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Energy Vulnerability and Energy Poverty: Experience and Approaches in the EU

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1 Introduction

The energy transition represents both an opportunity and a challenge for the European Union (EU). Analysis shows that an absolute energy-related household expenses could rise until 2030 after which the share of energy-related expenses as a proportion of income are expected to decrease (EC 2020c). Therefore, it is important that the costs of the energy transition are distributed fairly. High energy prices are most problematic for vulnerable households and the EU must put appropriate structures in place to ensure that the energy transition benefits the whole society.

At the forefront of current EU energy policy lies the European Green Deal introduced in 2019. The Green Deal sets the political aspiration for greenhouse gas emission reductions of 55 % by 2030 compared to 1990 levels and climate neutrality by 2050. These goals were turned into a legally binding obligation by the European Climate Law (EU 2021). The 'Fit for 55' package details how the Green Deal is proposed to be delivered in practice (EC 2021a). The main building blocks of the Green Deal include, for example, the supply of clean, affordable, and secure energy as well as the "Leave no one behind" principle supported through the Just Transition Mechanism (Heyen et al. 2021).

This paper considers the strategies adopted by the EU regarding energy poverty and vulnerability. This includes an overview of the state of energy poverty in the Europe, the role that energy efficiency and the building sector play in these debates, and how the EU interacts with Member States (MS) to drive forward a sustainable energy transition. The paper then turns towards several best-practice examples of instruments and measures that have been implemented to ensure that socially vulnerable households are supported, but also empowered to partake in the energy transition.

2 The EU strategy regarding energy poverty and vulnerability

The European Climate Law (EU 2021) which entered into force in July 2021 includes an obligation that climate neutrality has to be reached by 2050 with an interim 2030 goal of reducing GHG emissions by 55 % below 1990 levels. In the same month, the European Commission published a series of legislative proposals (EC 2021a) aimed at making the EU “fit for 55”, i.e. aligning energy and climate policy instruments with the 2030 reduction target. These proposals feature the social dimension of energy and climate policy-making quite prominently. Along with their proposal for the introduction of an EU-wide carbon price on housing and mobility, the Commission proposes to set-up a 150 billion Euro Social Climate Fund recognizing that “the increase in the price for fossil fuels will have significant social and distributional impacts that may disproportionally affect vulnerable households, vulnerable micro-enterprises and vulnerable transport users” (EC 2021b).

Much earlier, in 2015, the EU launched the Energy Union Strategy (EC 2015a) with the aim of establishing an EU-wide energy union that provides consumers with secure, sustainable, competitive, and affordable energy. The Energy Union is built upon five dimensions: security, solidarity, and trust; a fully integrated internal energy market; energy efficiency; climate action, decarbonizing the economy; and research, innovation and competitiveness. The 2020 “State of the Energy Union” report (EC 2020a) examines the progress made towards these dimensions and the Energy Union’s contributions to the EU’s long-term energy and climate goals. The Energy Union is identified as a key pillar for achieving the objectives set by the Green Deal and the EU’s transition to climate neutrality by 2050. Several associated reports are presented along with the report, which include: the progress report on improving energy efficiency (COM(2020)954); the progress report on renewable energy sources (COM(2020)952); the progress report on competitiveness (COM(2020)953); a report on energy prices and costs (COM(2020)951); the progress on energy subsidies, in particular for fossil fuels; the progress report on the internal energy market; and the individual assessments of final national energy and climate plans under der EU Governance Regulation (SWD(2020)900 to 926). These reports provide insights into both into EU-level operations and how EU legislation is being met by individual Member States.

2.1 Energy poverty and vulnerability in EU policy making

The importance of recognizing and alleviating energy poverty can be traced back to early work on fuel poverty in the UK, which brought the issue of high energy costs for low-income households into the focus of national policy (Boardman 2004; 2012). The EU Commission’s recommendation on energy poverty puts forward that all Member States should develop a working definition of energy poverty and quantify the number of households in energy poverty (EC 2020b). This is also supported by the Recast Electricity Directive 2019/944/EU. For example, MS should report on the number of energy-poor households, an indicative objective to reduce energy poverty, outline relevant policies and report on their progress of reducing the number of households in energy poverty (EC 2020c).

While the EU’s energy poverty policy sets out clear requirements for Member States, the detailed and local work is left up to the Member States. Levels of energy poverty vary greatly across Member States and the EU to acknowledges the diversity of the definitions and levels of energy poverty across Member States (EC 2020c). Nonetheless, the Electricity Directive and Regulation (EU 2018/1999) (EU 2018) does provide clear indications of how energy poverty is to be understood in broad terms and provides some indication of which Member States need to adapt and operationalize this definition to their national contexts.

The EU Commission reviews activities by the Member States to evaluate whether the criteria and demands set by the EU framework are being met. The primary mechanism for this review is through

the (draft) National Energy and Climate Plans (NECPs)[1], which should include objectives and policies and measures relevant to energy poverty. Despite an EU assessment of the draft NECPs which prompts Member States to include energy poverty in more detail in the NECPs, the extent to which the Member States adhere to these obligations and recommendations varies. Some Member States provide very detailed information on energy poverty, setting a definition, identifying indicators, defining objectives for alleviating energy poverty, and providing details of the policies and measures that are in place to achieve these goals. Others provide very little information or consider energy poverty to be part of social policy and hence not relevant for the NECP.

About half of the Member States provide explicit objectives to reduce energy poverty and quantify this objective. Sometimes these objectives are explicit in their formulation to reduce energy poverty, while other Member States state their objectives as the implementation of several policies and measures related to energy poverty alleviation. The extent to which energy poverty is a concern is at the discretion of the individual Member States. Finland, Denmark, and Malta, for example, argue that they do not have a significant number of households meeting the criteria of energy poverty and therefore no explicit policies related to energy poverty are formulated. Germany points out that the social welfare system has energy-related components that provide a comprehensive framework to support low-income households. In Sweden energy poverty is not considered a separate issue from poverty overall and is hence tackled primarily through social policy.

Whether Member States have developed policies and measures to alleviate energy poverty is dependent on whether energy poverty has been identified as a central concern. If this is the case, these measures are primarily related to the improvement of energy efficiency. 21 Member States in total report energy efficiency measures that aim to reduce energy poverty in their NECPs. Direct tariff and bill support measures and policies for market regulation with regard to energy poverty are described by 16 and 12 Member States respectively. The level of detail in description of policies and measures varies greatly and while some Member States describe existing measures, others focus exclusively on planned measures to achieve national targets.

On an EU-level the EU Energy Poverty Observatory (EPOV), established in 2016 holds a central function in the debate through collecting data, developing indicators, and sharing best practice examples for tackling energy poverty across the EU. They have pushed to include a more rigorous reporting on energy poverty in the NECPs and moved energy poverty into the foreground of both EU-level and MS policy. Most importantly, the EPOV has established a number of indicators that are used to monitor energy poverty across the EU and are often adopted by Member States in their NECP reporting. The EPOV uses four primary indicators, two of which are self-reported indicators, which are based on data from the EU Statistics on Income and Living Conditions (EU-SILC)[2], and two expenditure indicators, based on data from the Household Budget Survey (HBS)[3], both available from the EU's Statistical Office Eurostat:

- Ability to keep home adequately warm – based on the EU-SILC survey question: Can your household afford to keep its home adequately warm?
- Arrears on utility bills - based on the EU-SILC survey question: In the past twelve months, has the household been in arrears, i.e. has been unable to pay the utility bills (heating, electricity, gas, water, etc.) of the main dwelling on time due to financial difficulties?

