publications/decarbonisation-heating-and-cooling>.

As far as the pursuit of sustainability is concerned, district heating and cooling (DHC) systems promise to reduce reliance on both fossil fuels and electricity. In 2016, the EU Heating and Cooling Strategy was launched against this backdrop.[7] It points to actions and tools that were intended to ensure that the HC sector will not obstruct progress towards the EU objective of climate neutrality by 2050. This strategic overview was implemented through the Clean Energy for All Europeans Package that was adopted in 2019.[8] Other relevant policy developments can be found in the strategies Renovation Wave for Europe and Energy System Integration (ESI) as part of the EU Green Deal.[9] The ESI requires the use of all available tools in the heat and power sector based on energy system integration, energy efficiency and circularity. The strategy also emphasises that 'a more integrated system will also be a "multi-directional" system in which consumers play an active role in energy supply'.[10] The 2021 Fit-for-55 package[11]—strengthened by the REPowerEU targets[12]—improved the legal framework of the energy transition through recasts of, among others the Energy Efficiency Directive (EED)[13] and the Renewable Energy Directive (RED III).[14]

In this context, policy and regulatory frameworks need to address several complex challenges. The decarbonisation of the HC sector can be driven by its electrification. However, as Angelidis and colleagues have pointed out, the transition towards sustainable HC practices, including DHC, poses significant challenges for the electricity industry.[15] In fact, the electrification of the thermal system could put a strain on the electricity grid. This risk calls for a holistic approach to decarbonisation that enables the technological coupling of energy flows and energy storage to alleviate the overload that would affect the electricity grid. From an industrial standpoint, aside from the technologies involved, this also fosters a coupling of the electricity industry and the industrial sector providing HC services.

Thermal networks are a compelling choice for sector coupling through district energy systems. Furthermore, it is crucial to underline that, unlike electricity and gas grids, thermal networks are inherently local. This localness facilitates stakeholder engagement at the community level. Integrating DHC networks and the generation of renewable electricity into a single system would advance circular economy[16] practices and community-based solutions. As will be discussed in this article, the EED and RED III foster circular energy practices in HC systems. These systems utilise waste heat from industrial processes, power generation, or renewable sources like geothermal or solar energy to provide heating to residential and commercial buildings or power energy-efficient heat pumps.

The latest generation of DHC enables each connection point to become a prosumer[17] and energy sharing[18] would become a realistic possibility. From the Clean Energy for All Europeans package, the concept of 'prosumerism' finds support in several directives referring to the broader idea of 'consumer empowerment'.[19] A prosumer takes an active role in the energy market by participating in the production and consumption of energy. Furthermore, the notion of 'empowerment' goes beyond this, to include complementary grid services such as storage, grid balancing and demand response.[20] This expansive conceptualisation underlines the multifaceted agency of prosumers in shaping the energy ecosystem. The transformative potential of new legal entities as 'energy communities' (ECs) further enhances the democratic and societal-value-driven nature of energy transition.[21]

At present, the discourse about ECs revolves chiefly around the generation and distribution of electricity. The potential for community-based thermal energy applications and their coupling with the electricity grid and related services has largely been overlooked. The legal framework for thermal energy communities (TECs) has been neglected in the juridical literature. To examine this research gap in energy law scholarship, this contribution starts by assessing the relevant legal framework for the roll-out of DHC systems in combination with the concept of, and legal provisions related to, ECs. Recently, this neglect has been mainly highlighted in the social science literature. That literature has also emphasised the legal issues that affect the

[7] Commission (EU) 'An EU Strategy on Heating and Cooling' (Communication) COM(2016) 051 final, 16 February 2016.

[8] Commission (EU) 'Clean Energy for All Europeans' (Communication) COM(2016) 0860 final, 30 November 2016.

[9] Commission (EU) 'A Renovation Wave for Europe – Greening Our Buildings, Creating Jobs, Improving Lives' (Communication) COM(2020) 662 final, 14 October 2020; Commission (EU) 'Powering a Climate-neutral Economy: An EU Strategy for Energy System Integration' (Communication) COM(2020) 299 final, 8 July 2020; Commission (EU) 'The European Green Deal' (Communication) COM(2019) 640 final, 11 December 2019.

[10] COM(2020) 299 final (n 9) 3.

[11] Commission (EU) '"Fit for 55": Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality' (Communication) COM(2021) 550 final, 14 July 2021.

[12] Commission (EU) 'REPowerEU Plan' (Communication) COM(2022) 230 final, 18 May 2022.

[13] Directive 2023/1791/EU of 13 September 2023 on energy efficiency and amending Regulation 2023/955 [2023] OJ L231/1.

[14] Directive 2023/2413/EU of 18 October 2023 amending Directive 2018/2001/EU, Regulation 2018/1999/EU and Directive 98/70/EU as regards the promotion of energy from renewable sources, and repealing Council Directive 2015/652 [2018] OJ L 2413. This article refers to the article numbers appearing in the consolidated version of the Renewable Energy Directive 2018/2001/EU of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources [2018] OJ L328/82 (RED II), as amended by Directive 2023/2413/EU (RED III). To make the new provisions of the Directive recognisable to the reader, they will be referred to as RED III. Provisions not amended by the 2023 directive will be identified as RED II.

[15] O Angelidis et al, 'District Heating and Cooling Networks with Decentralised Energy Substations: Opportunities and Barriers for Holistic Energy System Decarbonisation' (2023) 269 Energy 1, 2.

[16] Circular economy represents a novel approach focused on closing, narrowing and decelerating material loops to accomplish sustainability objectives by improving economic, environmental, and social outcomes. Circular models are suitable for tackling modern environmental challenges, including resource scarcity, waste mismanagement and energy inefficiency. On the concept of the circular economy and its usefulness for a paradigm shift in society, see A de la Varga Pastor, 'La incorporación de la economía circular en la legislación estatal de residuos a raíz de la Directiva (UE) 2018/851' (2020) 102 Actualidad Jurídica Ambiental 178.

[17] ibid.

[18] L Diestelmeier and V Cappelli, 'Conceptualizing "Energy Sharing" as an Activity of "Energy Communities" under EU Law: Towards Social Benefits for Consumers?' (2023) 12 Journal of European Consumer and Market Law 15.

[19] Directive 2019/944/EU of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU [2019] OJ L158/125, recitals 10, 43–47 and 52, art 2 and provisions in Chapter III; Directive 2018/2001/EU of 11 December 2018 on the promotion of the use of energy from renewable sources, [2018] OJ L328/82, recitals 66–73, arts 21–22. See S Lavrijssen 'Power to Energy Consumers' (2017) 26 European Energy and Environmental Law Review 172.

[20] S Jacobs, 'The Energy Prosumer' (2017) 43 Ecology Law Quarterly 524.

[21] J Swens and L Diestelmeier, 'Developing a Legal Framework for Energy Communities Beyond Energy Law' in S Löbbe et al (eds), *Energy Communities: Customer-Centered, Market-Driven, Welfare-Enhancing?* (Elsevier 2022) 61.

architecture, governance and functioning of TECs.[22] However, very few legal studies have focused on these issues.[23]

This article aims to advance understanding of how the EU legal framework for energy and climate change facilitates the efficient and integrated use of renewable energy and HC systems at the local level. It particularly emphasises the pivotal role played by ECs within the Union's evolving energy paradigm. While the existing HC regulatory framework is fragmented and complex,[24] this study focuses squarely on legislative developments linking these systems to local ECs. With this focus, the research question is: how can the EU legal framework be leveraged for implementing ECs within the HC sector?

The article is organised as follows. Section 2 outlines the essential technological characteristics and advantages of the latest generations of DHC systems. Section 3 introduces the significance and applicability of ECs in delivering HC services, on the basis of the concept, typology and functions of ECs. To answer the research question, Section 4 examines the EU regulatory framework for the HC sector, focusing on the changes brought about by the Fit-for-55 package. Thus, an integrated overview of the provisions of RED III and the EED is provided. Connecting the dots, the analysis unveils the substantial legal opportunities for thermal ECs alongside several challenges. Section 5 presents some concluding remarks.

