



Original research article

Not enough (yet): A capabilities assessment of the implementation of energy poverty policies in Italy

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ABSTRACT

Energy-poor individuals face greater difficulty in accessing the benefits of energy transition policies. This conceptual article employs a priori analytical categories based on the Capability Approach to assess the effectiveness of energy transition policies in addressing energy poverty in the context of Italian energy transition efforts. We use the expression “effectiveness gap” to describe the discrepancy between the intention to address energy poverty through energy transition policies, the practical implementation of these plans, and their unsatisfactory results thus far. From a capability approach standpoint, a person’s wellbeing depends on “conversion factors”. Conversion factors determine to what degree people are able to transform resources into the achievement of beings and doings (i.e. functionings). Some conversion factors are internal to a person (e.g. physical condition, gender, age) others are external such as environmental and socio-economic factors (e.g. public policies). In Italy, energy transition policies do not fully consider conversion factors of energy-poor people potentially leading to their exclusion from public incentives. We argue that Italian energy transition policies could be deemed unjust as they disregard energy-poor people’s socio-economic conditions, thus failing to enable some of their functionings. We recommend developing policies that enhance energy-poor people’s agency, dignity, and freedom of choice by actually allowing them to access public incentives. The main novel contribution of this article is using the Capability Approach to provide a normative perspective on energy poverty in Italy. The article aims to contribute to scholarly and policy debates as well as policy-making concerning the challenges of solving energy poverty.

1. Introduction

The increase in anthropogenic greenhouse gases (GHG) emissions and other human-induced environmental disruptions pose a significant threat to the safety of all species, requiring concrete and urgent political action worldwide.¹ Energy transition policies are crucial to mitigate and adapt to climate and environmental changes [1]. Energy-vulnerable people are among the most affected by climate crises because of the challenges they may face, not only in adapting to environmental changes (e.g. summer temperature spikes and winter dips, see [2]), but also suffering greater burdens from energy transition processes ([2], e.g. increasing energy costs and rents, see [3–6]). In this article, we use both

“energy-poor households” and “energy-poor people” to emphasize individuals’ condition, which can be overlooked when focusing solely on households [7]. We also use “energy vulnerability” and “energy poverty” interchangeably.² Recent contributions to the literature have demonstrated how energy-poor people are often less capable of benefiting from the opportunities provided by energy efficiency incentives [8–11].

The threads linking energy poverty, climate change, and energy transitions become more crucial in the context of a *just* energy transition, where there is a growing ambition to promote sustainable global energy systems that are equitable, accessible, and affordable, as in Sustainable Development Goal (SDG) 7 identified by Agenda 2030 of the United

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¹ The latest IPCC report [1] states that in 2011–2020 human-induced GHG emissions *unequivocally* provoked an increase in the surface temperature of 1.1 °C above the 1850–1900 level. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.

² The two terms are often used in the literature to indicate distinct sets of conditions [7] and other terms may be in use (e.g. energy precariousness; energy insecurity).

Nations. This goal entails ambitious transition projects, with a particular emphasis on ensuring that more vulnerable citizens and consumers are not left behind [12]. Moreover, SDG 13 stresses the need to “take urgent action to combat climate change and its impacts”. This often means preventing and mitigating the social injustices that may arise when transitioning to new, environmentally sustainable energy systems to meet climate targets [9,13]. However, it remains uncertain whether the resulting policies are delivering what they intended to achieve.

To assess whether energy transition policies are helping to address the problem of energy poverty, this article focuses on the Italian context and considers the situation of those whose wellbeing is often negatively affected in multiple aspects as a result of energy poverty [14]. In doing so, the article addresses an “effectiveness gap”, identified as the mismatch between the intention to address energy poverty through energy transition policies, the practical implementation of these plans, and their unsatisfactory results thus far.

The focus on Italy is due to its diverse geography and varying socioeconomic conditions, which make this country an interesting context for studying energy poverty (see also [15]). According to a recent study by Campagnolo and De Cian [16], Italy may experience increased energy poverty in the future due to the necessity for citizens to spend a larger proportion of income on electricity for cooling. Moreover, Italy recognizes energy poverty as a problem to be tackled within the energy transition, as suggested by the recently updated Italian National Energy and Climate Plan (NECP)³ [17]. Furthermore, Italy falls within the group of Southern and Eastern European countries that still suffer energy poverty due to many entrenched factors such as years of recession, unaffordable energy, poor housing, including inadequate heating [18]. Hence, a focus on Italy may provide additional insights into both the reasons for and the specificities of its energy poverty issues.

The specific research questions are: [1] Are current energy transition policies in Italy addressing the issue of energy poverty? and, [2] If this is not the case, can such energy transition policies be deemed unjust? To answer these questions, we adopt the Capability Approach (CA) and some of its operationalizations [19,20] to assess some Italian energy transition policies, with the goal of providing a normative perspective on energy poverty in the country and to evaluate issues about justice.

From its first appearance in the late 1970s, the CA has enriched the debate on justice especially within liberal discourses. It focuses on human development and flourishing based on human dignity and freedom of choice while highlighting concrete inequalities and injustices [21]. One crucial knot of this theory is that individual wellbeing and human development depend not only on the resources available to a person. Rather, they mostly rely on “conversion factors” that help transform resources (e.g. money, good and services) into what a person aspires to be or to do [21]. Conversion factors determine to what degree a person is able to convert resources into what she desires to do or be (i. e. doings and beings, or functionings, see Section 2.1). These “conversion factors” can be internal to a person (e.g. physical condition, mental health, age, language proficiency, skill and technical know-how, nutritional status, self-confidence, independence) as well as external, such as socio-economic and environmental factors “stemming from the society in which one lives, such as *public policies*, social norms, practices that unfairly discriminate, societal hierarchies, or power relations related to class, gender, race, or caste [...] climate, pollution, the likelihood of earthquakes, and the presence or absence of seas and oceans” [22,p. 46].⁴ Internal and external conversion factors “influence how a person can convert the characteristics of the commodity into a functioning” [23, p. 99]. According to the CA, many injustices depend on the absence of

³ The National Energy and Climate Plan (NECP) is a comprehensive framework outlining Italy's strategies and measures to meet its energy and climate objectives for 2030. It aligns with the European Union's goals under the Paris Agreement and the European Green Deal.

