

Working Paper

Policy instruments and measures to alleviate energy poverty in Germany - learning from good practices in other European countries

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Zusammenfassung

Im Gegensatz zu einigen anderen europäischen Ländern gibt es in Deutschland relativ wenige Politiken, die sich direkt mit dem Thema Energiearmut befassen. Energiearmut hat viele Ursachen, etwa niedriges Einkommen, allgemeine Armutbedingungen, schlecht gedämmte und ineffizient heizende Häuser und fehlenden Anreizen für die Verbesserung von Effizienz. Vor diesem Hintergrund ist die sozialverantwortliche Gestaltung von Klimaschutzpolitik und Energiewende eine besondere Herausforderung. Sie ist aber unerlässlich, um breite gesellschaftliche Unterstützung für die tiefgreifenden Veränderungen zu generieren, die notwendig sind, um ehrgeizige Emissionsminderungsziele zu erreichen.

In diesem Papier wollen wir von Best-Practice in anderen Ländern lernen und untersuchen, wie fünf ausgewählte europäische Länder (Dänemark, Frankreich, Irland, Schweden und Großbritannien) das Thema Energiearmut in ihrer Politikgestaltung angehen. Dafür wurde eine Bestandsaufnahme der politischen Instrumente und Maßnahmen zur Bekämpfung bzw. Verringerung der Energiearmut in diesen Ländern erstellt. Dabei wird sowohl auf die nationale wie lokale Ebene abgehoben, sowie staatliche Maßnahmen und private Initiativen von NGOs, Bürgern und anderen Organisationen berücksichtigt. Wir kategorisieren Instrumente und Maßnahmen dabei grob in Preismaßnahmen (z.B. Winter Fuel Payment in Großbritannien und Fuel Allowance in Irland), Förderung von Energieeffizienz (z.B. Habiter Mieux in Frankreich oder Steuerermäßigung für energieeffiziente Sanierungen in Dänemark und Schweden), Informations- und Beratungsprogramme (z.B. das französische SLIME-Programm und das dänische BedreBolig-Programm) und gesetzliche Bestimmungen (z.B. rechtliche Garantien und institutionelle Regelungen).

Die wesentlichen Gestaltungselemente, positiven Aspekte und Grenzen der Instrumente und Maßnahmen in den fünf Ländern werden in einer eingehenden Länderanalyse untersucht, wobei auch länderspezifische Besonderheiten, insbesondere in Bezug auf den Energieverbrauch, das Strom- und Heizungssystem sowie die Sozialversicherungsbestimmungen berücksichtigt werden. In einem nächsten Schritt wird die Übertragbarkeit auf den deutschen Kontext untersucht. Dafür greifen wir auf das Übertragbarkeitskonzept von Williams et al. (2014) zurück und definieren, ob ein Transfer in den deutschen Kontext durch i) Kopieren, ii) Adaption, iii) Hybridisierung, iv) Synthese oder v) Inspiration möglich ist.

Unsere Bewertung zeigt sechs wesentliche Aspekte, die erfüllt werden müssen, um eine Anwendung für Deutschland zu empfehlen: Instrumente und Maßnahmen sollten (i) langfristig ausgerichtet sein und Energieeinsparungen durch Effizienzsteigerungen und / oder Verhaltensänderungen generieren, (ii) die Zielgruppe der einkommensschwachen Haushalte ansprechen (u.a. prekär beschäftigte Personen, die keine Transferzahlungen erhalten), (iii) wenn möglich, eine Kombination aus Information und finanziellen Investitionsanreizen bieten, (iv) vorzugsweise auf lokaler oder regionaler Ebene oder sogar Peer-to-Peer umgesetzt werden, (v) das Vermieter/Mieter-Dilemma vermeiden (relevant, da Deutschland einen sehr großen Mietermarkt hat), (vi) nicht die Sozialpolitik ersetzen, sondern Energie- und Klimapolitik so gestalten, dass Verzerrungen minimiert werden.