[1] Final NECPs and the Commission's individual assessments can be found here: https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en

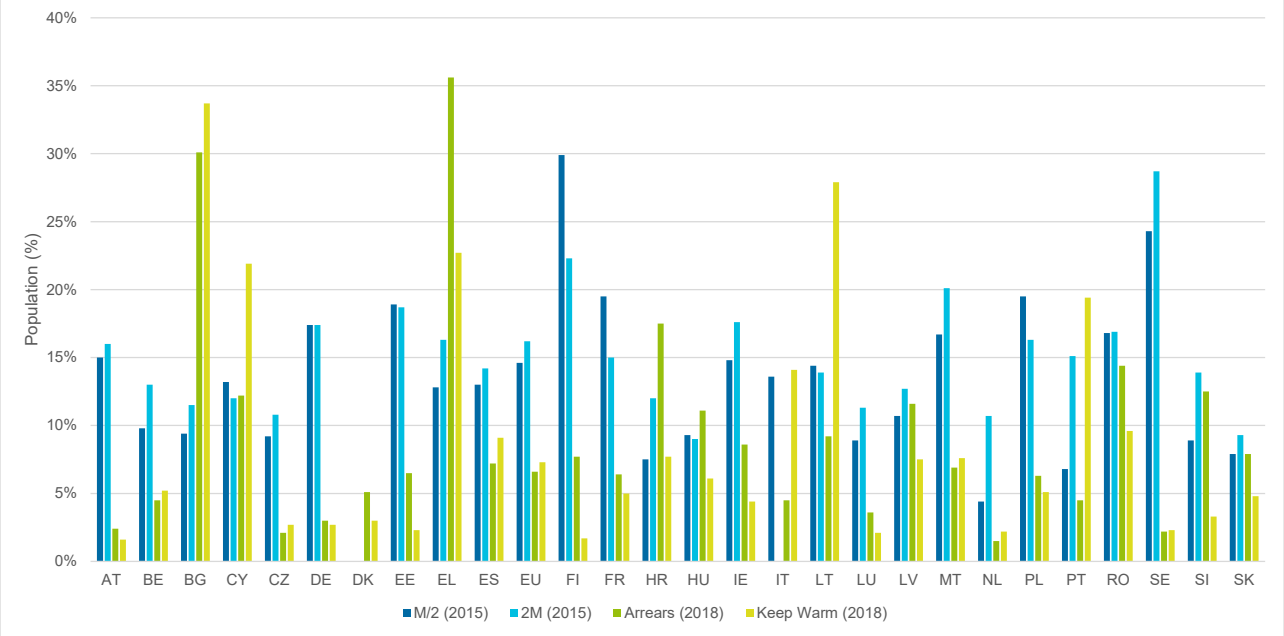
[2] https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions

[3] https://ec.europa.eu/eurostat/web/household-budget-surveys

- The expenditure-based indicator M/2: Absolute (equivalized) energy expenditure below half the national median - estimated based on data from the HBS
- The expenditure-based indicator 2M: Share of (equivalized) energy expenditure (compared to equivalized disposable income) above twice the national median - estimated based on data from the HBS

These indicators are complimented by a range of secondary indicators from Eurostat, EU-SILC, and the Building Stock Observatory, which include data on energy prices and building features. Figure 1 provides an insight into the levels of energy poverty in the different EU Member States, applying the primary indicators defined by the EPOV. There is a large variability in the level of energy poverty across Europe. If we consider the first two indicators listed above (shown in green in the figure), Greece, Bulgaria, Cyprus, and Lithuania all have high energy poverty levels. When considering the expenditure-based indicators Finland, Sweden, France, and Poland also have high level of energy poverty. It is therefore important to consider a range of indicators when discussing the prevalence of energy poverty in Europe.

Figure 1: Levels of energy poverty in the EU[4] based on the EPOV primary indicators



Source: Own representation based on EU Energy Poverty Observatory (EU Energy Poverty Observatory 2021)

Finally, crucial to the EU's function is the sharing of information and good practice among EU countries and the recast Electricity Directive, for example, explicitly states the need to support the sharing of good practice between MS. The Covenant of Mayors for Climate and Energy[5] also provides a useful platform for implementing and sharing best practices among 9000+ local authorities. Similarly, the Vulnerable Consumer Work Group (VCWG) was reconvened in an effort to explore common approaches in the EU to vulnerability and energy poverty. A guidance document on vulnerable consumers has been complemented by a working paper from the VCWG that contributes to the discission on energy poverty (VCWG 2013; EC 2015b). When defining the energy

[4] Country abbreviations are as follows: AT – Austria, BE – Belgium, BG – Bulgaria, CY – Cyprus, CZ – Czechia, DE – Germany, DK – Denmark, EE – Estonia, EL – Greece, ES – Spain, EU – European Union, FI – Finland, FR – France, HR – Hungary, IE – Ireland, IT – Italy, LT – Lithuania, LU – Luxemburg, LV – Latvia, MT – Malta, NL – Netherlands, PL – Poland, PT – Portugal, RO – Romania, SE – Sweden, SI – Slovenia, SK – Slovakia

[5] https://www.covenantofmayors.eu/

poor and/or vulnerable households regional and national contexts need to be taken into account (Pye et al. 2015), e.g. socio-economic status/groups, housing situation, energy carriers/infrastructure, and location/geography. This is also emphasized by the EPOV which provides detailed guidance for policymakers[6]. To further foreground local, municipal, and community-based approaches to tackling energy poverty the EU has launched the Energy Poverty Advisory Hub (EPAH)[7] in 2021. This project succeeds the EPOV and provides a comprehensive platform of projects tackling energy poverty across the EU, but also allows for networking between various actors at multiple scales. The ENGAGER[8] Energy Poverty Action group is another initiative which works to bring international experts together to tackle energy poverty in Europe.

2.2 The role of energy efficiency and the building sector

The focus on energy-poor households carries through all subsequent EU policies and directives, especially those that focus on energy efficiency. EU policy draws a direct link between energy efficiency measures and alleviating energy poverty. Investing in energy efficiency measures for vulnerable groups can decrease household energy costs, as well as delivering important energy savings (EC 2020e). Energy efficiency measures have the potential to decrease energy poverty if these measures are properly targeted and provide sufficient financial support where necessary (EC 2020d). Indeed, Energy Efficiency First is one of the guiding principles of the Green Deal and key initiatives from the EU with regard to energy efficiency including the Energy Efficiency Directive (EED), the Energy Performance of Buildings Directive (EPBD)[9], the Ecodesign Directive and the Energy Labelling Framework.

The EED, for example, includes specific requirements to implement energy efficiency measures among vulnerable households, including those affected by energy poverty and as part of the EPBD, Member States must outline national measures to alleviative energy poverty in their long-term renovation strategies. The Commission's recommendation on energy poverty also suggests introducing mandatory renovation or minimum energy performance requirements via the EPBD. This in particular could have a positive impact on low-income and energy poor households who often live in the worst performing buildings (EC 2020e). Similarly, the proposed Social Climate Fund is set to cover investments targeted at the most vulnerable including building renovations (especially in worst-performing buildings), electrification of heating and cooling and facilitating access to low-emissions mobility (EC 2021b).