## 2 | FOURTH- AND FIFTH-GENERATION DISTRICT HEATING AND COOLING: A BRIEF OVERVIEW OF TECHNOLOGY

District heating (DH) systems have been in use since the 1870s.[25] The early generation of DH systems were based on a central supply of heat carried by steam, first implemented in the United States in the 1880s.[26] The main purpose of DH and district cooling (DC) infrastructures is to facilitate cost-effective and energy-efficient thermal management. Both systems rely on interconnected pipe networks to link thermal sources and sinks.[27]

Traditional DH systems are designed for specific spatial heat, specific heat density and linear demand-density requirements.[28] Lund and colleagues developed a taxonomy of the first three generations of DH.[29] These conventional DH systems depend heavily on fossil fuels and operate at high temperatures, which leads to substantial thermal losses. Instead, the most recent district energy systems can operate effectively in mild climates with lower heat-demand densities. These advanced systems are designed to provide both heating and cooling, and they are engineered to run on renewable energy sources to a large degree.[30]

A holistic approach to decarbonising the energy sector involves integrating different energy flows and storage methods, leveraging synergies between thermal and electricity grids to lower energy costs, enhance grid stability, and advance ambitious decarbonisation goals. Research shows that ambient or low-temperature networks offer advantages over conventional DH and DC systems.[31] They promote circular economy practices by using low-grade thermal resources, meeting rising cooling demands and enabling energy trade, turning each connection point into a prosumer.[32] Therefore, this transition supports a shift from monopolistic to open-access energy markets, offering growing potential for energy communities.

The terms ‘fourth generation’ and ‘fifth generation’ imply progression and an improvement in energy efficiency, which is misleading.[33] As Lund and colleagues explained, the first three generations emerged from an evolutionary process, and this evolution was even more pronounced in the shift from the third to the fourth generation; however, the relationship between the fourth and fifth generation is complementary.[34] Fourth- and fifth-generation systems share the same overarching aim, decarbonisation; conversely, the first three generations depended on non-renewable energy.[35]

[22]See, e.g., J Fouladvand et al, ‘Simulating Thermal Energy Community Formation: Institutional Enablers Outplaying Technological Choice’ (2022) 306 Applied Energy 117897; J Fouladvand et al, ‘Analysing Community-based Initiatives for Heating and Cooling: A Systematic and Critical Review’ (2022) 88 Energy Research and Social Science 102507; A Papatsounis et al, ‘Thermal/Cooling Energy on Local Energy Communities: A Critical Review’ (2022) 15 Energies 1117; J Fouladvand, ‘Thermal Energy Communities: What, Why and How to Formulate Complex Collective Action for the Thermal Energy Transition in Europe’ (2023) 18 Environmental Research Letters 81,004; and K Hartmann and J Palm, ‘The Role of Thermal Energy Communities in Germany's Heating Transition’ (2023) 4 Frontiers in Sustainable Cities 1027148.

[23]S Lavrijssen and B Vitez, ‘Good Governance and the Regulation of the District Heating Market’ in M Weijnen et al (eds), *Shaping an Inclusive Energy Transition* (Springer 2021) 185; A Billerbeck et al, ‘Policy Frameworks for District Heating: A Comprehensive Overview and Analysis of Regulations and Support Measures across Europe’ (2023) 173 Energy Policy 113377; I Gallego Córcoles, *Comunidades de energía y transición energética* (2021 Thomson Reuters Aranzadi) 210–214; I González Ríos, ‘Las Comunidades energéticas locales. Un nuevo desafío para las entidades locales’ (2020) 117 Revista Vasca de Administración Pública 147; I Revuelta Pérez, ‘Comunidades energéticas: desafíos jurídicos para los entes locales’ (2022) 16 Anuario de Derecho Municipal 77; L López de Castro García-Morato, ‘Las comunidades energéticas locales: sinergias de la transición energética y de la lucha frente a la despoblación’ (2023) 364 Revista de derecho urbanístico y medio ambiente 105.

[24]It covers problems that are as varied as network ownership, consumer tariffs, consumption metering systems, third-party access to the network and support measures. A systematic analysis of all of these matters is beyond the scope of this article.

[25]PA Østergaard et al, ‘The Four Generations of District Cooling – A Categorization of the Development in District Cooling from Origin to Future Prospect’ (2022) 253 Energy 1.

[26]H Lund et al, ‘4th Generation District Heating (4GDH): Integrating Smart Thermal Grids into Future Sustainable Energy Systems’ (2014) 68 Energy 1.

[27]ibid 2.

[28]K Gjoka et al, ‘Fifth-generation District Heating and Cooling Systems: A Review of Recent Advancements and Implementation Barriers’ (2023) 171 Renewable and Sustainable Energy Reviews 112997.

[29]Lund et al (n 26) 2.

[30]ibid. The issue of the intermittency of renewable energy technologies has led some countries, such as Estonia and Finland, to consider the integration of small modular nuclear reactors (SMRs) as a strategy for phasing out fossil fuel plants and complementing renewable sources in micro-grids and DHC systems. This option presents a series of challenges in terms of both economic viability and regulation. Beyond the debate on the appropriateness and classification of nuclear energy as a ‘clean’ technology (though not renewable), considering SMRs would introduce an additional regulatory layer to the current analysis, which exceeds its scope. However, integrating SMRs into DHC systems remains a topic of interest for further research. See D Michaelson and J Jiang ‘Review of Integration of Small Modular Reactors in Renewable Energy Microgrids’ (2021) 152 Renewable and Sustainable Energy Reviews 111,638; J Leppänen et al, ‘A Finnish District Heating Reactor: Background and General Overview’ in *Proceedings of the 2021 28th International Conference on Nuclear Engineering* (American Society of Mechanical Engineers 2021); S Hadi Ghazaie et al, ‘On the Use of Advanced Nuclear Cogeneration Plant Integrated into Latent Heat Storage for District Heating’ (2022) 50 Sustainable Energy Technologies and Assessments 101838.

[31]Angelidis et al (n 15) 1–2.

[32]ibid 2.

[33]H Lund et al, ‘Perspectives on Fourth and Fifth Generation District Heating’ (2021) 227 Energy 5.

[34]ibid.

[35]ibid 4.

Buffa and colleagues proposed the concept of fifth-generation DHC in 2019 to underline the nonlinear, bidirectional and decentralised characteristics of those systems. In principle, these characteristics allow each consumer to produce energy.[36] In the ideal scenario of balanced demand for heat and cold, the fifth-generation systems would be almost perfectly circular. Similarly to electricity microgrids, bidirectional decentralised DHC grids hold the promise of prosumerism.[37] These thermal networks may require end users to employ decentralised heat pumps to boost temperatures to appropriate levels.[38] According to Lund and colleagues, fifth-generation DHC systems have three fundamental properties. First, they leverage the synergy between HC in areas with mixed-purpose buildings. Second, these systems purport to dismantle the barriers associated with the use of local waste-heat sources, minimising upfront costs that utilities and other entities shoulder in the course of such projects. Third, fifth-generation DHC systems impose fewer restrictions on system growth because the centrality of the heat supply loses its importance as new end users both heat the network and draw from it, making the system dynamic and adaptable.[39]

In conclusion, there is no discontinuity between the most recent systems; as a general matter, fifth-generation systems discharge the same functions as fourth-generation ones. The particularities of each actual project will determine the most appropriate architecture of the district to enhance its flexibility and resilience.[40]

## 3 | THE CONCEPT AND REGULATORY FRAMEWORK FOR ENERGY COMMUNITIES

Recent research on advanced DHC systems indicates that a new organisational model is needed for the potential of emerging bidirectional thermal grids to be harnessed fully and for prosumers to be integrated into the energy system. ECs' mode of organisation differs from the traditional business model of energy utilities.[41] In the same vein, it has been argued that new technology development in light of the European energy legislation for the ECs allows for the implementation of an energy model not only characterised by distributed energy resources but also by two other dimensions: the decentralisation of decision making through more open and democratic forms of governance; and objectives that allow for community-centred socio-environmental benefits rather than financial benefits.[42] Lavrijssen and Vitéz argue that the local nature of heat networks suits small-scale prosumerism, promoting energy democracy and justice by enabling active citizen participation in the energy sector.[43]