⁴ Our emphasis.

actual possibilities for people to translate resources and goods into valuable achievements [24].

Through the CA we suggest that the effectiveness gap in Italy may be caused by inadequate attention to the difficulties that may prevent energy-poor households from converting public resources allocated by the State into actual opportunities. Starting from the idea that capabilities represent a foundational “currency of justice” [25], we argue that energy transition policies aimed at combating energy poverty in Italy could be deemed unjust as they fail to take into account the socio-economic conditions that characterize energy-poor people (e.g. limited financial stability, which restricts their ability to make upfront payments, or their housing situation, which often involves rented apartments), thereby preventing them from converting resources into functionings. Finally, building on the operationalization of the CA developed by Lee et al. [20], we also make the normative claim that to be just, such energy transition policies should aim to *enhance* the agency of energy-poor people.

This article is a conceptual contribution that employs a priori analytical categories based on the CA as its theoretical basis. The aim is to assess specific and current Italian energy transition policies that aim to address energy poverty by using the CA as an evaluative lens. The CA has sometimes been challenged due to its struggle with measuring people's capabilities in practice. Here, we do not aim to assess capabilities but to assess policies from a capabilityarian standpoint. As highlighted by Crevani et al. [26,forthcoming], in energy research the CA has been used most prominently as (i) a conceptual tool; (ii) an energy planning tool; (iii) an impact evaluation tool. We are interested in the application of the CA according to this last option, as a tool to “assess the impacts of energy interventions on the sets of capabilities” [26,forthcoming]. We provide a content analysis of energy transition policies and assess them through the lens of CA. We also highlight the lack of data regarding the impact of energy transition policies on energy poverty in Italy, and this underlies our key call for improved data collection and better statistics.

The article is structured as follows: in Section 2, we discuss the theoretical framework and clarify how the CA can help assess energy transition policies in Italy that aim to tackle the issue of energy poverty. Section 3 presents the effectiveness gap, offering an overview of Italian policies that emerged in the wave of the energy transition and are also expected to combat energy poverty. The overview shows the challenges of determining whether these policies reach energy-poor households. Section 4 analyses the Italian energy transition policies through the normative lens of the CA. Section 5 provides an outlook that encourages policymakers to design policies that empower energy-poor people and enhance energy-saving behaviors. Section 6 presents some concluding remarks.

2. The theoretical framework

2.1. The capability approach

In the late 1970s, Sen elaborated for the first time the capability approach (e.g. [27]), successively enhanced on the normative level by Nussbaum [28,29]. Although there are some differences in how Sen and Nussbaum defined capabilities, [22,30], they are generally understood as a person's actual opportunities to do or be and should be distinguished from “functionings”, (i.e. the actual states of “beings” and “doings” that a person has reasons to value and may achieve). As Groves formulated, capabilities “are [...] possibilities for achieving functionings” [31,p. 2], and are not to be confused with goods that we can use. For example, being healthy is a “functioning”, while the actual opportunity to be healthy is a capability. While Nussbaum set a list of central capabilities

[28],⁵ for Sen collective decision processes determine the relevant capabilities [32]. Overall, the particularity of this theory of social justice is that rather than aiming to define what institutions should characterize a just and ideal society, the capability approach starts from concrete and realized forms of injustice, which seriously affects the wellbeing of individuals [32,33]. Put differently, it focuses on what people can effectively be and do rather than the resources available to them. Sen motivates this shift by affirming that “[t]here are, in fact, various types of contingencies which result in variations in the conversion of income into the kinds of lives that people can lead” [32,p. 255]. Factors such as individual traits, circumstances, environmental surroundings, and social conditions influence individuals in actually converting resources into opportunities. This shift from inputs to outcomes [34] does not deny the relevance of material empowerment (that could depend, for example, on energy). Rather, it implies considering external and internal factors when implementing policies to make the redistribution of resources equitable. In capabilitarian terms, “justice means that each citizen is equally entitled to a set of basic capabilities” [35,p. 1279]. In this article, we do not aim to specify the basic capabilities, but aim more generally at understanding justice in terms of substantial opportunities (capabilities) for citizens of a country to achieve “functionings”, by considering those factors that could prevent them from realizing what they have reason to value. As Nussbaum states, her theory of justice is “partial” and yet is compatible with other theories of just distribution of resources [28].

In this theoretical framework of justice, States should develop targeted policies that consider those socioeconomic, environmental, and physical contingencies that may limit people from doing and being what they value doing or being.⁶ In Day's words, “[c]apabilities [...] are not just a matter for the individual to work on, but for society to consider, assess, and ideally to promote for its citizens, through its programs, policies, and ways of working” [36,p. 125].⁷ Day's emphasis on the political decisions and conditions for capabilities to be available to people and the role of policies (i.e. improving people's capability sets) directly relates to the concrete issue of energy poverty and the corresponding energy policies.

2.2. The capability approach and energy poverty

Starting with Boardman's publication on “fuel poverty” [37], definitions of energy poverty have proliferated in scientific and policy discussions. In the academic literature, an influential work by Bouzarovski and Petrova [38] tries to resolve the dichotomy that has developed between “fuel poverty” (mainly concerning issues of energy affordability in the global North), and “energy poverty” (mainly addressing issues of energy access in the global South) (see [39]). They suggest defining energy poverty through an aspect common to the experience of both the global South and the global North: the “inability [of energy-poor households] to attain a socially and materially necessitated level of domestic energy services” [37,p. 31]. This shift towards energy services (from energy per se) (see also, [40]) occurs today in energy policy documents as well (e.g. [41]), and it is pivotal to understand the CA's role in conceiving energy poverty and how to better address it through policies. Considering capabilities as currency to measure an individual's wellbeing reminds us that people and households are interested in energy services only to the extent that they benefit human development. This idea is well reflected in the capabilitarian definition of energy poverty provided by Day et al. [42,p. 259]:

“an inability to realize essential capabilities as a direct or indirect result of insufficient access to affordable, reliable and safe energy services, and taking into account available reasonable alternative means of realizing these capabilities”.

To date, many studies confirm the positive correlation between the Human Development Index (HDI) and energy services [43–45]. From a capabilitarian point of view, a constraint in basic energy services, when they enable human functionings [20], limits people in their actual capabilities and, ultimately, in their freedom [42]. As such, energy poverty and its multidimensional implications (e.g. on health, education, emotion, and play, see [14,46]) represent a hurdle to personal flourishing.