Energy-poor households can benefit from the energy transition by gaining access to affordable energy-efficient buildings as well as renewable energy (EC 2020c). Indeed, experience in the EU has shown that renewable energy is cost-competitive with fossil fuels and that strengthening renewable energy in the EU can contribute to making energy supply more affordable and reducing energy poverty (EC 2020e).

2.3 The role of the EU and interaction with Member States

Mitigating the uneven effects of the energy transition requires policy interventions at the EU, national, local and regional level (EC 2020e). The above-mentioned EU directives and recommendations provide guidance for Member States and set priorities within the energy transition, which includes a

[6] https://www.energypoverty.eu/guidance-policymakers

[7] https://www.energypoverty.eu/

[8] http://www.engager-energy.net/aims-and-objectives/

[9] A revision of the EPBD is ongoing and a proposal for review was published on 15/12/2021: https://ec.europa.eu/energy/sites/default/files/proposal-recast-energy-performance-buildings-directive.pdf

strong focus on protecting vulnerable households. There are several examples of how the interaction between the EU and its Member States play out in this regard. The Just Transition Mechanism, for example, is an EU-level policy that facilitates targeted actions at the local level but provides a crucial framework for such actions to be prioritized in the first place. An evaluation of the EED has shown that having a common EU framework is beneficial for individual MS. Directives such as this establish a common framework that all Member States adhere to while leaving enough freedom for individual countries to set concrete policies (EC 2020d). This also holds for the proposed Social Climate Fund, where the EU provides funding and oversight, but actual instruments and measures are set out in national Social Climate Plans and also implemented at the national level (EC 2021b). In this sense, the role of the EU is to set standards and regulations, and enforce reporting and monitoring, especially with regard to energy efficiency. Without the overarching direction that the EU provides vulnerable households and energy poverty would not be as explicitly discussed on the national level.

At the forefront of EU policy remains a commitment to locally, regionally, and nationally tailored definitions and goals which provide a solid basis for geographically differentiated responses, measures and instruments that can tackle differentiated problems. This is also the reason why there is no EU-wide definition for vulnerable or “energy poor” households. The Unfair Commercial Practices Directive (UCPD) does, however, define vulnerable customers in the EU law. The directive differentiates between vulnerable and average customers, where the former require additional protections due to their mental or physical infirmity, age (children and elderly people) or credulity. This differentiation has been subject to criticism, as many consumers fall below the average consumer standards, but do not meet the criteria for the vulnerable consumer category (Šajn 2021).

In their proposal for setting up a Social Climate Fund, the European Commission defines vulnerable consumers – in the context of a carbon price - as “vulnerable households, vulnerable micro-enterprises and vulnerable transport users who spend a larger part of their incomes on energy and transport, who, in certain regions, do not have access to alternative, affordable mobility and transport solutions and who may lack the financial capacity to invest into the reduction of fossil fuel consumption” (EC 2021b).In other EU energy legislation, however, the definition of vulnerable customers is primarily left to Member States and covered only through energy poverty definitions and indicators. Nonetheless, the EU plays an important role in pushing energy poverty into the forefront of policy, even though this is in the early stages and uptake on MS level is differentiated. Therefore, the EU is central in providing guidance and some precedence on definitions and indicators, specifically through central organizing bodies such as the EPOV and offers a starting point for the discussion around vulnerability and affordability.

With regard to energy poverty, it is clear that countries with extensive social welfare systems tend to focus less explicitly on energy poverty. This means that the responsibility for tackling energy poverty and protecting vulnerable households lies within the existing state apparatus, rather than within energy and climate policy. Nonetheless, there are examples where social policy has been (re-) designed to help welfare households with the new (financial) challenges that the energy transition brings. One example in this regard is the German “Climate Bonus”, discussed in Chapter 3.2.5. Whereas social policy lies within the responsibility of individual Member States, climate and energy policy is more heavily regulated and monitored by the EU. This also applies to national policies concerning energy efficiency and the building sector, which are closely aligned to EU guidance.

3 Policies and measures for vulnerable households

Changes in energy prices typically affect vulnerable households disproportionally. This chapter considers how vulnerable households can be protected within the energy transition, but also participate in the transition. This is particularly relevant, because not taking further climate protection measures is not an option and taking no action also has distributional effects that disadvantage vulnerable households (Beermann et al. 2021). First, we briefly sketch the distributional effects of energy and climate policies generally and then turn towards best-practice examples from EU Member States and third countries that show how these effects might be mitigate or reversed, how vulnerable households can find ways to partake in the energy transition (i.e. take advantage of energy and climate policy), how these households are protected in the energy market, and how resilience of these households is increased.

3.1 The distributional effects of energy and climate policy

While it has become increasingly important to develop measures and instruments to meet energy and climate goals, these polices bring about socio-economic changes whereby the cost and benefits are not always evenly distributed. Ensuring that such distributional effects are considered both during development and implementation is a key element of successful energy and climate policy. The EU's "Green Deal" addresses these distributional effects through the "Just Transition" principle, which foregrounds the positive and negative social impacts of environmental policies in the EU (Heyen et al. 2021; Heffron und McCauley 2017). There are also several studies that engage with the distributional effects of energy and climate policy on a national and international scale (Lamb et al. 2020; Baum 2020). This section provides a brief overview of some of the relevant literature in this field, which forms the basis of the discussion of best-practice examples from the EU. These examples either consider energy and climate policies that have addressed regressive distributional impacts as part of their policy design or measures that work to counteract regressive distributional impacts by targeting low-income and other affected households specifically.

The discussion around the impacts of a CO_2 tax is particularly prevalent in the recent literature, in particular on a CO_2 tax in the heating and transport sectors on a national scale. The literature shows that the distributional effects of a CO_2 tax are almost always regressive and disproportionally affect low income households by increasing costs (e.g. Berry 2019). The effects are however strongly differentiated not only by income, but also other household characteristics including what fuels are used for heating and the reliance on automobile transport (Eisenmann et al. 2020; Elmer et al. 2019; Preuss et al. 2019). The CO_2 tax is however often discussed in relation to a tax revenue redistribution mechanism, which can counteract regressive effects or even produce progressive effects (Antosiewicz et al. 2020; Bach et al. 2019; Matthes et al. 2021; Zerzawy und Fischle 2021). In case of an EU-wide carbon price in buildings and transport as proposed by the Commission, distributional effects not only within, but also between Member States matter (Feindt et al. 2021).

The current literature also studies the distributional effects of feed-in tariffs in the electricity sector, which also almost always produce negative distributional effects. In general, low-income households do not profit from such tariffs as they do not have access to renewable energy infrastructure (Winter und Schlesewsky 2019; Grover und Daniels 2017). The extent of these effects also depends to some extent on how these tariffs are financed. Böhringer et al. (2017), for example, demonstrate that financing such tariffs via a levy on the electricity prices affects low-income households disproportionally more than if the tariffs were financed through an increase in the VAT.

In order to avoid distributional effects, policy often reverts to housing standards or fuel norms which are considered more progressive than taxation policies. Several studies from the USA show, however, that this is not necessarily the case. Building energy codes can also have negative impacts

for low-income households as code-induced energy savings often come through reduced square footage and may hence lead to decreased home values (Bruegge et al. 2019). Similarly, fuel economy standards in the transport sector in the USA are only progressive when new vehicle purchases are considered, as low-income households tend to drive older models (Davis und Knittel 2019). These studies come to the conclusion that regulatory standards are only more progressive than a CO_2 tax, that does not revenue recycle, but are more regressive than a CO_2 tax, which transfers revenues back to the population.