The latest generations of DHC systems not only move towards a fresh and prosumerist business model but may also usher in a paradigm shift. The notions of prosumers and active consumers are emblematic of a market framework and a set of actors' market rights. In the evolving energy model, citizen participation in community-based entities engenders a different array of rights (not market-based) intertwined with the concept of 'energy citizenship'.[44] This, in turn, is paired with the concept of 'energy democracy'.[45] Technological innovation enables this transformation through, among others, benefits that would result from the introduction of active substations into new HC systems, disrupting the prevailing monopolistic model. However, even though technology enables the model change, the driver behind the change is political, and the law underpins an ongoing societal transformation. In the traditional model, conventional energy utilities, which are often large, mainly supply heat to consumers; conversely, the evolving prosumerist paradigm is apt to enhance civic agency, generating an additional 'social benefit'[46] for communities and their most vulnerable members. The open-access market is built from the bottom up, and citizens can actively steer energy transition processes in a democratic way. ECs are essential to this process.[47]

ECs are organisational structures designed to promote a participatory and just energy transition. As a legal form, the EC is inspired by the notions of consumer empowerment and energy citizenship from the Clean Energy for All European Package. ECs are regulated by the Renewable Energy Directive[48] these are referred to as 'renewable energy communities' (RECs)) and by Directive 2019/944 laying down common rules for the internal electricity market (EMD) (Articles 2 and 16; these are referred to as 'citizen energy communities' (CECs)).[49] Despite the relative novelty of these legal forms, ECs have existed in various guises for as long as there have been community-led energy initiatives in Europe.[50]

ECs have emerged at a time when the energy system is shifting away from the hierarchical fossil fuel-based model. Beyond the technological changes to the energy mix that are necessary for the economy to decarbonise, the shift also involves a sociopolitical transformation towards a fairer model marked by enhanced democracy,

[36]S Buffa et al, '5th Generation District Heating and Cooling Systems: A Review of Existing Cases in Europe' (2019) 104 Renewable and Sustainable Energy Reviews 504.

[37]S Boesten et al, '5th Generation District Heating and Cooling Systems as a Solution for Renewable Urban Thermal Energy Supply' (2019) 49 Advances in Geosciences 131.

[38]R Zeh et al, 'Large-Scale Geothermal Collector Systems for 5th Generation District Heating and Cooling Networks' (2021) 13 Sustainability 6035.

[39]Lund et al (n 33) 4.

[40]According to Gudmundsson and colleagues, 'the most important for the future energy system is the flexibility to utilize intermittent energy sources and provide load services to other parts of the energy system, in particular to the power sector. In this respect the flexibility is directly related to the ability of the system to decouple the heat demand and the heat generation …. [R]esilience of those two systems [4th and 5th DHCs] is their ability to cope and recover from disruptions.' O Gudmundsson et al, 'Comparison of 4th and 5th Generation District Heating Systems' (2021) 246 E3S Web of Conferences 9004.

[41]Angelidis et al (n 15) 7.

[42]Diestelmeier and Cappelli (n 18) 17–18.

[43]Lavrijssen (n 23) 206.

[44]Diestelmeier and Cappelli (n 18) 23.

[45]On the legal implications of this concept, R Fleming et al, 'What Is Sustainable Energy Democracy in Law' in R Fleming et al (eds), *Sustainable Energy Democracy and the Law* (2021 Brill) 3.

[46]ibid 18.

[47]A Savaresi, 'The Rise of Community Energy from Grassroots to Mainstream: The Role of Law and Policy' (2019) 31 Journal of Environmental Law 487.

[48]RED II (n 14) arts 2 and 22.

[49]Directive 2019/944/EU of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU [2019] OJ L158/125.

[50]E Caramizaru and A Uihlein, 'Energy Communities: An Overview of Energy and Social Innovation' (Publications Office of the European Union 2020).

decentralisation and integration of new actors into energy systems.[51] Walker and Devine-Wright identified two dimensions on which the concept of an EC can be defined and on which it differs from the conventional notion of an energy company: the 'process dimension' has to do with the dynamics of participation and influence, that is, with the composition and the governance structure of ECs. The 'outcome dimension' accounts for the spatial and the social distribution of the outcomes of those communities.[52]

EU law defines the characteristics and functions of ECs and requires Member States to promote and facilitate their development. RECs and CECs are legal entities based on open and voluntary participation. Local authorities can be shareholders or members of both. The two governance structures differ. An REC is autonomous from its members or shareholders. This status can be acquired by natural persons, small and medium-sized enterprises or local authorities that are situated 'in the proximity' of the renewable energy projects that the REC owns and operates.[53] Therefore, large companies cannot participate in RECs. A CEC is not autonomous in this way, and there is no requirement of proximity—the entity is effectively controlled by its members or shareholders, which may be natural persons, local authorities or small enterprises. Large enterprises can become members or shareholders but cannot exercise effective control over the CEC.

Member States must ensure that both types of ECs can produce, supply, consume and store energy. CECs can also engage in aggregation and distribution and provide energy-related services to their members or shareholders. In addition, if the national transposing legislation allows it, CECs may own, establish, purchase or lease distribution networks. The functional definition of an EC that emerges from the directives is, therefore, a clear exception to the principle of unbundling.[54] The activity chain of an EC may be vertically integrated. Consequently, an EC is particularly suited for the provision of DHC thermal-energy services, which are vertically integrated—it would be normal for a heating-and-cooling operator to manage generation, distribution and the grid (as explained in Section 4.5).

The primary purpose of ECs of both types is 'to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits'.[55] There is no absolute prohibition on generating profits, but they must be reinvested into the EC or in a manner that furthers its social and environmental interests,[56] 'serv[ing] a much broader role than merely producing, distributing and supplying energy; that is to incorporate societal value'.[57] This objective is reflected in the European legislator's decision to allocate a function that is new to energy law, namely energy sharing, to ECs. Few scholars have paid attention to this function, which is distinct from classical supply and from other activities that are similar but not identical to sharing, such as peer-to-peer and collective self-consumption.[58] Energy sharing is not premised on a market-reciprocity or consumer-activation logic; its purpose is to support solidarity.[59] Energy sharing is particularly useful for vulnerable individuals and in cases in which energy poverty is widespread. The Social Climate Fund Regulation (SCF)[60] underscores the ECs' commitment to addressing energy poverty by advocating for grassroots initiatives. According to recital 25 of the SCF Regulation, these efforts aim to involve consumers in energy efficiency measures and renewable energy projects, thereby aiding vulnerable households and combating energy poverty. The SCF Regulation encourages Member States to recognise and support citizen and renewable energy communities as rightful recipients of the Fund's benefits.[61] In the same vein, Recommendation 2023/2407 on energy poverty states that there is a need to enable households affected by energy poverty access to energy sharing schemes among others by removing financial entry barriers for such households and encourage engagement of municipalities in such schemes'.[62]

However, the legal implications of the word 'sharing' remain vaguely defined, especially when the beneficiaries are local authorities (both the RED II and EMD do not restrict the sharing of energy to certain categories of partners or shareholders). The new 2024 Directive improving the Union's electricity market design (IEMD)[63] goes a step further on the importance of 'energy sharing': the recognition of a new 'right to share' is justified in recitals 22–24 and defined in Article 2(5); also, a definition for this activity is provided by Article 2(1)(a). However, implementing the definition of this key function (energy sharing) falls mainly to national legislators. Given that the holders of the right to share may do so 'within the same bidding zone or a more limited geographical area'[64] as determined by the Member State, the latter could significantly limit the energy sharing area and thus undermine the innovation of this right.

[51]L Diestelmeier, 'The Role of Energy Communities in Facilitating Sustainable Energy Democracy' in Fleming et al (n 45) 124.

[52]G Walker and P Devine-Wrigth, 'Community Renewable Energy: What Should It Mean? (2008) 36 Energy Policy 497.

[53]RED II (n 14) art 2(16).

[54]E Bartlett Castellá, 'Comunidades energéticas' in JF Alenza García and L Mellado Ruíz, *Estudios sobre cambio climático y transición energética*, (Marcial Pons 2022) 304.

[55]Art 22 RED II (n 14) and 16 EMD (n 49).