Nicht alle diese Aspekte können immer gleichzeitig in einem einzigen Instrument oder einer einzigen Maßnahme vereint werden. In vielen Fällen ist es entscheidend, Prioritäten zu setzen. In Notlagen muss finanzielle Unterstützung für die Belange des täglichen Bedarfs z.B. die Beheizung von Wohnraum angeboten oder Strom- und Gassperren in den Wintermonaten verboten werden. Diese Maßnahmen der direkten Unterstützung sind unerlässlich, aber auch relativ teuer und bieten in der Regel keine Anreize zur Verbesserung der Effizienz oder Änderung von Verhaltensweisen. Wären

sie gekoppelt mit Energieeinsparungen würde dies die finanzielle Belastung für Kommunen und soziale Einrichtungen deutlich reduzieren.

Vier ausgewählte Instrumente und Maßnahmen werden für den Transfer in den deutschen Kontext ausgewählt, für sie führen wir eine Wirkungsanalyse mit Hilfe eines Mikrosimulationsmodells durch, das auf der deutschen Einkommens- und Verbrauchsstichprobe basiert, einem repräsentativen Datensatz der privaten Haushalte in Deutschland. Wir identifizieren die potenziellen Adressaten der gewählten Instrumente und Maßnahmen und liefern eine erste Abschätzung der Auswirkungen. Wir diskutieren auch die mögliche Umsetzung der Instrumente und Maßnahmen in Deutschland, wobei die Erfahrungen aus der Umsetzung in anderen Ländern berücksichtigt werden. Die folgenden vier Instrumente und Maßnahmen werden ausgewählt: i) Ausweitung des Anspruchs auf Heizkostenerstattung auf zusätzliche Bevölkerungsgruppen, ii) Einführung eines Stromfreibetrages, iii) Unterstützung von Sanierungsmaßnahmen in einkommensschwachen Haushalten und iv) Ausweitung des Stromspar-Checks auf weitere Gruppen. Andere relevante Instrumente und Maßnahmen, die nicht in der Mikrosimulation untersucht werden, aber dennoch positive Beispiele und potenzielle Kandidaten für die Übertragbarkeit auf Deutschland darstellen, werden qualitativ diskutiert.

Dieser Bericht zeigt, dass eine einfache Lösung, die spezifisch für alle Zielgruppen funktioniert, kurz- und langfristige Unterstützung und Anreize bietet, sozialpolitisch Armut reduziert oder vermeidet und zur Erreichung energie- und klimapolitischer Ziele beiträgt, nicht ohne weiteres verfügbar ist. Es wird auch weiterhin eine Herausforderung sein, alle diese Ziele in einem integrierten Ansatz zu verfolgen. Dazu ist es wichtig, dass die Sozialpolitik einerseits und die Energie- und Klimapolitik andererseits integriert werden, soweit dies praktikabel und möglich ist. Die Transformation von Energiesystemen erfordert sozialverträgliches Denken über die Systemgrenzen hinaus. Ein Erfahrungsaustausch und gegenseitiges Lernen über politische und geografische Grenzen hinweg liefert wichtige Erkenntnisse darüber, wie dies erreicht werden kann.

Abstract

While in some European countries energy poverty is deeply embedded in state policy, in Germany there are relatively few policies that directly address energy poverty. Energy poverty negatively affects living conditions and health. It has many causes, often resulting from a combination of low income and general poverty conditions, inefficient homes and a housing tenure system that fail to encourage energy efficiency. The socially responsible design of climate protection policies and energy transitions is a particular challenge, but it is essential in order to generate broad social support for the far-reaching changes needed to achieve ambitious emission reduction targets.

The aim of this project is to learn from best-practice models in those other countries, by examining how five selected European countries (Denmark, France, Ireland, Sweden, and the United Kingdom) approach energy poverty in their policy making. We produce an inventory of energy poverty policy instruments and measures in these countries, which includes actions at the national and local level, as well as both government policies and private initiatives by NGOs, citizens and other organizations. We broadly categorize instruments and measures into four sub-categories: price management (e.g. Winter Fuel Payment in the UK and the Fuel Allowance in Ireland), support for energy efficiency (e.g. Habiter Mieux scheme in France or reducing tax on energy efficient refurbishments in Denmark and Sweden), information and guidance schemes (e.g. the French SLIME program and the Danish BedreBolig program) and legislative provisions (e.g. legal safeguards and institutional arrangements, and evaluate these policies in order to identify best-practice examples that may be interesting for the German context.