Distributional effects can generally also be counteracted when low-income households are targeted directly, which is sometimes the case for energy efficiency subsidies in the residential heating sector (Elsharkawy und Rutherford 2018; Grey et al. 2017). Studies show, however, that these subsidies only produce progressive distributional effects when low-income households are targeted specifically and take advantage of this support (Lekavicius et al. 2020; Lihtmaa et al. 2018; Drivas et al. 2019).

In general, the distributional effects of CO_2 taxation policies are hotly debated in the current literature, while other distributional effects of energy and climate policy are not as prevalent. While most studies only explore the effects along income groups, several others argue that it is important to look at individual households in more detail as the effects of energy and climate policies, especially when assessed as a bundle of instruments rather than individually, can vary greatly (Matthes et al. 2021).

3.2 Best-Practice examples from Europe

As has become clear in Section 2.3 the approaches taken to energy efficiency and energy poverty vary across the EU and the UK[10]. Equally varied are the measures and instruments implemented to support vulnerable households in the energy transition. First, we address best-practice energy and climate policy that has distributional impacts and how these are addressed as part of policy design. This is based on existing literature and the discussion around CO_2 pricing policies, because this has been the main focus of the European debate in the last two to three years (Section 3.2.1).

Second, we consider best-practice measures that work to counteract regressive distributional impacts by targeting low-income households specifically. These policies either focus on consumer protection, consumer participation, or consumer resilience. Protection is offered through regulatory instruments usually related to disconnection protections and tariff/bill support (Section 3.2.2), participation is focused on enabling households to take advantage of renewable energies and new technologies (Section 3.2.3), while resilience is strengthened through energy efficiency and direct financial support (Section 3.2.4 and 3.2.5).

Most prominent in the EU context are energy efficiency measures because they offer long-term support and relief to vulnerable households. This also reflects that energy efficiency and the building sector are a major cornerstone of EU policy and both support low-income households and ensure CO_2 emission reductions in the sector (cf. also Section 2.2). The active participation of vulnerable households in the energy transition is less prominently discussed on the EU-level and the changing nature of energy infrastructure has had little effect on the discussion around vulnerable households both on an EU-level and in the various countries. Nonetheless, smart metering has become an important instrument, as well as tackling the tenant/owner dilemma of infrastructure participation.

Finally, direct financial support is a key mechanism used by a range of countries in the EU to support vulnerable households (Section 3.2.5). It provides instant relief, leading to fewer disconnections but is also closely tied to social security systems or welfare systems. Those countries less concerned

[10] Although the United Kingdom is no longer part of the European Union, their approach to tackling energy poverty is particularly relevant due to the historical development of the concept of energy poverty from within the UK context.

with energy poverty (e.g. Scandinavia, Germany), often cover these energy-related vulnerabilities through social rather than energy policy.

What follows are a range of best-practice examples, chosen based on the availability of information, and considering some geographical spread across the EU. We take into account the fact that similar instruments and measures often exist in several EU countries by listing them under "similar measures" in the following tables.

3.2.1 Instruments and measures related to CO_2 pricing

As described above, CO_2 pricing is seen as important energy and climate policy in Europe, but the distributional effects of this policy should not be underestimated. The design and implementation of CO_2 pricing hence needs to consider these effects and the impact on vulnerable households. Two examples given here describe these ongoing discussions and review examples of revenue recycling options, as well as how CO_2 pricing affects household heating.

Revenue recycling options from CO_2 pricing in Germany	
Status	Implemented / discussion for (higher) future revenues
Type of Measure	Financial support (and incentive for sector coupling if reduction of electricity price)
Target Group	All households
Implementing Agency	National government
Policy Segment	Energy / climate policy
Description	At the beginning of 2021, Germany introduced a CO_2 price on natural gas, fuel oil and coal used for heating purposes, as well as petrol and diesel. From 2021 until 2025 the price follows a regulated path reaching € 55/t CO_2 in 2025 and will be determined on the market afterwards. As of now, revenues from CO_2 pricing in Germany go in the Energy and Climate Fund from which, amongst others, a stabilization of the renewable energy surcharge is financed, which leads to lower electricity prices for households that would otherwise have materialized. Different revenue recycling options are discussed for future years. Amongst those, most prominently i) a further reduction of electricity price components that can be influenced by the government, i.e. the Renewable Energy Surcharge and the electricity tax and ii) a lump-sum rebate on a per capita basis. The first option can be implemented easily, while it is not clear to date how the second option would be administered in Germany, as there is no straightforward way to hand out money to every household in Germany. In other countries, for example Switzerland, this is possible through the national health insurance system.
Results/Effects	Both using the revenue for a reduction in electricity prices and reimbursing households on a per-capita basis are progressive, i.e. households in higher income groups spent relatively more on the CO_2 price plus either revenue recycling option that households in lower income groups (Matthes et al. 2021; Zerzawy und Fischle 2021; Kalkuhl et al. 2021). The lump sum rebate is slightly more advantageous from a household perspective, if one considers the fact that not only households are affected by CO_2 pricing and reimbursement of revenues, but also small business, trade and services and that those benefit relatively more from a reduction in electricity prices than households, i.e. private households finance some of the electricity cost reduction for small business, trade and services through their CO_2 costs (Kalkuhl et al. 2021; Zerzawy und Fischle 2021). Using the CO_2 price to reduce electricity prices, however, has the additional benefits of i) supporting sector coupling (heat pumps, e-mobility) and ii) being an easy and swift

	way to reimburse households, while a lump-sum rebate is likely to face administrative challenges and administrative cost (Matthes et al. 2021). Furthermore, the relatively high renewable surcharge in Germany also has to do with the fact that Germany supported the then relatively expensive technology early on. Many argue that this "innovation cost" should be financed through a different mechanism than a surcharge for all (non-exempt) electricity consumers, which is also echoed in the coalition contract of the new German government. Already around the year 2025, it may be the case that revenues from CO_2 pricing exceed the amount needed to reduce both the renewable surcharge to zero and the electricity tax to the minimum amount (Matthes et al. 2021). That is why the discussion of the different revenue recycling options is less of an either/or question, but rather a question about how to recycle revenues in the short and the long term.
Similar measures	Public Service Obligation (PSO) – Denmark CO_2 tax and revenue recycling – Switzerland[11]

Limited pass-through of CO_2 costs from heating energy to tenants - Germany	
Status	Discussed / Nearly passed in 2021
Type of Measure	Financial support / financial incentive
Target Group	Tenants / landlords
Implementing Agency	National government
Policy Segment	Energy / climate policy
Description	In Germany, more than 50% of households live in rented properties (Schumacher et al. 2021). Which is why the "landlord-tenant-dilemma" receives particular attention in this country. Related to environmental taxes, it is generally the case that the cost of these taxes falls on tenants, while the measures that are to be incentivized by these taxes can only be taken by the landlord. CO_2 pricing is prime example of this, where the tenant pays the full cost of heating (the landlord passes on the complete bill), while measures such as building refurbishment or installing a heat pump can only be taken by the landlord. This is why, in the context of the German CO_2 price, a limit on the amount of CO_2 costs that can be passed through from landlords to tenants was discussed at the highest government level and only narrowly voted down. The favourite option was splitting the costs evenly between tenant and landlord, but also the option of the full CO_2 cost being paid by the landlord was discussed. It is expected that this issue will be taken up again in the new legislature, as it is included in the coalition contract of the new German government.
Results/Effects	Limiting the share of CO_2 costs that can be passed through to tenants has a progressive effect, as households in low income groups are more likely to rent, while landlords are more likely to be situated in high income groups (Matthes et al. 2021; Schumacher et al. 2021). What is more, leaving CO_2 costs to be paid for by the landlord increases their incentive to invest in measures that reduce these CO_2 costs, e.g. building refurbishment or heat pumps (Schumacher et al. 2021). Although these costs are still relatively low to date, they can act as a signal to landlords that are in charge of making decisions related to their property. As the lifetime of a boiler, for example, amounts to more than 20 years,

[11] https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/reduction-measures/co2-levy/redistribution.html

	it is exactly these decisions taken by homeowners that determine emissions in the building sector for the next decades. Limiting the pass-through of CO_2 costs from landlords to tenants may in theory reduce incentives to save heating energy by the tenant ("rebound effect"). While this may be the case, to date CO_2 costs in overall heating costs are relatively small thus the level of overall heating costs plays a larger role (Schumacher et al. 2021).