[56]Some scholars have questioned whether the benefits to the community and to the members of the ECs are aligned with the interests of all consumers in the electricity system so that a 'welfare enhancement' of all consumers, inside and outside the community, is realised; see D Robinson and I del Guayo, 'Alignment of Energy Community Incentives with Electricity System Benefits in Spain' in S Löbbe et al (eds), *Energy Communities* (Academic Press 2023) 73.

[57]Swens and Diestelmeier (n 21) 61.

[58]Diestelmeier and Cappelli (n 18); L Diestelmeier and D Kuiken, 'Is Sharing Caring? "Energy Sharing" within Energy Communities under EU Law' in R Fleming et al (eds), *A Force of Energy: Essays in Energy Law in Honour of Professor Martha Roggenkamp* (University of Groningen Press 2022) 275.

[59]Diestelmeier and Cappelli (n 18).

[60]Regulation 2023/955/EU of 10 May 2023 establishing a Social Climate Fund and amending Regulation 2021/1060/EU [2023] OJ L130/1.

[61]ibid art 81(c).

[62]See Commission (EU) 'Recommendation on energy poverty' (Recommendation), 20 October 2023, para 19.

[63]The new Directive amending Directives 2018/2001/EU and 2019/944/EU as regards improving the Union's electricity market design was adopted on 21 May 2024 and is awaiting publication in the Official Journal at the time of writing. The text of the IEMD is available at: <https://data.consilium.europa.eu/doc/document/PE-2-2024-INIT/en/pdf>.

[64]ibid art 2(5).

## 4 | THE ENHANCED REGULATORY FRAMEWORK FOR (THERMAL) ENERGY COMMUNITIES AND HEATING AND COOLING UNDER THE FIT-FOR-55 PACKAGE

Harnessing local energy potential is of the utmost importance in contemporary EU energy and climate policy. The 2016 Clean Energy for All Europeans Package[65] prioritised consumer empowerment through energy citizenship, individual and collective self-consumption and ECs. Then, the 2020 Communication 'A Renovation Wave for Europe'[66] defined a strategy for the renovation and decarbonisation of building stock, acknowledging that energy-related renovation rates must at least double by 2030 for climate neutrality to be achieved by 2050. From the perspective of the present analysis, this strategy is relevant because it highlighted two crucial factors: (1) an integrated approach whereby renewable electric and thermal energy technologies, storage, heat pumps and digital infrastructure are combined so that the entire system is managed flexibly and intelligently, and (2) a novel scale[67] that focuses on community-based and district-level experience. Building on these factors, the strategy identifies ECs as key players with significant potential.

The updated strategic and legislative framework of the European Green Deal and the Fit-for-55 package further elevated the importance of HC to achieve the 2050 climate-neutrality target.[68] The approaches and principles outlined above have now been integrated into the European energy and climate legislative package. The new EED and RED III are the package's legislative pillars that significantly connect the HC sector with the ECs. To answer the research question, the following subsections provide an overview of the relevant legal provisions to examine the potential legal opportunities and shortcomings associated with the implementation of ECs in the HC sector. The overview is summarised in Table 1.

### 4.1 | The energy-efficiency-first principle

The energy-efficiency-first (EE1st) principle was introduced through Article 2(18) of the Regulation on the Governance of the Energy Union (Governance Regulation).[69] According to Mandel and colleagues, EE1st is a guiding principle for energy-related decision making within defined system boundaries.[70] The most recent EED finetunes the legal obligations of the EU Member States on energy efficiency. Article 3 EED emphasises the consistent application of EE1st across various levels of governance, including national, regional, local, and sectoral decision-making loci. The principle is intended to deliver not only economic but also environmental and social benefits for local communities.[71] As far as the latter kinds of benefits are concerned, it is important to point out that when they are implementing the EE1st principle, Member States must address energy poverty.[72] For example, the application of the EE1st principle may require Member States to target certain houses (the worst performers) first to tackle energy poverty in terms of energy efficiency. This requirement to tackle energy poverty is particularly important in connection with ECs. By collectively investing in efficient solar, wind or biomass projects, ECs play a key role in diversifying energy sources and reducing dependence on expensive imports. This reduces costs for participants and makes local communities more resilient to energy price fluctuations and supply disruptions. In addition, the sharing activity can facilitate access to energy for the most vulnerable people who cannot afford to invest in the community. Improved energy efficiency in participating households further reduces energy demand and costs. In addition, job creation in the renewable energy sector stimulates local economic growth, generating income for community welfare and infrastructure development, directly impacting poverty alleviation.

Local HC plans must also comply with EE1st[73] irrespective of the thresholds set out in Article 3(1) EED, given its nature as an 'overarching principle' of EU law.[74] The implication is that some options, such as green hydrogen as a domestic heating fuel, cannot be assessed only from a technology-neutral perspective; accordingly, the principle circumscribes the discretion that public authorities ordinarily enjoy in planning. EE1st is intended to be applied by national authorities and by the operators of gas and electricity transmission and distribution systems when they plan and develop networks and when they invest in them.[75] In addition, Member States are required to have those operators assess and enhance energy efficiency in their transmission and distribution systems, particularly in the deployment of smart grids. As stated in recital 127 to the EED, the incorporation of the EE1st principle in planning and decision-making processes would incentivise

[65]Commission (EU) 'Clean Energy For All Europeans' (Communication) COM(2016) 860 final, 30 November 2019.

[66]Commission (EU), 'A Renovation Wave for Europe – Greening Our Buildings, Creating Jobs, Improving Lives' (Communication) COM(2020) 662 final, 14 October 2020.

[67]As highlighted in S Galera Rodrigo, *El hacer urbano de la Unión Europea. Modelo de ciudad, poder local y sostenibilidad energética* (Atelier 2022) 119ff.

[68]According to the Regulation 2021/1119/EU of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations 401/2009/EC and 2018/1999/EU (European Climate Law) [2021] OJ L243/1. Since no specific requirements are set by Regulation 2021/1119 for its actuation, to provide guidance on the application of EE1st without imposing legal obligations on the Member States, the Commission adopted the Commission (EU) 'Energy Efficiency First: From Principles to Practice' (Recommendation) 2021/1749, 28 September 2021.

[69]Regulation 2018/1999/EU of 11 December 2018 on the Governance of the Energy Union and Climate Action [2018] OJ L328/1.

[70]T Mandel et al, 'Conceptualising the Energy Efficiency First Principle: Insights from Theory and Practice' (2022) 15 Energy Efficiency 41. According to Mandel and colleagues, the EE1st principle prioritises demand-side resources and supply-side efficiency when they prove more cost-effective in achieving decision objectives than default supply-side resources. EE1st is integrated into the liberalised energy markets of the EU. It is a multifaceted concept that pertains to all investment decisions in the energy system, regardless of their origin, and it is holistic, in that it calls for consideration of all energy vectors. Furthermore, the societal perspective is emphasised in its application, which makes it a principle of public policy. EE1st is unique due to its wide scope—it covers a wide assortment of market activities, energy vectors, and costs and benefits. It is crucial for the formulation of policy, and it encourages comprehensive planning and the accommodation of social perspectives into impact assessments. The principle should guide the design of policy instruments.

[71]See EED (n 13) recital 16.

[72]ibid art 3(5)b.

[73]ibid art 25(6)b.

[74]ibid recital 15.

[75]ibid art 27. The application of the EE1st principle by transmission and distribution operators will be monitored by national regulatory authorities, who will seek to ascertain the degree of compliance that the operators have achieved in improving energy efficiency.