The main design elements, positive aspects and limitations of the instruments and measures in the five countries are investigated in an in-depth country-by-country analysis. This also takes into account country-specific characteristics, in particular in relation to energy use, the electricity and heating system, as well as social security provisions. Applying the transferability concept by Williams et al. (2014), we consider whether a transfer to the German context is possible by i) Copying, ii) Adaptation, iii) Hybridization, iv) Synthesis, and v) Inspiration.

Our assessment reveals six essential aspects that should be met in order to recommend an application to Germany: Measures and instruments should (i) have a long-term focus and generate energy savings through efficiency gains and behavioral change, (ii) address the target group of low-income households (incl. the precarious employees who do not receive transfer payments), (iii) offer a combination of information and financial investment incentives where possible, (iv) be implemented preferably at local or regional level or even peer-to-peer, so that local conditions can be adequately addressed, (v) avoid the landlord/tenant dilemma (relevant, as Germany has a very high tenant market share), (vi) not replace social policy, but rather design energy and climate policy in a way that distortive effects are minimized. Not all of these aspects can always be addressed in a single instrument or measure. In many cases it is key to set priorities. Financial support is offered for daily needs or for heating apartments and houses, or electricity and gas cut-offs are prohibited in the winter months. These measures provide direct support, but are relatively expensive and do not usually provide incentives to improve efficiency or change behavior. However, if these instruments and measures would simultaneously incentivize energy savings, this would significantly reduce the financial burden on municipalities and social institutions.

Four selected instruments and measures were deemed interesting for transfer to the German context, and an impact analysis using a microsimulation model based on the German Income and Expenditure Survey, a representative dataset of household income and expenditure data, was carried out. We identify the potential beneficiaries of the chosen instruments and measures and deliver a first estimation of the impact should this policy instrument or measure be applied in Germany. We also discuss how exactly instruments and measures could be implemented in Germany taking into account lessons learnt from the implementation in other countries. The impact analysis is carried out for the following four instruments and measures: i) extending the reimbursement of heating costs to other population groups, ii) introducing an electricity allowance, iii) supporting renovation measures in low-income households and iv) extending the Electricity Saving Check ("Stromspar-Check) to additional groups. Other relevant instruments and measures which are not investigated by microsimulation but still provide positive examples and potential candidates for transferability to Germany include integrated information and guidance schemes for energy renovation measures involving craftsmen and industrial associations and increased consumer protection measures to prevent power cut-offs.

This report shows that mutual learning is useful for the design and implementation of instruments and measures. There is no simple solution that works for all target groups, provides short- and long-term aid and incentives, reduces or avoids poverty in socio-political terms, and contributes to the achievement of energy and climate policy goals. It will continue to be a challenge to pursue all these objectives in an integrated approach. To this end, it is important for social policy to develop alongside energy and climate policy and, conversely, for energy and climate policy to be designed in a socially compatible manner. The transformation of energy systems requires a socially sustainable (re)development beyond its system boundaries and an exchange of experiences and mutual learning across political and geographical borders can allow us to do just that.

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1. Introduction

The definition of and compliance with climate protection and energy targets is an important social task that affects all actors. Instruments and measures to achieve these goals are generating socio-economic changes especially against the background that costs and benefits are often unevenly distributed (SRU 2016). A special aspect in this context is the so-called energy poverty. Energy poverty is understood in the broad sense to mean that households are not in a position to pay their heating and electricity costs, to heat their homes appropriately, to cool them down or impose restrictions on electricity for basic needs (such as cooking, washing, media, cf. Day et al. 2016 and Heindl 2017). Energy poverty is an issue in many European countries and is controversially discussed, especially in the context of the distributional effects of energy and climate policy. The socially responsible design of climate protection policies and energy transitions is a particular challenge, but it is essential in order to generate broad social support for the far-reaching changes needed to achieve ambitious emission reduction targets (Baumol & Oates 1975; Elkins 2005).