3.2.2 Protection: regulatory instruments

Consumer protection is a central concern with regard to energy affordability and vulnerable households. Disconnection protections are in place across a large number of countries in the EU. It is particularly common to have these protections in place in Eastern Europe, but seasonal disconnection protections are also place in cold countries. In the UK, there are a number of interacting measures that ensure that disconnections remain an exception especially among low-income households. Additionally, several EU countries offer social tariffs to vulnerable households, regulating the energy prices in a way that remains affordable for these customers.

Disconnection Protections (multiple measures) – United Kingdom (England & Wales)	
Status	Implemented
Type of Measure	Regulatory and informational
Target Group	Low-income households; pensioners; households receiving welfare benefits; and others (see description)
Implementing Agency	Energy suppliers; national government
Policy Segment	Social policy
Description	There are a number of interacting measures in place to prevent energy disconnections. All energy suppliers are obligated to observe the winter protection scheme, which ensures that pensioners living alone or with children under five are not disconnect in the winter months (October – March). This is further supplemented by the Energy UK Safety Net (Energy UK 2016). It offers protection to further groups throughout the year and ensures that the energy suppliers protect vulnerable customers. In the UK, the six largest energy suppliers have joined the safety net. They each have a priority services register, which identifies vulnerable customers. These include: pensioners, disabled customers, and those with long-term medical conditions. The energy suppliers are prohibited from disconnecting customers on this register. Suppliers have to take into account individual circumstances and follow a number of steps to work with the customer; this also includes accepting alternative payment formats such as installment plans, the fuel direct payment (see below) and repayment through a prepayment meter. A fuel direct measure can aid customers with paying fuel bills, by deducting these costs directly from any benefits. It is also common to install a prepayment meter (pay-as-you-go) to control debt or even collect debt. This also regulates how contact with customers is handled and what a debt collection pathway looks like. Energy suppliers also provide a range of other important services including: help with meter reading, easy to read bills, and priority reconnections. Independent information and help services ensure that customers are taking advantage of all of these options (Citizens advice 2021; National Debtline 2021).
Results/Effects	In 2003 there were around 16,000 disconnections of domestic customers for debt in the UK. In 2017, the energy regulator Ofgem reported that there were only 17 disconnections for debt in England and Wales, with none in Scotland (Energy UK 2019). An audit evaluating the Energy Safety Net and the energy suppliers bound by it in 2018 also found that all six suppliers attained the highest possible award, recognizing the significant efforts they have made to comply with the commitments.

Similar Measures	*Disconnection protections:* Disconnection prohibition in winter[12] – Finland Disconnection protection Catalonia[13] – Spain Disconnection protection during winter (various)[14] – Belgium Disconnection protection vulnerable consumers[15] – Romania Winter truce[16] – France *Prepayment Meters:* Power limiters instead of disconnection in Cologne[17] – Germany Prepayment electricity and gas meters for indebted households[18] – Austria Prepayment meter placement[19] – Belgium *Energy Company Codes:* The EAI Energy Engage Code[20] – Ireland Code of Practice for Energy Suppliers[21] – Ireland

Social Domestic Tariff – Greece	
Status	Implemented
Type of Measure	Regulatory
Target Group	Low-income households and other vulnerable groups (see below)
Implementing Agency	Ministry of Environment, Energy and Climate Change; energy suppliers
Policy Segment	Social policy
Description	Vulnerable households can take advantage of a discounted electricity tariff since 2011. This tariff is offered by all electricity suppliers and applies to a range of households including parents with vulnerable children, long-term unemployed, persons with disabilities, and persons who require life support (GovGR 2021; HEDNO 2021). The program was recently extended to also include short-term unemployed and those disconnected due to unpaid bills. The tariff is differentiated according to the size of the household and caps the maximum household income to take advantage of the tariff. SDT customers need to monitor their consumption to ensure they do not exceed the consumption limits for their category. These are also set according to the size and constitution of the household. The cost of the SDT is covered by the utility service charge included in electricity bills issued to all other consumers known as a public service compensation (YKO). That charge is removed for SDT beneficiaries. Due to a decrease in oil prices, the YKO

[12] https://www.energypoverty.eu/measure-policy/disconnection-prohibition-winter
[13] https://www.energypoverty.eu/measure-policy/disconnection-protection-catalonia
[14] https://www.energypoverty.eu/measure-policy/disconnection-protection-during-winter; https://www.energypoverty.eu/measure-policy/disconnection-protection-during-winter-0; https://www.energypoverty.eu/measure-policy/disconnection-protection-during-winter-1
[15] https://www.energypoverty.eu/measure-policy/disconnection-protection-vulnerable-consumers
[16] https://www.energypoverty.eu/measure-policy/winter-truce
[17] https://www.energypoverty.eu/measure-policy/power-limiters-instead-disconnection-cologne
[18] https://www.energypoverty.eu/measure-policy/prepayment-electricity-and-gas-meters-indebted-households
[19] https://www.energypoverty.eu/measure-policy/prepayment-meter-placement-0
[20] https://www.energypoverty.eu/measure-policy/eai-energy-engage-code
[21] https://www.energypoverty.eu/measure-policy/code-practice-energy-suppliers

	income was recently lower than in previous years. The energy ministry plans to cover this gap using funds raised through CO_2 emission certificate auctions (energypress 2021). Those receiving the social tariff are also automatically classed as vulnerable customers and benefit from special protective measures: deadline of forty days for the payment of electricity bills, the possibility for partial and interest-free payment of the electricity bills, suspension of the supplier's capability to disconnect due to outstanding debts during the winter period (November to March) and the summer period (July and August) as well as stricter conditions for the termination of the electricity supply contract by the supplier (HEDNO 2018).
Results/Effects	10 % of all residential customers benefitted from a social tariff in 2016 and also in 2019 (Rademaekers et al. 2018). Under the current criteria, 450,000 households are eligible for electricity subsidies through the SDT program (energypress 2021). Proposals have been discussed in 2021 to further increase in the SDT-related discount rates, which would offset any electricity price rises.
Similar Measures	Care-Energy social tariff Hamburg[22] – Germany Energy Price Cap[23] – United Kingdom Special solidarity tariff for natural gas[24] – France Regional social tariff[25] – Belgium Social tariff[26] – Portugal

3.2.3 Participation: infrastructure and technology

Participation in the new energy market is not a central concern on EU-level with regard to vulnerable households. There is, however, some discussion around the distributional impacts of the uptake of PV in terms of who benefits from subsidy payments and feed-in tariffs. Nonetheless, smart-metering is an important energy infrastructure development that has moved forward across the EU. We explore here the status of smart-meter deployment in Italy, where smart-meter rollout began before it became a concern on EU-level and which has highest uptake of smart-meters in the EU together with Sweden and Finland. A second interesting example describes energy cooperatives in Germany and how renters can take advantage of renewable energy infrastructures.