**TABLE 1** The enhanced regulatory framework for (thermal) energy communities and heating and cooling under the Fit-for-55 package.

| Energy Communities | Topic | Provisions |
|---|---|---|
| arts 2 and 22 RED II (RECs)<br>arts 2 and 16 EMD (CECs) | Energy-efficiency-first principle | art 1(28) Governance Regulation<br>art 3 EED |
| | Acceleration of permit-granting procedures, planning and energy system integration | rec 20, 110 RED III<br>rec 107 EED<br>art 15(b), (c) RED III<br>art 16 RED III |
| | Local energy potential and DHC | rec 145 EED<br>art 23(1),(4) RED III<br>art 24(4),(6)–(8) RED III<br>art 25 EED<br>art 26 EED |
| | Connected and efficient buildings | rec 18 RED III<br>art 15(a) RED III<br>art 11 EPBD<br>Annex II (referred to in art 3) EPBD |
| | Other measures | arts 2(d)(14)(9) and 3(4)(a) RED III on power purchase agreements<br>art 21 EED on DHC consumer rights<br>arts 8(1)(b), 9 SCF on eligible measures and investments, pass-on benefits<br>Section VI EP REC<br>art 2(1)(a) and 2(5) IEMD on energy sharing |

these operators to explore advanced energy efficiency solutions. This exploration ought to entail evaluations of the incremental costs of demand-side resources and the environmental and socioeconomic impacts of various network-related investments and operational strategies. Such an approach necessitates a departure from narrow economic efficiency analyses and a focus on the maximisation of societal welfare. EE1st thus transcends the purely economic efficiency rationale and is animated by a wider social-welfare rationale. The principle is aligned with the tendency to favour new organisational structures in energy models, which is exemplified by the importance of socioenvironmental goals to ECs (see Section 3). This development grants the principle substantive legal force for the first time, underscoring its significance in energy policy.

## 4.2 | Acceleration of permit-granting administrative procedures, planning and the promotion of energy system integration

The recently enacted RED III reflects a settled trend whereby the EU increasingly acknowledges the pivotal role of administrative planning and permit-granting procedures in its legislation. Because of their special position as owners and developers of energy projects closely linked to the territory, territorial planning is key to implementing ECs. Poor planning exacerbates the problems caused by hurdles in permit-granting procedures.[76]

Against this backdrop, the RED III requires Member States to undertake a coordinated mapping exercise by May 2025. Consequently, it will be necessary to identify domestic potential as well as areas that are suitable for the establishment of generation facilities and the associated infrastructures. Factors such as energy efficiency gains, flexibility and integration into the energy system ought to be considered explicitly, as per Article 15(b).

The RED III streamlines permit-granting procedures to build, repower and operate renewable energy plants, including those combining different technologies such as heat pumps, co-located energy storage thermal facilities, etc.[77] The main principles of the permit-granting procedure of the RED III should be applied consistently with the 'think small first' principle of the EED so that 'the specific structure of the cogeneration and district heating and cooling sectors, which include many producers that are SMEs, should be taken into account, especially when reviewing the administrative procedures for obtaining permission to construct cogeneration capacity or associated networks'.[78]

In light of its ambitious targets,[79] the RED III introduces 'renewable acceleration areas'.[80] The size of these areas is at the discretion of the Member States, subject to a vague requirement that they be 'significant'. In formulating designation plans, the competent authorities must prioritise artificial surfaces and built-up areas. Conversely, places with a high environmental value, such as Natura 2000 sites, should be excluded from the renewable acceleration zones. The plans must undergo strategic environmental assessments, and public participation must be guaranteed. However, at the project level, applications for renewable energy generation or co-located energy storage

[76] Scholars have also highlighted barriers such as the complicated rules that govern administrative authorisation for the choice of sites and the conduct of environmental impact assessments, the problems that pertain to energy networks and grid connections, as well the constraints to technological specification adjustments during the permit application procedure; see R Ruge, 'The Reality Gap: Simplification of Environmental Law as Key for the Acceleration of Permit Procedures for Europe's Green Deal' (2022) 31 European Energy and Environmental Law Review 258.

[77] RED III (n 14) art 16.

[78] ibid recital 110.

[79] ibid art 3.

[80] ibid art 15(c).

facilities within the designated areas, as well as their connections to the grid, are exempt from both the requirement to conduct an environmental impact assessment and the requirement to assess their impacts on Natura 2000 sites. It is beyond the scope of this article to analyse the complex problems that acceleration areas will engender. It should suffice to note that, although these areas are expected to serve large renewable energy sites, local and community projects for HC are not excluded from the scope of acceleration areas. The veracity of this proposition is evident from the express references to artificial and built-up surfaces, such as rooftops and the facades of buildings, transport infrastructures, parking areas, waste, industrial, and urban-wastewater treatment sites, and degraded land that cannot be used for agriculture. Therefore, there is no requirement that the size of the acceleration areas and the size of the projects correspond—urban or industrial DHC projects can be located in acceleration areas.

The EED underscores the importance of heat pumps for advancing the decarbonisation of the supply of energy for HC, including for DH systems. Therefore, all heat that is derived from heat pumps and introduced into a DH network must be considered renewable energy[81] The RED III also emphasises the key role of heat pumps, which enable energy sources such as wastewater treatment plants, geothermal energy and waste heat to be exploited. The swift rollout of heat pumps enables the use of otherwise under-utilised renewable resources. Article 16(e) of the RED III streamlines permit procedures for smaller heat pumps (below 50 MW), which should wind down within a month, as well as for ground-source pumps. In the latter case, the procedure must conclude no later than three months after its initiation. Heat pumps of up to 50 kW that are installed by self-consumers of renewable energy will benefit from a fast-track procedure for connection to the transmission or distribution network, provided that the conditions that are set out in the directive are met.

The rules on the streamlining of permit-granting procedures should also account for 'the broad public acceptance of the deployment of renewable energy'.[82] This 'acceptance' is crucial for the viability of the energy transition, and Member States assume responsibility for the passage of measures that encourage community involvement.[83] However, it would have been preferable not to use the term 'acceptance', which is an outcome, and instead use the term 'acceptability' to focus on consensus building, emphasising the processes or conditions that lead to this outcome. Such an approach would also accord with the procedural tenet of energy justice.[84] This procedural justice perspective is especially relevant to the identification of acceleration areas. Under the Aarhus Convention and the EU law that implements it, the macro plan for the designation of such areas could be more vulnerable to mismatches between law and social preferences than the micro decision about the location of an individual renewable energy-related activity.[85] Interestingly, the European legislator considers the ECs to be a particularly useful formula for achieving social acceptance because the participation which that format entails amounts to more than a mere procedure. If this proposition holds true in the highly complex case of offshore wind-farm projects,[86] it should, *a fortiori*, also hold true in other energy projects.

It remains to be seen whether ECs, to the extent that they are expected to deliver environmental benefits, will be legal vehicles able to prevent the environmental risks that could arise from the new EU acceleration provisions. Indeed, Article 16(f) of RED III establishes a presumption that the development of renewable projects, the connection of renewable energy plants to the grid, the grid itself and the storage assets constitute 'overriding public interests' for the purpose of the assessment rules from the Habitats Directive, the Water Framework Directive and the Birds Directive.

## 4.3 | Assessment of local energy potential and DHC planning

A regulatory framework for identifying and exploiting local energy potentials has been in place since the passage of the 2012 EED. The focus of that framework is on high-efficiency cogeneration and urban DHC systems. The revised EED augments this procedure and introduces implementation measures for HC as part of the national energy and climate plans required under the Governance Regulation.[87] The EED emphasises the role of regional and local authorities in developing, designing, executing and evaluating those measures. Local authorities should be empowered to address the specific features of their climates, cultures and societies.[88]

The EED provisions that are essential to DH revolve around assessment and planning for HC systems. The comprehensive evaluation unfolds in two stages. The potential for efficiency gains is assessed first. A cost–benefit analysis for the territory, which is based on climatic conditions, economic feasibility and technical suitability, is conducted thereafter. If the benefits are shown to exceed the costs, the Member States are legally obliged to develop efficient DHC infrastructures.[89]

Galera Rodrigo has written that Article 14 of the 2012 EED, which is the provision that concerns the identification and utilisation of local energy potentials, including for waste heat, 'is not merely a local public policy but a European public policy that necessitates local-level implementation'.[90] This interpretation has been reinforced by

[81] EED (n 13) recital 107.
[82] RED III (n 14) recital 20.
[83] ibid recital 30.
[84] RJ Heffron, 'Energy Justice: The Triumvirate of Tenets Revisited and Revised' (2024 fc) Journal of Energy and Natural Resources Law.
[85] L Squintani and G Perlaviciute, 'Access to Public Participation: Unveiling the Mismatch between What Law Prescribes and What the Public Wants' in M Peeters and M Eliantonio (eds), *Research Handbook on EU Environmental Law* (Edward Elgar 2020) 133.
[86] In this vein, the amended Article 9(7) RED III states that '[i]n order to enhance public acceptance, Member States may include renewable energy communities in joint offshore renewable energy projects'; RED III (n 14) art 9(7).
[87] EED (n 13) art 25(1).
[88] ibid recital 145.
[89] ibid art 25(4).
[90] Galera Rodrigo (n 67) 122.

the introduction of Article 25(6) EED. This groundbreaking provision requires regional and local authorities with populations over 45,000 to develop HC plans. The EED includes minimum content requirements for the plans in question. The focus on next-generation DHC systems is evident from the requirement that local authorities have to assess their preparedness for low-temperature DH. In addition, the plans should highlight the potential for high-efficiency cogeneration, waste-heat recovery, and the integration of renewable energy into the HC sector. Public participation in the formulation of local plans is being maximised, and the involvement of new actors in the energy system is treated as a mandatory element of all plans. The drafters of the plans are required to evaluate the role of ECs and other consumer-led initiatives that can contribute actively to local HC projects.