In the last decade, several studies of energy poverty cases adopted the CA [31,47,48]. For instance, Pellicer-Sifres et al. [49] explore the relationship between energy poverty and wellbeing through Nussbaum's theory of central capabilities. Interviews in four European countries identified six central capabilities (Bodily Health; Emotions; Affiliation; Play; Practical Reason; Senses, Imagination, and Thought) that are directly impacted by energy poverty. The authors highlight the importance of addressing energy poverty as an injustice and suggest the need to adopt the CA in both research and policy. Similarly, Middlemiss et al. [50] delve into the social relations aspect of energy poverty, to examine how relationships with family, friends, and other individuals affect people's ability to deal with energy poverty. They argue that good social relations can enable access to energy services and vice-versa. The findings of this research emphasize the significance of considering the quality of social relations in addressing energy poverty and highlight the role of policy and practice in shaping these dynamics.

Highlighting that what matters is what we can achieve with energy services (i.e. basic capabilities), rather than the energy service per se, leads positive assessment of reasonable means to realize basic capabilities which are less dependent on energy [42]. This feature is particularly relevant at a time of rapid climate and environmental changes that are largely driven by the energy sector.

2.3. The capability approach: balancing individual freedom and environmental policies

The use of the CA to evaluate climate and environmental policies as well as their societal implications is quite recent [51,52]. Given the CA's strong emphasis on individual freedom, its adoption might appear inadequate for tackling urgent collective environmental problems ([22], for a discussion of the “critique of individualism” of the CA, cfr. [53]).⁸ Environmental and climate emergencies often necessitate robust governmental interventions, which could potentially conflict with what individuals have reason to value and seek to achieve. In the context of energy poverty, for example, it is conceivable that a person might be indifferent or even opposed to energy transition efforts. Additionally, the CA has traditionally been linked to a conception of the welfare state that relies on economic growth, a notion which is often criticized for being incompatible with sustainable future scenarios [55,56]. Addressing these criticisms, Bonvin and Laruffa [57] have argued that it is possible to decouple the welfare state from economic growth within the CA's normative framework. Moreover, they contend that the emphasis on democracy within the CA helps to mitigate conflicts that might arise between individual choices and the implementation of strong climate mitigation policies. Also enriched by these different standpoints, the debate surrounding the social versus individual dimension of the CA is extensive [58–60], with many authors defending the strong social

⁵ 1. Life. 2. Bodily Health. 3. Bodily Integrity. 4. Senses, Imagination, and Thought. 5. Emotions. 6. Practical Reason. 7. Affiliation. 8. Other Species. 9. Play. 10. Control over One's Environment. A. Political. B. Material.

⁶ In capabilitarian terms, Claassen says that: “Justice then is a matter of using public power to save citizens from private practices of oppression and coercion, so that they can function as autonomous choosers of their own lives” [35].

⁷ Our emphasis.

⁸ All the more reason, if we consider that many environmental problems are longitudinal collective action problems [54], that is problems that depends on the aggregated sum of all unintended contributions of individuals who are unknown to each other.

implications of the CA [61,62].

In this article, we do not delve into that discussion. Instead, we consider the hypothetical situation of energy-poor individuals who, despite being willing to participate in the energy transition, could be overlooked by policies that fail to account for their internal and external conversion factors (see below). This does not imply that all energy-poor people positively value energy transition policies. They may oppose these policies, which can also apply to those who do not require public assistance to invest in energy efficiency measures. What a person has reason to value (functioning) is ultimately a matter of individual choice, but among which capabilities (actual opportunities to be or to do) is not. These also depend on the society in which the individual lives. For Nussbaum, for instance, central capabilities should be considered “as a basis [...] of a political overlapping consensus” [28,p. 14], while in Sen’s approach, it is a democratic decision-making process that decides on which capabilities a society should focus [32].

Climate change is scientifically proven, empirically experienced, and widely recognized as a problem that needs to be addressed urgently. Policymakers should promote democratic debates in society as well as the dissemination of information which shapes individuals’ opinions and enhances their agency (see Section 2.4). Environmental and climate concerns are among the most serious challenges of our time. The capability to live more sustainably, and in a less damaged world, could well be among the most highly valued capabilities in a society.

Nevertheless, this article does not address these broader considerations. Instead, we limit our focus to assessing energy transition policies that may be deemed unjust due to their failure to provide actual opportunities for a specific group in society (i.e. energy-poor people).

2.4. The capability approach, energy justice, and energy poverty policies

Lacking energy services prevents people from enabling capabilities and achieving valuable functionings, affecting their freedom, actions, and wellbeing. What are policies expected to do then, from a CA perspective, to address energy poverty *justly*? In Section 2.1, we made the normative claim that policies should improve a person’s set of capabilities. In this section, we elaborate on this idea concerning energy poverty. In energy studies, the research field of “energy justice” recognizes the need to identify and address inequalities and injustices in the energy sector, expanding the debate beyond economic considerations [63–66]. The CA stands out as a prominent normative tool for understanding questions of energy justice. A recent special issue in the *Journal of Human Development and Capabilities* addressed these intersections [34]. Some contributions discuss energy poverty specifically [7,14,20]. For instance, Lee et al. propose a “capabilitarian energy justice framework” to evaluate energy poverty policies in their attempt to achieve social justice. They distinguish energy poverty policies into “compensation-based” and “empowerment-focused” categories through the criterion of “human agency” [20], that is, the capacity of a person to make decisions and act autonomously based on their values. Since “empowerment-focused” policies aim to “[expand] the agency of the less privileged by elevating their capacity to control decisions at personal and community levels” [20,p. 300], they are more recommendable than compensation-based ones to counteract energy poverty.⁹ From a CA point of view, just energy policies are expected to enhance the agency of energy-poor individuals. According to Lee et al. [20], energy efficiency policies best exemplify the “empowerment-focused” typology of policies. Yet, energy-poor households often have difficulties implementing them due to high upfront costs [20]. At the European Union (EU) level, the empowering role of energy transition policies for energy-poor households is widely recognized. EU Directive 2023/1791 states that

⁹ The concept of agency is extremely relevant in the CA literature. Various typologies of agency (individual, participational, and navigational) related to the CA can be found in Claassen [35].