Smart Meters - Italy	
Status	Implemented
Type of Measure	Infrastructure
Target Group	All households
Implementing Agency	Distribution system operators; national
Policy Segment	Energy policy
Description	The Italian distribution system operator (DSO) Enel (now called e-distribuzione), which accounts for about 86 % of the points of delivery began introducing smart meters in 2005. Following this, the national government defined a legal framework for mandatory smart-meter rollout to all metering points in the country in 2006, prior to the relevant

[22] https://www.energypoverty.eu/measure-policy/care-energy-social-tariff-hamburg
[23] https://www.energypoverty.eu/measure-policy/energy-price-cap
[24] https://www.energypoverty.eu/measure-policy/special-solidarity-tariff-natural-gas
[25] https://www.energypoverty.eu/measure-policy/regional-social-tariff
[26] https://www.energypoverty.eu/measure-policy/social-tariff

	Commission communication in 2009 (Ntouros et al. 2021). Other DSOs followed and the majority of first-generation smart meters were installed in Italy between 2008 and 2011. 3.6 million meters were deployed during this time (Stagnaro und Leoni 2019). The main functionalities of the meters are: transmitting data on energy consumption; receiving updates of the contractual parameters; and managing supply connectivity. A related regulatory framework allows the DSOs to recover their costs through the metering tariff (Energy Digital 2020). The second generation SmartEcoMeters (2GSMs) are replacing existing smart meters until 2025. These new meters have a 15-minute read capability which enables a better management of energy consumption and on the utility side, allows for earlier detection of network or meter malfunctions with consequent reduction of recovery times and disconnections.
Results/Effects	By 2011, 95% of metering points were equipped with a smart metering device, achieving EU's 80% goal well ahead of 2020 (Bisello et al. 2021). A cost-benefit-analysis of the 2GSMs suggests that these are likely to entail more benefits than costs, but while costs are relatively certain and immediate, benefits are less clear and affected by discount rates and the degree of customer engagement (Stagnaro und Leoni 2019). Through the introduction of smart-metering, Enel/e-distribuzione has become one of the most efficient utilities worldwide. Through smart grids and technology convergence realized between 2001 and 2015, the overall cost reduction of the distribution system operation in Italy has led to a decrease of 32% of the corresponding part in the tariff, while achieving a significant improvement of the quality of service (Enel 2018).
Similar Measures	Smart metering has been implemented across EU Member States. A significant number of smart meters have also been installed in Finland[27] and Sweden[28].

Self-generated electricity for tenants ("Mieterstrom") – Germany	
Status	Implemented
Type of Measure	Financial incentive
Target Group	Tenants, private landlords, housing associations
Implementing Agency	National government
Policy Segment	Energy / climate policy
Description	The law on the consumption of self-generated electricity by tenants was conceived against the background of limited space of ground-mounted PV in Germany, a desire to keep grid expansion costs low and increase participation in and acceptance of the energy transition. Under German law own consumption of electricity is more attractive than buying electricity from the grid. Roof-mounted PV, however, has to date predominantly been installed on owner-occupied buildings. This is the case since incentives to install solar panels on rented properties were small and administrative burdens high. The law on self-generated electricity for tenants was amended in 2021 in order to increase incentives for installing PV panels also on rented properties. On the one hand, the reimbursement for delivering this type of electricity to tenants was increased, on the other hand additional actors can now benefit from this law (Meyer et al. 2021).

[27] https://eu.landisgyr.com/blog/metering-as-a-service-continues-to-boom-in-finland

[28] https://www.researchgate.net/publication/335940105_Smart_meters_in_Sweden_-_Lesson_learned_and_new_regulations

Results/Effects	Depending on assumptions on the uptake of this model, the law can generate important emission reductions (Meyer et al. 2021). The law further ensures that tenants that participate in this model do not pay more for their electricity than before the change. In fact, it is more likely that electricity costs are reduced (Meyer et al. 2021). What is more, the law may increase acceptance of the energy transition as it provides the possibility to also supply self-generated electricity to tenants.

3.2.4 Resilience: energy efficiency instruments

As mentioned in Section 2.2 energy efficiency is key to achieving energy and climate goals and this is reflected in the large number of energy efficiency measures implemented across the EU. There are a number of funds that provide interest-free loans, tax deductions, subsidies and grants targeted specifically at low-income households to improve energy efficiency. These often support large scale renovations, but there are also a number of measures in place that target small-scale changes such as boiler replacements or replacement of inefficient and old appliances. Where relevant, these measures also target cooling equipment (e.g. in Spain). At times these measures are also targeted at social housing and try to address the tenant/landlord dilemma in countries where this is particularly relevant. Here we provide two examples from France and Germany: The Habiter Mieux Program in France focuses on low-income owner-occupiers and provides them with significant financial support to carry out large-scale energy efficiency renovations and the Electricity Savings Check in Germany focuses on delivering accessible in-person energy savings advice coupled with small-scale energy efficiency measures. Additionally, energy companies can also be drivers of socially sustainable energy efficiency measures through government mandated obligations, as is the case in the UK.

Habiter Mieux (Better Living) – France	
Status	Implemented
Type of Measure	Financial support
Target Group	Low-income owner-occupiers
Implementing Agency	Agence Nationale pour l'Habitat (ANAH; National Agency for Living); national
Policy Segment	Energy / climate policy
Description	The Habiter Mieux program was launched in 2011 to combat energy poverty in France. Studies from 2009 showed that energy poverty often affected homeowners with very low incomes (Dubois 2015). The program subsidizes energetic renovation measures and covers 35% of the workload when the household resources are modest, or 50% when the resources are very modest (up to a limit of € 10,000 and € 15,000 respectively). The limits for "modest" and "very modest" income are set according to region and number of household members. An additional state bonus covers a further 10% of the work amount, which is limited to € 2,000 or € 3,000, provided the energy renovation work leads to an energy efficiency gain of at least 35% for owner-occupiers (Anah 2017). Higher premiums also apply if the house had an F or G energy label before the project and a jump of at least two energy labels is achieved. Landlords (and, indirectly, tenants) can also benefit from the Habiter Mieux program. Landlords can apply for financial support through the program and a tax deduction on their property income if an agreement is signed with the relevant authority (Anah) stating a maximum rental amount (Anah 2016). This obliges the landlord to not exceed a fixed maximum rent for nine years. For landlords, up to € 15,000 per house, but a maximum of 187.50 € / m2, will be covered by Anah with an additional premium of up to € 1,500. The tax deduction on the property income is only applied if the energy gain is at least 35%. For all households, the building must be more than 15 years old, the work must be