Article 26 of the EED introduces a new definition of 'efficient district heating,' outlining the criteria that DH systems must meet to qualify.[91] There is also economic leverage in meeting the requirements of an efficient district heating system. Indeed, the guidelines on State aid for climate, environmental protection, and energy require efficient DHC systems may be eligible for State aid.[92] Moreover, various EU programmes offer financial support for transforming existing DH systems into 'efficient' ones and certain Member States confer supplementary privileges to systems that are classified thus.[93]

The RED III strengthens measures to mainstream renewable energy in HC sector. First, to accelerate the penetration of renewables, the new Article 23 of RED III sets a binding minimum increase at the Member State level. This binding target is supplemented by indicative increments or additional rates that are calculated on a Member State-specific basis to reapportion the economic burden of ensuring that renewables have a reasonable share in energy production by 2030. The new provision also establishes that Member States may incorporate waste heat and cold from efficient DH systems when calculating their progress towards the renewable HC targets from the directive.

In line with the EED, the RED III requires Member States to evaluate their potential to derive energy from renewable sources and to use waste heat and cold for HC. Scale matters in this evaluative framework, and particular attention must be paid to small-scale domestic initiatives that pose minimal ecological risks. Article 23(4) RED III underscores the use of HC systems and district-level solutions within community-oriented organizational frameworks. This provision stipulates that, in order to meet the prescribed objectives, the Member States must adopt at least two of 12 specific measures. Noteworthy among these measures is the promotion of renewable HC purchase agreements for corporations and 'collectives of small consumers'.[94] In addition, there are measures for promoting DHC networks that are based on renewable sources, especially ones that are established by RECs. These measures may include regulatory provisions, financial arrangements and support mechanisms.

The realisation of the full technological potential of fourth- and fifth-generation DHC systems, which are flexible power-to-heat solutions (see Section 2), also depends on measures that target energy integration and address fragmentation in planning. Those measures are outlined in Article 24(6) and (8) of the RED III. Member States must create coordination frameworks that involve HC system operators, providers of waste heat, be it industrial or tertiary in origin, and scientific experts and local authorities, which will be called upon to shape the urban planning of HC networks and systems. Member States must also require electricity distributors and the operators of DHC systems to examine the potential of the systems in question to deliver balancing services and other functionalities every four years. The services in question include demand responsiveness and the thermal storage of excess electricity from renewables. The aim of the assessment is to determine whether using DHC systems is more resource- and cost-efficient than alternative solutions. The outcomes of the evaluation should be considered by transmission system operators and distribution system operators when they make decisions about network, investment and infrastructural planning. These coordination efforts may also be expanded to include gas transmission and distribution system operators, which would bring hydrogen networks and other energy infrastructures into the scheme.

## 4.4 | From districts to connected efficient buildings

Since the local level is crucial to an integrated energy system, buildings play a key role for the end users of energy.[95] Buildings in the EU account for 40% of final energy consumption and 36% of greenhouse gas emissions, with 75% being energy-inefficient.[96] The new energy performance of buildings directive (EPBD) aims to decarbonise building stock by 2050, considering the whole-life-cycle emissions of buildings.[97] The EPBD outlines the roadmap, requirements and methodology to achieve climate neutrality.[98] To reach this goal, Member

[91] In a departure from the previous EED, the most recent definition of an 'efficient heating and cooling system' refers to a decarbonisation pathway. Nevertheless, the use of fossil fuels such as natural gas is set to remain permissible in the period between 2040 and 2050 (EED (n 13) art 26(4)). It remains an open question whether this HC supply regulation will be extended in the upcoming Energy Performance of Buildings Directive because the Commission treats the phaseout of fossil fuels by 2040 as viable.

[92] Commission (EU) 'Guidelines on State aid for climate, environmental protection and energy' (Communication) COM(2022) 481, 18 February 2022.

[93] S Oxenaar et al, 'Warming up to It: Principles for Clean, Efficient and Smart District Heating' (Regulatory Assistance Project 2023) 29–30.

[94] RED III (n 14) art 23(4)(f ).

[95] Buildings' importance has become particularly pronounced in the current energy crisis: 'Europe spent €330 billion extra on subsidies to reduce energy bills in 2022. These measures provided much-needed, short-term relief to households across Europe in an energy crisis … As a result, millions of euros were spent last year on energy that was wasted.' C Cuffe, 'European Parliament Wants Fair, Flexible Approach to Efficient Buildings Law' (EurActiv, 12 October 2023).

[96] Directive 2024/1275/EU of 24 April 2024 on the energy performance of buildings (recast) [2024] OJ L2024/1275 (EPBD) recital 6.

[97] ibid art 1.

[98] However, the new directive has been criticized to the extent that, given the significant flexibility provided to member states, it is now their burden to ensure that this Directive will actually support the delivery of the Fit-for-55 goals; See Climate Action Network (CAN) 'Final Energy Performance of Buildings (EPBD) Trilogue' (8 December 2023) <https://caneurope.org/final-epbd-trilogue/>.

States should plan to phase out fossil fuels and renovation of badly performing public and private buildings.[99] In addition, the EPBD explicitly recognizes the role of local energy communities.[100] The shift towards local policies and the complexity of the regulatory framework for buildings are not new issues and have been highlighted in the legal literature.[101]

The new Directive follows the integrated renovation perspective already embraced by European legislators.[102] The core premise behind that concept is that buildings should not only engage with their surroundings by leveraging high-efficiency installations but also go beyond the correlation of energy efficiency with economic savings and emissions reduction. Instead, renovation should be perceived as a building-oriented initiative that has far-reaching social, environmental and economic benefits.[103] The EPBD, following the strategy set out the 2020 Communication 'A Renovation Wave for Europe', is rooted in an integrated, participatory and community-focused approach, which entails a significant change in scale. The EPBD emphasises the importance of districts and local communities. This focus is particularly germane to HC systems and ECs. The potential for synergies in renovation is most apparent at the district and community levels. The consolidation of projects at these levels can precipitate the emergence of zero-energy or even positive-energy districts. Such a development would be facilitated by advanced DHC systems with considerable potential for the recovery of renewables and waste heat. Those systems should be coupled with gains in flexibility and improved thermal-storage capabilities. In fact, the EPBD sets that Member States shall ensure that the total annual primary energy use of a new or renovated zero-emission building is covered by: energy from renewable sources generated on-site or nearby; energy from renewable sources provided from a renewable energy community; and energy from an efficient district heating and cooling system.[104]

Furthermore, in the national building renovation plans, Member States may include indicators on market barriers and failures that affect 'renewable energy communities and citizen-led initiatives' and policies and measures on 'the role of renewable energy communities and citizen energy communities in district and neighbourhood approaches'.[105] Therefore, ECs should engage actively in the generation, consumption, storage, supply and sharing of energy, which would serve the most vulnerable members of society.