“Member States shall take appropriate measures to empower and protect people affected by energy poverty” ([41] art. 24). However, there seems to be a mismatch between the intention and the result of the implemented energy transition policies as far as energy poverty is concerned. Next, we present such an effectiveness gap regarding the Italian context.

3. The effectiveness gap in Italy

3.1. Impacts of energy transition policies on energy poverty

Some scholars have begun to investigate the unintended socio-economic side-effects of energy transition policies on energy-poor people [67,68]. Focusing on Europe, for instance, Faiella et al. [69] discuss the challenges of achieving a fair transition to net-zero emissions by 2050, emphasizing the risk of disproportionate burdens on vulnerable households. Similarly, Feenstra and Ozerol [70] warn about the unjust side effects of energy transition policies in the Netherlands, showing how transitioning from gas-based energy systems to “less carbon-intensive heating alternatives” puts energy-poor people at risk of being adversely affected or marginalized. Streimikiene and Kyr-iakopoulos [71] argue that addressing energy poverty requires a carefully designed strategic plan for low-carbon energy transition. As stated by Belaïd [6,p. 10], “climate policies must go hand-in-hand with inequality and energy poverty mitigation”. On a more theoretical level, Wood and Roelich [72] highlight that certain climate mitigation policies aiming at reducing fossil fuel burning could negatively impact energy-poor households that heavily rely on them. The interaction between energy poverty, climate change and the energy transition has also been addressed by the EU, where multiple transition policies have often failed to adequately address the issue of domestic energy deprivation [73]. According to the EU, “current building renovation rates are insufficient and buildings occupied by citizens on low incomes who are affected by energy poverty are the hardest to reach” [41,p. 15]. It is often difficult to determine whether the policies implemented to combat energy poverty in a wider transition program effectively reach energy-poor households. This problem has become known in the literature as the “hard-to-reach” citizens’ issue [74,75]. In the following sections, after presenting EU and Italian energy transition strategies, we address what we identified as an effectiveness gap (see Section 1) in Italy.

3.2. Energy transition targets and energy poverty: from the EU to Italy

The EU has recognized the impact of global warming on the environment, including the rise in extreme weather events and loss of biodiversity [76], and has set long- and short-term targets to meet the Paris Agreement’s goal of limiting global warming to well below 2 °C above pre-industrial levels and pursuing efforts to limit the increase to 1.5 °C ([77] art. 2). The EU has defined a set of legislative packages (see Table 1) with a key objective to achieve climate neutrality across the EU by 2050. There is a binding target to reduce domestic GHG emissions by at least 55 % compared to 1990 levels by 2030 (see [78,79] art. 4). To comply with these targets, ETS (Emission Trading System) sectors¹⁰ are expected to reduce their GHG emissions by 61 % compared to 2005 levels by 2030 [78]. For non-ETS sectors,¹¹ the revised Effort Sharing Regulation [80] laid obligations on EU Member States to fulfil the EU’s target of reducing its GHG emissions by 40 % below 2005 levels by 2030. For the EU, transitioning to more efficient and greener energy sources is an essential component of achieving these targets [81,82]. Given that over 75 % of the EU’s GHG emissions result from energy production and consumption across all economic sectors [83], decarbonizing the energy system is pivotal.

¹⁰ https://climate.ec.europa.eu/eu-action/eu-emission-trading-system-eu-ets/scope-eu-emissions-trading-system_en#sectors-gases.

¹¹ See footnote 10 for all other not listed sectors.

Table 1
European Directives addressing energy and related EU legislative framework.

Directive	Measures addressing EP	EU Framework
Energy Efficiency Directive (EU/2023/1791)	<ul style="list-style-type: none"> Under the energy savings obligation, each EU country is responsible for achieving a share of its energy savings among vulnerable customers and those affected by energy poverty. Aims to empower energy-poor consumers by requiring EU countries to enhance awareness and provide information on energy efficiency. Emphasizes the creation of one-stop shops, technical and financial advice and consumer protection via out-of-court mechanisms for the settlement of disputes. Improved regulations to identify and remove barriers related to split incentives for energy efficiency renovations between tenants and owners or among multiple owners. Establishes that the revenues generated from the EU Emission Trading System in the buildings and transport sectors will be allocated to the Social Climate Fund, which, among other things, contributes to the fight against energy poverty. 	EU Green Deal, Fit for 55 Package
Energy Performance in Buildings Directive (EU/2024/1275)	Defines actions at the national level to combat energy poverty through the improvement of the least energy-efficient buildings.	EU Green Deal, Fit for 55 Package
Governance Regulation (2018/1999)	Member States to include energy poverty reduction targets in their National Energy and Climate Plans (NECPs).	Directive adopted before the Clean Energy for All Europeans Package, but closely linked to it
Electricity Directive (2019/944)	Member States to provide a definition and criteria for measuring energy poverty.	Clean Energy for All Europeans Package

These EU packages mark a significant milestone in the recognition of energy poverty. Some of the Directives include measures that specifically address energy poverty (see Table 1). For instance, the “Energy Efficiency Directive” establishes a common definition of energy poverty [41,p. 31]. Under the guiding principle “no-one should be left behind”, some Directives propose measures to address energy poverty (see Table 1), encouraging citizens to take an active, conscious, and independent role in their energy decisions and consumption. The “fit for 55” package [78] establishes a Social Climate Fund to support vulnerable households, recognizes energy efficiency as one of the most effective tools for tackling energy poverty, and requires Member States to renovate at least 3 % of the total floor area of buildings owned by public bodies each year, with a focus on buildings serving vulnerable users and social housing. In sum, the EU recognizes that the energy transition can be both an opportunity to combat energy poverty and a potential factor in its exacerbation [41,84].

Following the EU lead, Italy implemented a set of energy transition policies. In the NECP 2023 [17] the decarbonization process is mostly

entrusted to the residential housing (e.g. civil buildings) and transportation sectors, both of which present considerable opportunities for improvement [17]. By the end of 2030, Italy shall reduce its GHG emissions from non-ETS sectors by at least 43.7 % in relation to 2005 [80]. To achieve this target, Italy aims to reduce by at least 30 % the GHG emissions (compared to 2021) in the building and transport sectors. However, according to the Italian NECP, the combination of all planned policies, in the civil and transport sectors, currently allows for an emissions reduction in the range of *only* 35 % to 37 % by 2030 [17].