	carried out by specialists and no further public subsidies for renovation measures may be accepted for five subsequent years.
Results/Effects	Since the start of the Habiter Mieux program in 2011 until the end of 2016, almost 191,000 residential units have been renovated (Anah 2017). In the initial phase (2010-2011), significantly fewer renovation measures were carried out than planned. However, they led to a higher energy efficiency than initially assumed. In the following years, an overall achievable energy gain of 38% per household is assumed for the work carried out (Anah 2016). In fact, energy savings of 40% were achieved for more than half of the beneficiaries (Anah/Dicom 2015). The savings on energy bills after renovations are completed is the first perceived benefit mentioned by 55% of homeowners surveyed. More than half of the households that have benefited from the program see a decrease in their energy consumption. 83% of households would not have carried out the renovation measures without the help of the program, which indicates that the measure acts as a renovation incentive. In addition, 82% of households state that they no longer live in a “cold home” in the winter after the renovation measures (Anah 2016). The renovation measures supported by the Habiter Mieux program also support small and medium-sized businesses. Most of the projects carried out involve craftsmen and small businesses (57% have one to four employees) (Anah 2017). In addition, the program mainly supports local businesses and craftsmen. More than 80% of the projects are in the same department as the companies that carried out these projects. If the neighboring departments are included, this proportion reaches almost 100% (Anah 19 Jul 2017). It is also estimated that the renovation of 50,000 residential units as part of Habiter Mieux maintained or created at least 17,000 jobs (Anah 19 Jul 2017).
Similar Measures	Dampoort renovates! [29] – Belgium Decent Homes Programme[30] – United Kingdom Grants for social insulation projects for rental buildings[31] – Belgium Social funds for energy management[32] – France

Stromsparcheck (Electricity saving check) – Germany	
Status	Implemented
Type of Measure	Advice and information; small-scale energy efficiency retrofits
Target Group	Low-income households; this includes recipients of welfare benefits as well as people whose income or pension is below the seizure exemption limit.
Implementing Agency	German Caritas Association and the Federal Association of Energy and Climate Protection Agencies in Germany (eaD) e.V.; funded by the National Climate Protection Initiative of the BMU; regional with national financing
Policy Segment	Energy Policy
Description	The electricity saving check has existed in various forms since 2008 (2008 to 2013 electricity saving check, 2013 to 2016 electricity saving check (plus), 2016 to 2019 electricity saving check municipal, 2019 to 2022 electricity saving check active). Trained electricity-saving helpers advise households with low incomes on-site in their households on energy-saving options for electricity, water and heat (the latter has become more significant in the latter energy saving check municipal and active programs). After an initial electricity-saving check, the electricity-saving helpers give qualified tips on how consumption can be reduced. In addition, they provide emergency

[29] https://www.energypoverty.eu/measure-policy/dampoort-renovates
[30] https://www.energypoverty.eu/measure-policy/decent-homes-programme
[31] https://www.energypoverty.eu/measure-policy/grants-social-insulation-projects-rental-buildings
[32] https://www.energypoverty.eu/measure-policy/social-funds-energy-management

	aids (e.g. power strips, LEDs, efficient shower heads) and install them. In addition, the replacement of old fridges and freezers with new, energy-efficient devices (A +++) is funded with a subsidy of € 100. The advisory services and immediate help for heating (heating and ventilation) were introduced in 2016. The emergency aids include free equipment with various sealing tapes and draft stoppers such as door brushes, as well as hygrometers with a dew point display and warning function when the air humidity is too high (which saves heating energy on the one hand and on the other hand improves the indoor air quality and prevents the formation of mold). The electricity saving helpers are themselves long-term unemployed who receive theoretical and practical training from qualified trainers from the regional energy agencies. On site, the electricity-saving check is often supported by local authorities, job centers, energy supply companies, the housing industry and other stakeholders.
Results/Effects	Between 2008 and 2019, around 320,000 households in 150 cities were advised. Free energy-saving items worth € 20 million were installed. Almost 17,000 households have exchanged their old refrigerator with a 100 € refrigerator voucher for an energy-efficient device of class A +++. So far, the program has achieved energy savings of € 350 million, around 100 to 250 € per household per year, and almost 550,000 tons of CO_2.
Similar Measures	Energy Bank[33] – Netherlands Electricity help fund[34] – Austria Audits that accompany renovations[35] – France Energy Savers[36] and Energy tutors[37] – Belgium

Energy Company Obligation – Great Britain	
Status	Implemented
Type of Measure	Regulatory
Target Group	All households
Implementing Agency	National government; energy suppliers
Policy Segment	Energy and social policy
Description	The Energy Company Obligation (ECO) is an energy efficiency scheme to help reduce carbon emissions and tackle fuel poverty founded in 2014. Medium and larger energy suppliers are obliged to fund the installation of energy efficiency measures in British households. Each obligated supplier has an overall target based on its share of the domestic energy market in Britain. This ECO policy is formed from one obligation, the Home Heating Cost Reduction Obligation (HHCRO). Under HHCRO, obligated suppliers must promote measures which improve the ability of low income, fuel poor and vulnerable households to heat their homes. This includes actions that result in heating savings, such as the replacement of a broken heating system or the upgrade of an inefficient heating system. The policy is evaluated in regular 3- to 4-year intervals and adjusted to developments and needs. Under ECO2, which ran from 2017 to 2018, suppliers were also required to deliver against an additional obligation called the Carbon Emissions Reduction Obligation (CERO). In ECO3, running from 2018 to 2022, this carbon obligation ends and the Affordable Warmth (AW) part of the scheme (focused on low income and vulnerable

[33] https://www.energypoverty.eu/measure-policy/energy-bank
[34] https://www.energypoverty.eu/measure-policy/electricity-help-fund
[35] https://www.energypoverty.eu/measure-policy/energy-audits-accompany-renovations
[36] https://www.energypoverty.eu/measure-policy/energy-savers
[37] https://www.energypoverty.eu/measure-policy/energy-tutors

	households) is increased from 70% to 100%. For the duration of ECO3 (2018-2022), the projected annual supplier spend is £ 640 million. Suppliers can pass these costs on to consumer bills. The ECO3 policy focuses on the following elements: expanding the eligibility under AW to include a broader range of vulnerable households; setting a solid wall homes minimum, at the equivalent of treating 17,000 homes with solid walls per year; increasing the maximum number of broken heating system replacements to the equivalent of 35,000 per year (and remove coal boilers as an eligible measure); increasing the proportion of homes in rural areas that should be assisted to 15% of the whole scheme; increasing the percentage of the scheme that suppliers can deliver with local authorities to 25%; allowing 10% of the scheme to be delivered through the promotion of innovative measures; and reducing the supplier threshold (at which suppliers become obligated under ECO) in phases over the course of ECO3 to 150,000 customer accounts (DBEI 2018). Ofgem, an independent energy regulator, provides oversight of these objectives that are set by the national government. A monthly report assesses whether the obligations are being met, which also differentiates between energy suppliers and their individual progress to meeting the set goals (Ofgem 2021). This includes a detailed overview of the specific measures that are carried out by energy suppliers as part of their obligation. Each month, obligated energy suppliers upload the measures they've delivered onto an online ECO register. Detailed data on household energy efficiency improvements is collected by the government on a monthly basis and provides details on the types of measures installed, regional differentiations, and household types (Department for Business, Energy & Industrial Strategy 2020).
Results/Effects	Overall, almost 2.7 million measures have been delivered in over 2 million households since ECO began in 2013 as of the end of March 2020 (Adcock und Hinson 2020). Of these measures, 65% were insulation, including cavity wall (34%), loft (22%), solid wall (7%) and 'other insulation' (2%). The remainder are mostly heating measures, with 23% boiler measures and a further 12% for 'other heating' measures. In total, 6.5 million households are eligible to take advantage of the measures delivered by the ECO3. The aim is to make energy-saving improvements to 900,000 homes between 2018-2022. During the ECO2 scheme between April 2015 and September 2018, more than 800,000 energy efficiency measures were installed in homes as part of ECO, according to the government (Adcock und Hinson 2020). By September 2020, another 316,569 measures were installed under the ECO3 scheme. In 2019, £ 421m was spent via the Energy Company Obligation (ECO) to support fuel poor customers through rebates and energy efficiency measures (Energy UK 2020). The 221,000 ECO measures installed will bring 13 Mt of CO_2 savings and save £ 2bn on customer bills over the lifetime of the measures
Similar Measures	Agreements on energy education and consultation for energy consumers[38] – Lithuania Energy Efficiency Obligation Scheme[39] – Latvia Energy efficiency obligations[40] – Luxemburg Energy efficiency obligations[41] – Malta