Article 15(a) of the RED III is dedicated to mainstreaming renewable energy in buildings; this new provision requires Member States to draft their integrated national energy and climate plans to include an indicative national share of renewable energy in final energy consumption in their building sector in 2030.[106] This indicative share is intended as an important signal to investors and as a means of monitoring progress in a hitherto stagnant sector that holds considerable potential. As stated in recital 18 to the RED III, the indicative share can be crucial in encouraging the development or modernisation of DHC networks. Furthermore, Article 24 RED III provide for measures on waste heat, cooling and proximity of energy generation. Waste heat and cooling may contribute to the indicative national renewable energy quota. To achieve the target, Member States must adopt various regulations, technical codes and supporting schemes, which may provide for substantial increases in the self-consumption of renewables, more extensive reliance on RECs, local energy storage, smart and bidirectional recharging, other flexibility services and major renovations that increase the number of efficient buildings. Buildings that generate, distribute, store and aggregate renewable energy are thus fundamental to the new distributed model.[107]

### 4.5 | The regulation of third-party access

It has long been known that DHC systems are natural monopolies.[108] In many Member States, the DHC sector is seen as a unified infrastructure—in each city or region, a single entity manages generation, distribution and the operation of the grid.[109] Accordingly, unlike the markets for gas and electricity, the DHC market is mostly exempt from the unbundling requirements of EU law. In most countries, therefore, DH is an integrated service.[110] The drafters of the RED II were highly cautious when regulating third-party access (TPA) to networks.[111]

Even though the DHC grid is a natural monopoly, the same is not necessarily true for the other links in the supply chain, such as production and retail. Lavrijssen and Vitéz contend that, despite the likelihood of consumers finding themselves bound to natural monopolies due to the legacy structure of their DHC systems, the capabilities of the latest generation of such systems and future technological advances will enable TPA to promote competition in the HC market. More intensive competition would enhance consumer choice and foster active participation in the thermal market.[112] This argument is valid irrespective of the extent to which renewable energies will penetrate the sector. Bacquet and colleagues have

[99] EPBD (n 96).

[100] Beyond the provisions set out below, that CEs are 'relevant actors' is reflected in ibid art 29(1)–(3).

[101] J Gifreu Font, 'La integración de medidas de eficiencia energética en el sector de la edificación en España a la vista de los objetivos de la UE para los horizontes 2020–2030. Las redes district heating and cooling' (2019) 10 Revista Catalana de Dret Ambiental 5; Galera Rodrigo (n 67) 82–89.

[102] Through the legislative evolution: Directive 2002/91 was replaced by Directive 2010/31, which was subsequently amended by Directive 2018/844/EU of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.

[103] Galera Rodrigo (n 67) 85–86.

[104] EPBD (n 96) art 11(7).

[105] ibid Annex II.

[106] RED III (n 14) art 15 establishes that '[i]n order to promote the production and use of renewable energy in the building sector, Member States shall determine an indicative national share of renewable energy produced on-site or nearby as well as renewable energy taken from the grid in final energy consumption in their building sector in 2030 that is consistent with an indicative target of at least a 49% share of energy from renewable sources in the building sector in the Union's final energy consumption in buildings in 2030'.

[107] Galera Rodrigo (n 67) 89.

[108] A Bacquet et al, 'District Heating and Cooling in the European Union. Overview of Markets and Regulatory Frameworks under the revised Renewable Energy Directive' (Directorate-General for Energy, 10 June 2022) <https://op.europa.eu/en/publication-detail/-/publication/0693f4ef-eac1-11ec-a534-01aa75ed71a1/language-en> 15.

[109] ibid 106.

[110] Billerbeck (n 23).

[111] ibid 6.

[112] Lavrijssen and Vitez (n 23) 215–220.

revealed that 'there is no obvious correlation between the share of renewables or excess/waste heat and the degree of market opening of DH systems. TPA may be a necessary condition, but in any case, it is not a sufficient one'.[113] Whatever the importance of this finding, it does not diminish the need for regulations that facilitate entry into the sector. The energy transition requires more than mere technological progress towards the decarbonisation of the economy. What is needed is a substantive restructuring of a socioeconomic model, which will inevitably lead to the emergence of new actors in the energy sector, such as ECs. Those actors should also assume novel functions, as outlined in Section 3.

TPA remains under-regulated in the new RED III. The EU legislators limited themselves to the following 'encouraging formula':

> Member States shall ensure that operators of district heating or cooling systems above 25 MWth capacity are encouraged to connect third party suppliers of energy from renewable sources and from waste heat and cold or are encouraged to offer to connect and purchase heat or cold from renewable sources and from waste heat and cold from third-party suppliers.[114]

In all other cases, the RED II provisions on TPA remain in force. The ability of DHC operators to refuse to connect a third-party provider are also retained, almost without modification. There are two novelties: (1) high-efficiency cogeneration can no longer be used as a justification for lack of DHC system capacity; and (2) connection can be refused if the system that the operator runs is an efficient DHC one.

## 4.6 | The enhanced role of thermal-energy communities

As noted in Section 1, ECs have focused chiefly on generating and supplying electricity. This emphasis may lead one to overlook their potential for the integration of community-based thermal energy applications and the possibilities of synergies with renewable generation, the electricity grid and other associated energy services. Although the RED II clearly allows RECs to provide thermal energy, whether CECs can engage in similar activities under the EMD was surprisingly unclear. An example of this uncertainty is evidenced in the Royal Decree that the Spanish government drafted to transpose the definition of the roles of ECs,[115] which confines CECs to the electricity sector. This limitation may appear to reflect the provisions of the directive, which is focused on the electricity market, but closer scrutiny reveals that interpretation to be untenable. The directive stipulates that CECs can deliver energy efficiency services, and the exclusion of thermal energy from the scope of those services would clearly be inefficient. The EMD also permits CECs to offer 'other energy services'[116] to their shareholders or members; the natural construction of that phrase would imply that the services in question need not be restricted to the electricity market.

The new EED resolves this uncertainty definitively. The directive calls for RECs and CECs to be actively supported in the pursuit of the objectives of the European Green Deal and the Climate Target Plan by 2030.[117] Member States are urged to consider and promote such communities. This can enhance local and household-level energy efficiency, including that of public buildings, and to collaborate with local authorities to that end. By empowering consumers and facilitating the participation of specific groups of households, especially in rural areas, ECs can coordinate capital and labour in the domain of renewable energy. These communities can educate citizens about energy savings. Above all, if Member States support them adequately, ECs can combat energy poverty by developing energy efficiency projects, which would lead to lower energy consumption and supply tariffs.

The support of Member States should manifest chiefly in the creation of laws that promote ECs and which allow energy, including thermal energy, to be shared with vulnerable or energy-poor members, in line with Article 24 of the EED. As Diestelmeier and Cappelli have noted, even in the countries in which ECs have been implemented widely, energy sharing is under-regulated.[118] They argue that energy sharing should target vulnerable consumers and the energy poor to ensure that they can easily access the social benefits that ECs offer.[119]

The European legislator has taken the view that ECs could induce durable changes in energy consumption behaviour and generate long-term energy savings, especially for households. ECs are thought to be capable of promoting sustainable investments among citizens and small businesses. Therefore, the Member States should support organisations and energy projects at the community level. This approach is confirmed by the Articles 8(1)(b) and 9 of the SCF Regulation.