The decision to focus on these two sectors highlights the condition of energy-poor households since they are more sensitive to changes in the surrounding environment (e.g. public transport facilities, energy bills, rents). Indeed, energy poverty is extensively addressed in the latest NECP. In line with EU Directives and communications, the Italian government recognizes energy efficiency, and more generally the energy transition, as pivotal to combat energy poverty [17]. But to what extent can energy-poor households actually benefit from energy transition policies in Italy?

3.3. Counteracting energy poverty through energy transition policies in the Italian context: an overview

In Italy, several scholars have tried to characterize and quantify energy poverty [85–88]. To date, there is no official national definition of this phenomenon. Yet, the topic is gradually gaining attention in official documents such as the *National Energy Strategy* (it., *Strategia Energetica Nazionale*, SEN) [89] or the *NECP 2019* [90]. Various Italian policies address energy poverty already: some directly, through specific national or local public interventions; others indirectly, as they are designed for different objectives but could be targeted for energy-poor users (see Fig. 1). These policies follow two main approaches: 1) providing financial support to citizens through bonuses and subsidies to cope with higher energy prices and living costs (e.g. electricity and gas bonuses); 2) promoting energy and economic savings through efficient technologies and renewable energy sources (all other policies. See Appendix 1 for details). In the NECP, measures emerging in the wave of the energy transition (e.g. supporting energy efficiency and the spread of renewable energy sources) are mentioned as capable of addressing energy poverty [17].

At present, however, it is difficult to determine the effectiveness of most of these measures in addressing the issue of energy poverty. This is the case for the “*Fondo Nazionale Reddito Energetico*”¹² which has been used only for a few isolated interventions, and never at the national level [91]. Similarly, the shortage of data makes it difficult to evaluate the impact of another fund provided by the Italian government: the “*Fondo Nazionale Efficienza Energetica*”. According to the *National Agency for New Technologies, Energy, and Sustainable Economic Development* (ENEA), relatively few interventions are eligible for the incentives of this fund [92]. In a previous report, ENEA reveals that of the twenty-six projects financed by the fund in 2021, only one was focused on building renovation by energy service companies [93], without specifying whether the sole project was aimed at social housing (i.e. whether it would benefit those who are more likely to be in energy poverty). Conversely, the capacity of *Renewable Energy Communities (RECs)* to tackle energy poverty is increasingly scrutinized. For instance, research insights from the CEES (Community Energy for Energy Solidarity) consortium question the ability of such initiatives to adequately address energy poverty and mitigate the impact of energy crises on households,¹³ as the success of citizen-led and community-owned energy projects depends on several variables, involving energy practices, ownership of a REC project, and institutional support from national and local governments [94]. Finally,

¹² This and all further mentioned policies are described in detail in Appendix 1, Table 2.

¹³ <https://www.energysolidarity.eu/>.

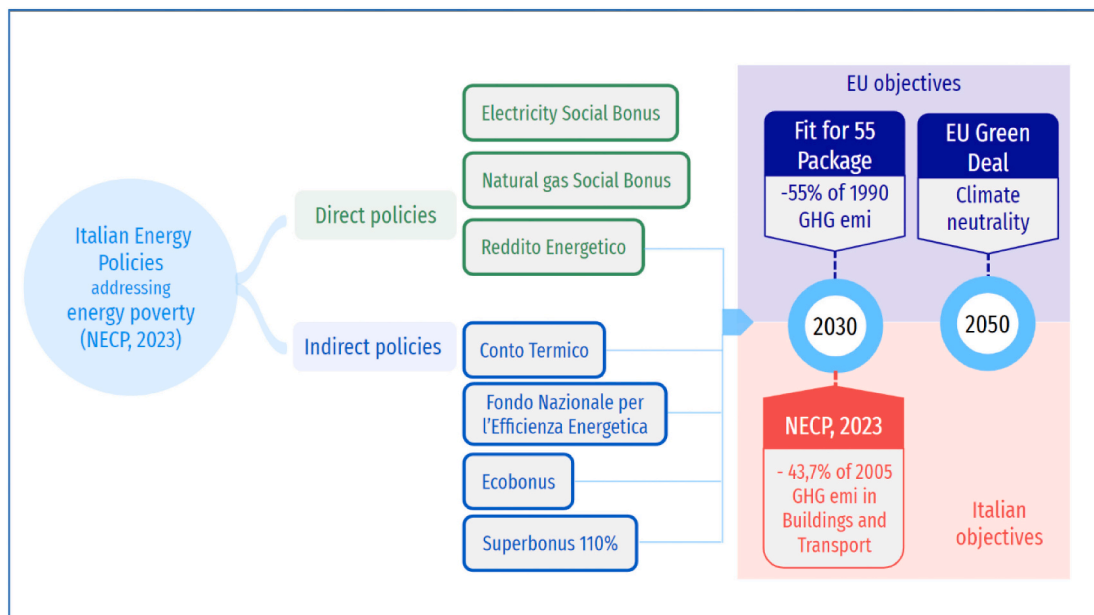


Fig. 1. Schematic representation of Italian policies addressing energy poverty.

there is the case of the “Ecobonus” and the “Superbonus” which establish a tax relief scheme for improving the energy efficiency of existing house/building. In the past few years, these two policies gained momentum, encouraging research on their effects, including on energy-vulnerable households. The *International Energy Agency* [95] points out that such incentives have regressive effects, benefiting homeowners and households with higher upfront spending capacity. The Italian Government Report on building tax incentives [96] confirms that slightly more than 10 % of the wealthiest taxpayers benefited from half of the total Ecobonus deductions provided by the State in 2023. Moreover, most low-income households live in rented homes [97]. Owners of rented properties are potentially eligible for the Ecobonus and Superbonus, but they might be discouraged from investing in energy efficiency due to high costs, and benefits that don't directly benefit them. Tenants, on the other hand, may find it unattractive to invest in energy improvements because of the short-term nature of rental agreements and the risk that any upgrades could lead to higher rents [97].