3.2.5 Resilience: direct financial support

Direct financial support for vulnerable households is very prevalent across the EU. This often comes in the form of direct tariff and bill support targeted at specific households. Support includes specific funds established to support low-income households (like the gas and electricity fund example shown here), as well as favourable debt payment conditions or staggered payment options for bills. Sometimes these costs are also regulated via the social welfare system (e.g. Finland, Luxemburg,

[38] https://www.energypoverty.eu/measure-policy/agreements-energy-education-and-consultation-energy-consumers
[39] https://www.energypoverty.eu/measure-policy/energy-efficiency-obligation-scheme
[40] https://www.energypoverty.eu/measure-policy/energy-efficiency-obligations
[41] https://www.energypoverty.eu/measure-policy/energy-efficiency-obligations-0

Denmark) and the second example here shows how this may be targeted to ensure participation for low-income households.

Fonds Gaz Electricité (Electricity and gas fund) – Belgium	
Status	Implemented
Type of Measure	Financial support
Target Group	Low-income households
Implementing Agency	Public Centre for Social Welfare; local and national
Policy Segment	Social policy
Description	The fund offers households that have difficulties paying their gas and electricity bills material support. Both tenants and homeowners can benefit from the fund by submitting a corresponding application to the local municipality. The fund offers both corrective and preventive actions. Corrective actions include negotiating payment plans with suppliers and settling certain bills. In the case of preventive actions, the fund can support households with the purchase of devices that use less energy and are safer (energy-saving lamps, electronic devices of consumption class A+ or better, etc.); provide support in the monitoring, maintenance or compliance of the energy efficient devices (maintenance of heating boilers, etc.); and offer financial support for energy efficiency measures (installation of double-glazed windows, roof insulation, etc.) (Soziale Sicherheit / Bürger 2021). The types of support available vary by region and households must meet certain conditions to take advantage of the fund. Larger renovation support is only possible for homeowners. The fund is supported by two further tariff support measures. This includes social grants that support households heating with heating oil, luminous oil (type C) or propane in bulk containers. Households can also benefit from a social tariff that provides lower tariffs based on income and geography.
Results/Effects	The number of cases needing financial support has decreased from 52,184 in 2008 to 28,895 in 2015. Besides bill support, this long-term success is thanks to the additional measures in terms of energy efficiency and energy audits.
Similar Measures	Electricity and Natural Gas allowances[42] – Ireland Electric bonus[43] and gas bonus[44] – Italy Energy allowance/Housing allowance[45] – Poland Heating aid in winter[46] – Bulgaria Heating allowance for pensioners[47] – Denmark

Klimabonus (Climate Bonus) – Germany	
Status	Regionally differentiated; implemented and in discussion

[42] https://www.energypoverty.eu/measure-policy/electricity-and-natural-gas-allowances
[43] https://www.energypoverty.eu/measure-policy/electric-bonus
[44] https://www.energypoverty.eu/measure-policy/gas-bonus
[45] https://www.energypoverty.eu/measure-policy/energy-allowancehousing-allowance
[46] https://www.energypoverty.eu/measure-policy/heating-aid-winter
[47] https://www.energypoverty.eu/measure-policy/heating-allowance-pensioners

Type of Measure	Financial support
Target Group	Households receiving welfare payments
Implementing Agency	Communes; local governmental
Policy Segment	Social policy
Description	Households that are supported by the German transfer benefit system receive designated financial support for their housing and heating costs. The welfare system covers the costs for heating (KdH) and rent (KdU) directly up to a certain limit, which is usually determined on the basis of local rent and heating levels. A climate bonus in the cost of accommodation and heating has already been introduced in several municipalities. The appropriate limit of the cost of the accommodation is increased by a so-called "climate bonus" if there is evidence of high energy efficiency of the building. This proof is usually provided by presenting an energy certificate for the building. This should enable recipients of welfare payments to live in more energy efficient housing, even if rents for these are higher (Schneller et al. 2020). A climate bonus was introduced in Berlin in 2016. For apartments with a final energy consumption of less than 100 kWh / m^2a, the guideline value for reasonable gross rents (the KdU) can be exceeded by € 0.63 / m^2 if proof is provided by an energy certificate. The climate bonus is calculated based on the appropriate living space and the number of people in the household. It is between € 31 per month for 1 person and € 64 for 5 people. The upper limit for the reasonable costs of heating (KdH) is in turn reduced by the climate bonus.
Results/Effects	The climate bonus reduces the financial burden on household energy costs. Targeted support is given to those households that have to bear additional costs when energy efficiency renovations are carried out, but do not have the financial means to do so. Preliminary studies from Berlin show that the climate bonus is high enough to cover the additional costs incurred through energy efficiency renovations (Schumacher und Noka 2021).This means that households that receive transfer payments can live in refurbished apartments, even when rent prices rises above the stipulated limits as a result of the renovations.

4 Summary

The aim of this working paper was to give an overview of the EU approach to and experiences with energy poverty, energy vulnerability and energy affordability, looking first at the overall EU strategy and how this relates to Member State policy and then detailing a number of best-practice measures at the Member State level.

The EU has worked to integrate energy poverty and vulnerability into their energy and climate policy for several years, but this effort has become increasingly prominent over the last five years through, for example, the Just Transition mechanism within the Green Deal and more recently the proposed Social Climate Fund. Energy efficiency is a key pillar within the EU's energy policy and is the central area within which energy poor households are addressed.

While the EU is responsible for the strategy regarding energy vulnerability and poverty at a higher level and for making sure that it is understood as a key issue, EU Member States take on the implementation of policy around energy poverty and vulnerability. The variability with which these issues are addressed within the different Member States becomes particularly clear in the way in which energy poverty indicators are developed on EU level and applied to varying degrees in the Member States.

Discussions about energy poverty are embedded in the broader context of distributional effects of energy and climate policy, the cost of which often places a higher (relative) burden on low-income households and other vulnerable consumers. Unwanted distributional effects are tackled primarily by the countries themselves and there are a large range of measures and instruments which can provide support for energy poor and other vulnerable households. This includes ensuring the socially just implementation of energy and climate policy itself, but also protecting vulnerable households through regulatory instruments, ensuring the participation of a broad range of households in the energy transition, and making these households more resilient against changes in costs/prices through energy efficiency and direct financial support.

Through the EU's policy, energy poverty has increasingly moved to the forefront of decision-making around energy and climate policy at a national level. Tackling this complex problem, from measuring and capturing the levels of energy poverty to implementing instruments and measures to alleviate and combat the issue, as well as evaluating the success of these policies, has brought forward a diverse set of approaches where energy and social policy increasingly work together.

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