Community involvement is compatible with local authorities' ownership of public energy companies or their participation in the legal entities through which ECs operate. In fact, in recent years, there has been a shift from local government privatisation to recognition of the potential of public energy companies to drive the energy transition. As noted by Nieuwenhout, unlike private firms, public entities prioritise social and community interests. This allows local governments to influence decisions, particularly in renewable energy and heat networks.[120] However, this approach may not always be the

[113]Bacquet (n 108) 16.
[114]RED III (n 14) art 24(4)(b).
[115]Proyecto de Real Decreto por el que se desarrollan las figuras de las comunidades de energías renovables y las comunidades ciudadanas de energía (20 April 2024) <https://www.miteco.gob.es/content/dam/miteco/es/energia/files-1/_layouts/15/Proyecto%20de%20Real%20Decreto-61313.pdf>.
[116]EMD (n 49) art 2(11)(c).
[117]See EED (n 13) recital 117.
[118]Diestelmeier and Cappelli (n 18) 23.
[119]ibid.
[120]CT Nieuwenhout, 'There and Back Again: The Dutch Energy Sector from Privatisation to New Public Energy Companies' in Fleming et al (n 58) 230, 238–239. On the role of local governments in promoting sustainable urban development in the context of energy transition, see L Presicce, *Los entes locales en la acción climática global. Responsabilidades, retos y perspectivas jurídicas* (Tirant lo blanch 2023) 71–75.

most cost-effective. Therefore, careful evaluation is crucial to ensure public energy companies serve the public interest and manage project risks effectively.[121]

Engagement strategies that involve national and local stakeholders in policymaking can be integrated into plans for decarbonisation and the renovation of buildings. These strategies are intended to increase awareness, collect feedback on policy, and enhance acceptability among the public, thus ensuring that ECs contribute actively to the promotion of sustainable energy practices.[122]

This participation could be an outcome of the assessment of the role of ECs integrated into local HC plans. Such an assessment aims to discern how these entities can effectively contribute to executing local heating and cooling projects.[123] The RED III underscores the importance of ECs for coordination between DHC system operators and potential providers of waste heat and cold. Member States are required to devise coordination frameworks that promote dialogue. In addition, those frameworks should involve RECs that engage in heating and cooling, as per the amended Article 24(6)(e) RED III. Thus, the role of ECs in the efficient integration of waste heat and cold into DHC systems is now acknowledged in legislation.

The RED III also establishes various operational measures. Thermal energy communities leverage various technologies, such as individual and collective self-consumption installations. Under the directive, solar energy installations of below 100 kW, including those that are used for renewable self-consumption, are assumed to have a minimal environmental impact. Recognising their advantages for consumers, the RED III expedites the permit-granting procedure for such installations by introducing the concept of positive administrative silence, which may accelerate their deployment.[124] This said, a notable limitation of that new legal regime is premised on the assumption that small installations typically do not necessitate an expansion of the grid connection point capacity, overlooking the potential bottleneck posed by the distribution grid for this category of installations or anti-competitive practices related to the operation of self-consumption by distribution system operators.[125]

In the ongoing EU effort to redesign the electricity market[126] so as to secure energy supply, much reliance has been placed on the potential of power purchase agreements.[127] Interestingly, RED III provides for new measures that support such arrangements, which should be extended to various renewable power purchase agreements, including for renewable HC (the amended Article 2(d)(14)(q) and Article 3(4)(a) RED III). Power purchase agreements are contractual instruments that can be used by ECs.

Finally, it is important to mention the consumer protection aspects of the legislation that is currently in force. Given that members and shareholders of ECs maintain their rights as active users or consumers, and considering that ECs serve as fitting legal structures for implementing HC systems or a DHC, it is noteworthy that the new EED strengthens consumer protection. The directive introduces basic contractual rights for district heating, cooling, and domestic hot water, aligning with the rights, protection, and empowerment established by the EMD for final customers in the electricity sector.[128]

## 5 | CONCLUDING REMARKS

This article started from the premise that heating and cooling, which account for a significant proportion of total energy consumption in the EU, must be decarbonised as a matter of urgency. In the face of this challenge, DHC systems—particularly fourth- and fifth-generation ones—hold much promise for the transition away from fossil fuels and towards renewable sources. For that potential to be realised, HC systems must be integrated into the generation of renewable energy. This integration is meant not only to facilitate sustainable and circular economy practices but also to empower communities, to transform consumers into prosumers and to improve social welfare. ECs emerged as decentralised and democratic organisational structures that aim to achieve these goals together with higher levels of local resiliency in the energy sector.

Against this background, this article aimed to improve understanding of how the EU legal framework on energy and climate change facilitates the efficient and integrated use of renewable energy and HC systems at the local level. To answer the question of how EU law can be used to implement ECs in the HC sector, the article has examined the legal framework resulting from the new EED and RED III. An overview of the relevant provisions in these legislative measures shows that many provisions increase ECs' potential as key players in the energy system.

The analysis shows that ECs will benefit from the provisions on streamlining permit-granting procedures and measures to promote energy integration. ECs will be able to perform a wide range of

[121]ibid.

[122]J Hogan et al, 'What Makes Local Energy Projects Acceptable? Probing the Connection between Ownership Structures and Community Acceptance' (2022) 171 Energy Policy 113257; M Kojo et al, 'From Acceptability and Acceptance to Active Behavioral Support' in F Karimi and M Rodi (eds), *Energy Transition in the Baltic Sea Region* (Routledge 2022) 111; V Azarova et al, 'Designing Local Renewable Energy Communities to Increase Social Acceptance: Evidence from a Choice Experiment in Austria, Germany, Italy, and Switzerland' (2019) 132 Energy Policy 1176.

[123]EED (n 13) art 25(6)(g).

[124]RED III (n 14) art 16(d).

[125]In the case of Spain, there are known anti-competitive practices by distribution system operators that limit the development of individual and collective self-consumption; see Comisión Nacional de los Mercados y la Competencia (CNMC), 'The CNMC Carries out Several Dawn Raids at the Premises of Relevant Companies in the Electricity Sector for Possible Anti-competitive Practices' (2023) <https://www.cnmc.es/sites/default/files/editor_contenidos/Notas%20de%20prensa/2023/20230628_NP_Inspecciones-abril-junio_sector-eléctrico_en_GB_.pdf>; see also 'Alianza por el Autoconsumo, 'Autoconsumo en España: diagnóstico, retos y propuestas' (2023) <https://alianzaautoconsumo.org/autoconsumo-en-espana-diagnostico-retos-y-propuestas/>.

[126]Council (EU), 'Reform of Electricity Market Design: Council Reaches Agreement' (17 October 2023) <https://www.consilium.europa.eu/en/press/press-releases/2023/10/17/reform-of-electricity-market-design-council-reaches-agreement/>.

[127]Y Ghiassi-Farrokhfal et al, 'Making Green Power Purchase Agreements More Predictable and Reliable for Companies' (2021) 144 Decision Support Systems 113514.

[128]EED (n 13) art 21.

functions covering electricity, energy efficiency and thermal services. Indeed, the regulatory framework for the HC sector focuses on a scale dimension (building-oriented, district-level, and community-based solutions) aimed at exploiting local energy potential. The potential role of ECs has to be mandatorily assessed in future local HC plans. Also, legislation now acknowledges the importance of ECs for coordination between DHC system operators and potential providers of waste heat and cold.

The new rules for applying the energy-efficiency-first principle go beyond strictly considering economic efficiency factors and determine that environmental and social benefits must be delivered simultaneously. An example is the legal obligation to address the impact of energy poverty when applying the principle.

These community and environmental benefits align with the outcomes that energy communities must provide. In addition, there is further alignment between the integrated structure of DHCs, on the one hand, and the bundled functions that ECs are entitled to perform, on the other. Therefore, ECs are legal entities that can be well suited to exploit activities in the HC sector.

In conclusion, within the framework of the Fit-for-55 package, ECs are assigned a significant transformative role, particularly as they are perceived as a formula that fosters social acceptability of energy transition and empowers citizens and communities. The success of this new formula will depend on the enabling laws that Member States will promulgate. Solutions require a case-by-case approach. However, two general points can be made regarding ECs. On the one hand, the national enabling legal framework must go hand-in-hand with good regulation of new energy activities such as aggregation, flexibility services, storage, vehicle recharging, collective self-consumption and last-generation DHC. On the other hand, public authorities should assume that the label of distributed, participatory and community-based formulas covers a wide range of experiences that shape a new business model, including ECs. However, ECs per se are an alternative model to that of traditional energy companies by virtue of their purpose and governance, which is why the enabling framework that should be provided to them is not primarily due to their status as emerging economic actors but rather on the social, environmental and members' benefits they provide, along with the democratisation of the energy system. Legislators and regulators must, therefore, remain vigilant against the prevalence of franchise energy communities promoted by subsidiaries of large incumbent energy companies. While it is legitimate for these companies to enter the new energy business, they should not undermine the fundamental aim of ECs.

Although the HC market presents inherent complexities and the regulatory framework frequently acts as a hindrance rather than a catalyst,[129] an orderly and systematic regulation has yet to be applied. This leaves significant room for intervention to achieve the desired energy transition goals in this sector.[130]

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[129] Hartmann and Palm (n 22).
[130] Galera Rodrigo (n 67) 90.