Energy poverty negatively affects living conditions and health. It has many causes, often resulting from a combination of low income and general poverty conditions, inefficient homes and a housing tenure system that fails to encourage energy efficiency. The households which are most affected are those already vulnerable to income poverty. Energy poverty can only be tackled by a combination of policies and measures, encompassing different policy domains and actors on the national, regional or local levels (Pye et al. 2017). The problem is common in many EU Member States, notably in Central and Eastern Europe, in many of the Southern EU countries, but also in Germany, the UK, Ireland, Denmark, Sweden or France, which are the focus of this report.

The issue of energy poverty is prominently debated in the context of energy and climate policies. The discussion focusses on the cost of such policies and the distribution of burden among households. Critics claim that energy and climate policies generally raise prices and are thus regressive in nature, i.e. they put a higher relative burden on households with low incomes than on those on high incomes. For Germany, however, Schumacher et al. (2016) show that the distributional effects of the German 'Energiewende' can be progressive. Energy efficiency policies conceived in this context have the potential to compensate households for cost increases, due to, for example, the renewable energy surcharge. However, the authors stress that it is important to design tailor-made programs for different target groups so that these potentials can be transformed into real savings for all households.

A series of studies that go beyond Germany deal with the question of how a socially responsible design of energy and climate policies can be achieved within the European Union or EU Member States (Pye et al. 2015; Pye et al. 2017; Schneller et al. unpublished; Schumacher, Cludius, Förster, Greiner et al. 2015; Urgate et al. 2016). Unlike some other European countries, Germany has relatively few policies directly addressing energy poverty (see Schneller et al. unpublished and SRU 2016 for a detailed account of policies in Germany). This has a variety of reasons, including the setup of the social transfer system. The experiences of other Member States regarding energy poverty issues can therefore provide valuable insights into best practices, which may be adapted and/or established in Germany. In addition, an analysis of the existing instruments in other Member States can identify strengths and weaknesses of different types of policies and provide learning examples.

The aim of this study is therefore to elaborate and examine instruments and measures in place to combat energy poverty in a selection of EU Member States, test their applicability and transferability to the German context and undertake a first evaluation of the expected effects. A special focus

will lie on policies which alleviate energy poverty and at the same time contribute to achieving energy and climate targets.

The study begins with a description of our approach (Section 2), followed by a screening and categorization of policy instruments in five selected EU countries (Denmark, France, Ireland, Sweden and the UK) (Section 3.1). In the next step, issues common to all countries are discussed (Section 3.2) and an in-depth assessment by country is carried out, where advantages and limitations of the policy instrument at hand is discussed, as well as the transferability to Germany examined (Section 3.3). Lessons learnt from this detailed assessment are drawn (Section 3.4). In the next step, four candidate instruments are selected for an in-depth assessment of their expected distributional effects and their potential to reduce the risk of energy poverty based on a microsimulation model using the German Income and Expenditure Survey (EVS) (Section 4). The study concludes with lessons learned and recommendations for political decision-makers on the socially responsible design of energy and climate policy instruments for the German energy transition (Section 5).

2. Definitions and approach

2.1. Definitions

Policy instruments addressing energy poverty can be found in many policy fields. In our study, we focus on instruments that are targeted at households, with a special focus on policies targeting low income households. We thus consider policies that directly and purposively influence energy consumption, the cost of energy supply and the distributional fairness at the household level. Moreover, we focus on policies with the explicit aim to reduce energy poverty either directly by targeting individuals, or indirectly by changing the framework conditions for energy consumption and energy demand. A special focus is placed on policy instruments that also support energy and climate targets.

An important distinction that is made in this study is the distinction between measures and instruments. Fischer et al. (2016) define a measure as a verifiable, measurable or assessable improvement in the respective topic. A measure can be technical or behavioral. Examples of measures are: energetic renovation of the building or energy consulting of households with low income. We define instruments (or policy instruments) consistent with their use in political science as a state intervention to promote the implementation of measures. Examples of policy instruments are regulatory instruments, economic instruments, communicative instruments, procedural instruments and instruments of societal self-regulations (Fischer et al. 2016).