By analyzing the territorial distribution of deductions, further confirmation of the regressivity of these measures can be found. As addressed in Martini [98], for example, lower access to Ecobonus is observed in Southern Italian regions, where the incidence of energy poverty is higher. Governmental data from 2008 to 2019 confirm that, before the introduction of the Superbonus, more than 60 % of deductions were used by taxpayers resident in the Northern regions [96]. The use of the Ecobonus and Superbonus through transfer credits helped economically weaker households to access investments, increasing the use of incentives in lower-income municipalities [96]. However, according to the IEA [95], few companies are interested in receiving a tax credit, as they would also need to advance costs while having to address their cash flow to cover operational costs. A credit transfer to financial institutions still requires an upfront financing capacity as reimbursements are made after the expenditure. In a study by RSE,¹⁴ Brugnetti et al. [99] conducted a cost analysis of the two policies to assess whether they could have been affordable for energy-poor households. They calculated the average regional expenses, net of state incentives, falling on households using the Ecobonus or

Superbonus in 2022 and compared it with the calculated 2022 “residual expenditure capacity” of households, net of minimal energy expenses and minimum car travel expenses for work. If the “residual expenditure capacity” falls below the relative poverty line, the household is classified as energy-poor.¹⁵ According to the results, it is unlikely that in 2022 energy-poor households could afford an energy efficiency intervention under the Superbonus 110 % scheme, considering that it would have meant using a significant fraction of its overall residual spending capacity. The analysis conducted on the Ecobonus leads to similar conclusions [99].

4. The “effectiveness gap” through the lens of the CA

In Section 2, we defined justice in capabilities terms considering both the relevance of opportunities to achieve valuable “functionings” and the conversion factors that enable them. We also highlighted the role of policies in counteracting energy poverty, and more generally, to improve people's capabilities set and enhance their agency. Drawing on these elements, here we analyze the policy overview conducted in Section 3.3.

Adopting the CA and focusing on conversion factors may help highlight that people in energy poverty conditions not only lack resources but also live in disadvantaged circumstances. The policies overview focuses on the economic factor, showing that the costs associated with additional but essential interventions to benefit from government efficiency initiatives, as well as the requirement to pay upfront for administrative expenses, can be prohibitive. Moreover, energy-poor individuals often live in rented homes where renovation expenses are rarely prioritized.

To revisit the research questions: [1] are current energy transition policies addressing the issue of energy poverty in Italy? and, if this is not the case, [2] can such energy transition policies be deemed unjust? From a CA standpoint based on the central roles of actual opportunities, the consideration of conversion factors, as well as the fundamental empowerment role of policies (see Section 2), it seems that energy-poor

¹⁴ RSE S.p.A. is an Italian company indirectly controlled by the Ministry of Economy and Finance through its sole shareholder GSE S.p.A (<https://www.rse-web.it/>).

¹⁵ The relative poverty line is annually defined by ISTAT (Italian National Institute of Statistics) depending on the number of family members. The values for 2022 are available here: <https://www.istat.it/it/files/2023/10/REPORT-PO-VERTA-2022.pdf>.

people and households have been among the losers of the Italian energy transition so far. When energy transition policies in Italy do not directly consider the socio-economic conditions of energy-poor people (i.e. conversion factors), they limit vulnerable subjects in their opportunity to take control of their energy consumption. Moreover, they are left behind in a transition process that could help them out of energy poverty. In other words, such policies risk narrowing their capabilities, as failing to effectively address energy poverty leaves people in conditions that have been widely proven to limit even fundamental capabilities (see Section 2.2). Therefore (at least within the Italian context), current energy transition policies that aim to alleviate energy poverty in Italy can be deemed unjust.

Through a CA lens an effectiveness gap is indeed observable and derives, at least partially, from a conceptualization of justice that pays inadequate attention to factors (e.g. economic factors) that impede energy-poor people from applying for energy transition incentives in Italy. The cost analysis conducted by Brugnetti et al. [99] argues that in 2022 in all Italian regions, energy efficiency incentives - under the Superbonus and Ecobonus schemes - have been mainly used by privileged households with the means to afford such expenses. This is because energy efficiency interventions incentivized by the Superbonus 110 % require non-deductible expenses (such as upfront costs for administrative costs), which are borne by private citizens. Similarly, the interventions incentivized by the Ecobonus assume an unavoidable share of non-deductible expenditure, since the deduction covers only a part of the total intervention cost.¹⁶ These “other” expenses (i.e. those not covered by the incentives schemes) have rarely been found to be within the economic reach of households in energy poverty in 2022. This means that only households capable of paying beforehand for ancillary and non-deductible measures could carry most of the energy efficiency interventions.

Moreover, authors have also argued that the sole implementation of energy transition policies does not suffice in addressing and solving the energy poverty phenomenon [48,100,101]. Similarly, through the theoretical lens of the CA, energy transition policies per se cannot be considered *empowerment-based* policies that reinforce and promote the agency of energy-poor individuals in energy issues. This is possible only when policies create actual opportunities for energy-poor households to take advantage of the energy transition. For energy policies to truly empower energy-poor people (and more generally all citizens), they need to not only provide resources in material terms but also offer support to develop the capacity for individuals to utilize these resources. This could happen, for instance, by developing more targeted energy transition policies to reach specific households such as rented ones [102]. Integration of energy policies with broader social welfare and community development initiatives can create support networks that offer education, information, and training on energy management, enabling individuals to make informed decisions about their energy use. Community-based projects can also foster a sense of ownership and engagement, ensuring that energy-poor households can directly benefit from the energy transition. For example, some pilot initiatives in Italy (mostly proposed by philanthropic organizations or associations helping vulnerable individuals) have introduced training programs to raise energy awareness alongside efficiency measures (such as replacing old appliances) aimed at the most disadvantaged users. These projects have received highly positive feedback and have great potential to be systematically integrated into political strategies to combat energy

¹⁶ The deduction rates used in the analysis proposed by Brugnetti et al. [99] to calculate the net intervention costs, referred to the year 2022, are 50 % for window frames replacement and 65 % for condensing boilers installation (including thermoregulation systems). (https://www.ufficienzaenergetica.enea.it/images/detrazioni/Normativa/30-decreto_efficienza_energetica_2020_gu.pdf).

poverty.¹⁷ For this purpose, policy design and energy rules need to change. Barroco Fontes Cunha et al. [103] have noted that energy communities in Italy could represent a partial solution to combat energy poverty. However, new energy market regulations that promote their implementation as well as other collective energy schemes, are needed. By establishing these connections (e.g. broader social welfare, energy policies and community development initiatives) and providing comprehensive support, energy transition policies can empower individuals and enhance their agency in energy-related matters.