In our study, we do not apply a strict definition of energy poverty. A uniform definition of energy poverty does not currently exist (Thomson, Bouzarovski et al. 2017 and is not even recommended, see e.g. Tirado Herrero 2017) and in our screening and assessment of best-practice policy instruments and measures in EU Member States we adopt the dominant understanding or definition of energy poverty in the respective country. As our focus is on policies and measures to alleviate energy poverty in the context of energy and climate policies, we do not assess the situation (occurrence, depth) of energy poverty itself. Within our analysis of policy candidates for Germany, we focus on policy instruments and measures that address households on low incomes and/or with little savings, as these households are more at risk of energy poverty, rather than defining energy-poor households in Germany. Throughout the study, we use the terms fuel poverty and energy poverty interchangeably.

2.2. Country selection

This study focuses on instruments and measures in five selected Member States: Denmark, France, Ireland, Sweden and the United Kingdom. These countries were selected on the basis of their structural similarity to Germany in terms of GDP, energy consumption, climate (at least in part) and household income, as well as the fact that these countries have a number of instruments and measures in place or planned in order to combat energy poverty.

Figure 2-1 Countries selected for analysis



Source: own presentation based on Grebemaps® Kartographie

For each of the selected countries, we draw together detailed fact sheets with background information on general indicators, indicators related to energy use, the heating and electricity system, the social welfare system, as well as technical aspects (see Section 7), which we draw upon in the following chapters.

2.3. Evaluation approach

Evaluation is defined as “the use of social research procedures to systematically investigate the effectiveness of social intervention programs”, or as “careful retrospective assessment of the merit, worth and value of administration, output, and outcome of government interventions, which is intended to play a role in future practical action situations” (Heiskanen & Schönherr 2009, p.21, citing Rossi et al. 1999 and Vedung 1997)

We develop a specific set of guiding questions loosely modelled on Schumacher, Cludius, Förster, Greiner et al. (2015) to assess the (expected) impact of the policies and measures in avoiding or

alleviating energy poverty, its impact on overall climate goals, as well as its transferability to Germany. We carry out a results-based evaluation that goes beyond the particular goals of individual policies and instruments and instead focuses on analyzing expected outcomes. The set of evaluation questions is as follows:

- Is the target group clear and adequately defined?
- Does the policy/scheme focus on short term symptoms or long term problems?
- Is the target group taking advantage of the policy/scheme?
- Is the policy/scheme adequately financed?
- Is there a monitoring/evaluation system in place?
- Does the policy/scheme effective or are improvements due to other circumstances?
- Does the policy/scheme sustainably tackle energy poverty?
- Does the policy/scheme contribute to climate policy?

The main focus of our study is to identify best-practice policy examples in the selected countries and assess their transferability to Germany. Policy transfer is traditionally defined as “a process in which knowledge about policies, administrative arrangements, institutions etc. in one time and/or place is used in the development of policies, administrative arrangements and institutions in another time and/or place” (Dolowitz & Marsh 1996, p.344). The principle behind policy transfer is that foreign experiences can contribute to innovation and improve the quality and rationality of domestic policy-making (Williams et al. 2014).

We adapt the transfer concept proposed by Williams et al. (2014) and consider different modes of policy transfer which describe how a policy can be used to shape domestic policies (Table 2-1) by i) Copying, ii) Adaptation, iii) Hybridization, iv) Synthesis, and v) Inspiration. The modes range from applying the exact same policy in a different country (copying), adapting and combining features to using design and implementation features in other countries as inspiration and stimulus for new policy development or policy adjustment.