Identifying a latent form of injustice is one thing; addressing it successfully is another. This brings us to an important question: Do the conceptual tools of the CA possess practical utility for policymakers aiming to improve energy transition policies? Policy implications of CA assessments of energy-poverty related issues have already been successfully advanced in the literature (e.g. [42]). We recommend envisioning the objectives of energy transition policies more broadly when trying to combine them with the energy poverty problem. We suggest two key objectives for energy transition policies. First, they should aim at improving the capabilities set of energy-poor individuals. To do this, it could be helpful to think about energy transition policies as conversion factors that enable people to transform their resources into functionings. This perspective encourages consideration of the socioeconomic, environmental, and physical contingencies that energy-poor people might face when seeking to benefit from energy transition incentives (e.g. difficulties for upfront payments or living in rented or sublet housing). Second, we emphasize the need to enhance the agency of energy-poor individuals. This might involve creating conditions through welfare systems, information campaigns, education, and public discussions that enable individuals to make autonomous decisions about their energy consumption and similar issues. However, envisioning the empowerment of energy-poor households from a policy perspective risks adopting a top-down approach. We suggest that government-driven initiatives should be merged with bottom-up ones. Indeed, Italian civil society often displays a richness of organizations and activism that policies can highlight, foster, and support, leading to a fruitful cross-fertilization to foster a sense of ownership and participation in the energy transition process.

5. Outlook

Energy poverty has not only a close relationship with energy transition policies in general but with *empowerment-based* policies specifically. In the context of climate change, enhancing people's agency through policies is crucial to promote energy-saving behaviors [104–106]. Some studies have shown that both pro-environmental and environmentally unfriendly behaviors are influenced not only by psychological barriers [107] but also by contextual and structural factors such as technology and public incentives [108]. According to Geerts [109], technologies can play a fundamental role both in exacerbating or reducing the “experiential gap”, that is, the divide between the experience that an individual has of electricity consumption and the effects of this consumption on the rest of the network and the environment. To this extent, political incentives towards modern and more efficient energy systems can contribute significantly to the spread and development of sustainable habits. This is not to say that technologies - e.g. off-grid microgeneration systems or solar panels - would be sufficient to promote a deeper collective environmental awareness. On the contrary, relying *only* on “cleaner” technologies can even lead to the opposite effect of consuming more energy due to the Jevons effect [110] or moral licensing [111]. However, if we consider the residential sector, we propose that energy transition policies (e.g. incentives for cleaner energy systems, renovation of buildings, information campaigns for alternative energy systems) have great potential to shape new and more

¹⁷ <https://bancodellenergia.it/progetti/>.

sustainable energy consumption habits (e.g. monitoring the amount of energy consumed through smart grids; using appliances during the day, when having solar panels). Energy policies can also enhance individual agency by encouraging critical and democratic examination of widely accepted energy practices, as energy consumption patterns depend on societal changes and the evolution of energy-related practices [112,113]. Engaging critically with the question “what do we need energy for?” ([113], see also for a similar question [114]) opens up the opportunity for policymakers and individuals to rethink energy consumption through a social understanding, rather than a merely economic one. Adopting the language of the CA could contribute to empowering energy-poor people to “realize, exercise and celebrate in action” [30,p. 163] more sustainable energy behaviors.

We identify three areas for improvement in energy transition policies in Italy and similar contexts: 1) addressing behavioral barriers to pro-environmental habits caused by energy deprivation [71], 2) considering personal, environmental, socio-economic conversion factors that influence the actual transformation of public incentives into sustainable energy technologies and systems, which could help individuals benefit from energy policies (e.g. retrofitting, tax breaks); and 3) promoting a democratic debate on energy practices within society. Developments in these directions would ensure that two key notions at the core of the capability approach - dignity and freedom of choice - will be safeguarded. In “*The Idea of Justice*”, Sen introduces the term “sustainable freedom” [32,p. 251] to emphasize the role of human agency and human freedom to engage in pro-environmental activities. This “sustainable freedom” today is not within the capability set of all individuals. Failing to extend this freedom to all “will lead to a society in which people might be willing, but are not able to reduce their energy consumption” [109].

6. Conclusion

In light of the nexuses among energy poverty, climate change, and energy transitions, this article explored the effectiveness of energy transition policies in addressing the energy poverty phenomenon in Italy. We presented a policy overview (see Section 3) which showed that despite the Italian government's intention to tackle energy poverty through specific energy transition measures, an effectiveness gap is observable in reaching energy-poor households. When data is available, the effectiveness gap appears pronounced. For instance, the “Ecobonus” and the “Superbonus” have not proved to be effective because energy-poor households could hardly access such public incentives. In Section 4, we analyzed this “effectiveness gap” through the lens of the CA, starting from the idea that capabilities (the opportunities to achieve “functionings”) are a fundamental currency of justice and that conversion factors play a direct role in achieving functionings. We suggested that the effectiveness gap in Italy may depend on inadequate attention to the difficulties of energy-poor households in converting public resources allocated by the State into actual opportunities. For this reason, the

Appendix 1

Table 2
Brief description of Italian policies addressing energy poverty, differentiated into direct and indirect policies.

Direct policies	Social Bonuses (electricity and gas)	Established in 2005 (electricity bonus) and 2008 (natural gas bonus), they provide a reduction for electricity and natural gas supply expenses for domestic customers recognized as being in economic hardship. The main eligibility requirements for the bonuses are related to income and the number of household members. These bonuses are the main instruments to address energy poverty in Italy. According to the Italian Observatory on Energy Poverty [97] as well as to the peer reviews of energy policies annually conducted by the International Energy Agency [95] the structure of the two bonuses discourage energy saving attitudes, reseller changes or investments towards more efficient equipment, thus negatively affecting long-term actions on energy poverty households.
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Italian transition policies considered in the article could be deemed unjust.

A key finding of the article is that there is an overall lack of data available to determine the concrete impact of energy transition policies on energy-poor households and people in Italy. This and the effectiveness gap characterizing the Italian situation speak of insufficient interest in the socio-economic context of energy-poor people, shedding light on the limited empowering effect of implemented energy transition policies. Our analysis and assessment through the Capability Approach (CA) are limited by the focus on energy transition policies affecting only the residential sector, which are sometimes very recent (see Fig. 2 in Appendix 1). However, the rationale behind our approach can be generalized and applied to the evaluation of other policies that could promote energy services, including those related to recreational facilities, public sport facilities, and transportation, as well as their impact on the capability set of various social groups (not only energy-poor people).

Public policies should work to improve the capabilities of individuals and their wellbeing, considering their socio-economic and physical circumstances. To this aim, we advanced some policy recommendations in Section 4. Building on the capability approach developed by Lee et al. [20], we make the normative claim that such policies should aim to enhance energy-poor people's agency, reinforcing their capacity to make autonomous decisions when it comes to energy matters that affect them directly. We recommend developing policies that empower energy-poor people and enhance energy-saving behaviors, two crucial issues that require further research.

CRedit authorship contribution statement

Noemi Calidori: Writing – review & editing, Writing – original draft, Project administration, Conceptualization. **Irene Galbiati:** Writing – review & editing, Conceptualization. **Giovanni Frigo:** Writing – review & editing, Supervision. **Lorenzo De Vidovich:** Writing – review & editing.

Declaration of competing interest

The authors declare no conflict of interest regarding the present submission.

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Table 2 (continued)

		Reddito Energetico	Grants allocated by the Italian government to incentivize energy efficiency by purchasing and installing renewable energy systems for economically disadvantaged households that are unable to afford these solutions. This initiative simultaneously addresses energy poverty and environmental protection. The establishment of the Fund was anticipated by resolution no. 7 of March 17, 2020, but the resources remained blocked for a long time until the official establishment of the fund in 2023 by the Italian decree of August 8, 2023.
Indirect policies	Energy efficiency policies	Ecobonus and Superbonus 110 %	They consist of tax incentives provided for energy efficiency improvements in buildings and/or residential technological equipment that account for a significant portion of household energy consumption. The Ecobonus was introduced in 2006 (DL 296/2006). It allows taxpayers to deduct a certain percentage of expenses incurred for energy requalification work on existing buildings from their individual income tax (Irpef) or corporate income tax (Ires). The value of the deduction rate varies depending on the type of dwelling being upgraded (single property unit or condominium) and the year in which the upgrade took place. The deduction applies to interventions aimed at reducing energy demand for heating, improving the thermal efficiency of the building, installing solar panels, and replacing winter climate control systems. The most relevant interventions eligible for the tax relief scheme are vertical walls, horizontal and inclined walls, window frames, solar heating systems, solar shadings, condensing boilers, heat pumps, biomass systems, building automation, installation of condensing boilers, and the replacement of windows frames. The Superbonus was introduced in 2020 (D.L. 34/2020 art. 119) as an enhancement of energy efficiency incentives. Like the Ecobonus, it is also offered as a tax deduction, with the difference that the deduction covers 110 % of the expenses incurred from July 1, 2020, for the implementation of specific interventions aimed at energy efficiency and the structural strengthening or seismic risk reduction of buildings. In terms of efficiency improvements, it mainly incentivizes interventions on domestic energy plants and building envelopes. It also includes Ecobonus interventions on the 110 % deduction, provided that they are carried out together with the previous mentioned interventions. Initially, the tax deduction for Ecobonus and Superbonus could be applied either as a direct deduction or through invoice discounting or tax credit transfer. However, the latter two methods of disbursement were abolished as of February 2023 (D.L. No. 11 of February 16, 2023).
	National Funds	Conto Termico	Fund that incentivizes interventions for energy efficiency in Public Administration and for the production of thermal energy from renewable sources. This measure could address the issue of energy poverty if public administrations undertake interventions on public residential buildings (social housing). It was introduced in 2012 (decree 28/12/2012) and recently updated in 2016 (decree 16.02.2016). This measure is also listed among those that could alleviate energy poverty in the NECP [17], but we did not consider in the article. This is because in 2023 the incentive quota for the public administration has been raised, introducing the possibility of combining the incentive with the National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza, PNRR) funds. The consequences of this amendment (which might result in a greater possibility of reaching users in energy poverty) can be evaluated only in the years to come.
		Fondo Nazionale per l'Efficienza Energetica	This fund provides subsidized or state-guaranteed financing (by the Ministry of Economic Development and the Ministry of the Environment) for energy efficiency interventions carried out by businesses and public administration. Similar to the Conto Termico, it also includes interventions for improving energy efficiency in public residential buildings, which could align with efforts to combat energy poverty. It was established in 2014 by the decree of 4.07.2014 (art. 15) and revised in the 2022 Legge di Bilancio.

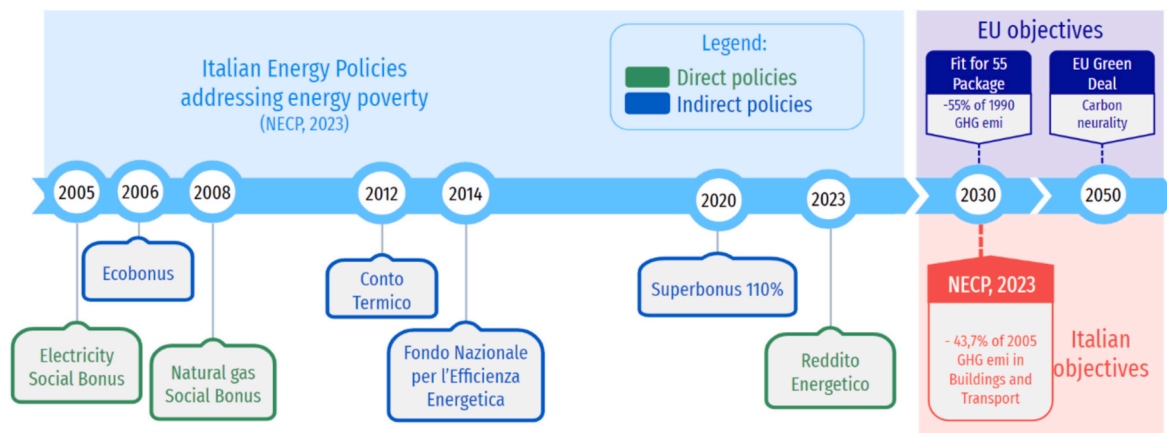


Fig. 2. Timeline of Italian policies addressing energy poverty and the European and Italian objectives for 2030 and 2050.

Data availability

No data was used for the research described in the article.

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