Table 2-1 Modes of policy transfer

<u>Mode</u>	<u>Description</u>
Copying	Enacting more or less intact a program/measure already in effect in another jurisdiction
Adaptation	Adjusting for contextual differences a program/measure already in effect in another jurisdiction
Hybridization	Combining elements from two different places/sources
Synthesis	Combining familiar elements in a number of different places to create something new
Inspiration	Intellectual stimulus to develop something new

Source: Williams et al. (2014)

The process which determines whether a policy might be transferable, and if so in which mode, is based on our detailed analysis of instruments and measures in the selected country. Specifically, we develop an understanding of the framework each policy or measure is embedded in, investigate the specific design and implementation aspects, focus on the lessons learned and best practice aspects. The following implementation factors are primarily considered:

- Does the policy or measures reach the target group of households with low income?
- Is the policy/scheme compatible with the German social system?
- Are the technical requirements compatible with those in Germany?

3. Policy instruments and measures to alleviate energy poverty in selected European countries

This section begins by providing an overview and categorization of policy instruments directed at energy poverty in the selected countries (Section 3.1), followed by a discussion of relevant aspects across all countries in particular related to the transferability to the German context (Section 3.2) and provides a detailed assessment by country (Section 3.3) guided by the evaluation questions outlined in Section 2.3. Finally, the main insights are summarized (Section 3.4) and candidate instruments and measures for an application to Germany selected. The following selection covers only parts of the diverse instruments and measures implemented, planned or discussed in the selected countries and does not claim to be complete. Similarly, we only provide selected examples for comparable instruments and measures in Germany. For an extensive analysis of the situation in Germany see Schneller et al. (unpublished) or SRU (2016).

3.1. Categorization of policies and measures

To begin, we screen the literature and search for available information to gain an overview on policies and measures tackling energy poverty in the five selected countries. We categorize the collected measures and instruments drawing on categories suggested by Schneller et al. (unpublished) and Pye et al. (2017) as follows:

- (i) Direct financial support
- (ii) Support for energy efficiency measures
- (iii) Information and guidance schemes
- (iv) Other measures

3.1.1. Direct financial support

A long-standing instrument to tackle energy poverty, particularly in the UK and Ireland, is the use of direct financial support. The Winter Fuel Payment in the UK and the Fuel Allowance in Ireland are examples of such measures. They are comprised of monthly or weekly payments from the government to households in the winter months. Such support is often coupled with the social welfare system, i.e. targeted at recipients of certain benefits, but a blanket approach has also been adopted. The Winter Fuel Payment for example is provided to all pensioners (above the age of 60) regardless of financial or social context (Kennedy & Thurley 2017), which has been subject to debate and criticism (Snell & Thomson 2013). In France and Sweden, on the other hand, blanket approaches are rejected in favor for more specific measures. The Energy Cheque scheme, currently

being piloted in Paris, selects recipients based on income and household composition (Ministère de l'Environnement 2016). This program has the added benefit of eliminating the need for individuals to apply for and seek financial support themselves, and hence potentially reaching energy consumers who are most vulnerable. Another useful approach to distributing financial support is to regulate these payments entirely through the social welfare system, as is the case in Sweden. This means including payments designated for electricity and gas costs into the minimum income and housing subsidies, but this is only feasible in a social welfare system that 'packages' welfare payments (which is the case in Germany).

In Germany, heating energy for the recipients of transfers is paid for by the government. Nonetheless, there may still be vulnerable groups that have to pay for their heating energy, this refers particularly to those groups that are just above the transfer threshold. Electricity, on the other hand, is part of the consumption basket for transfer receiving households and needs to be covered by households along with other basic needs out of their transfer payment (Cludius et al. 2015; SGB II 2011/2017; SGB III 2011/2017). Since the transfer payment is based on a typical consumption basket approach which is adjusted more slowly than electricity prices rise, calls have been made for reducing electricity price components that are determined by the government, such as the value-added tax (Neuhoff et al. 2013), in particular for households on low incomes. Some energy providers in Germany offer social tariffs to vulnerable customers (eg. Care Energie Sozialtarif, Sozialrabatt E.ON).

Direct financial support offers short-term and uncomplicated relief for the households reached. However, direct support alone does not contribute to combating the causes of energy poverty in the long term, since it does not improve household energy efficiency or bring about behavioral changes. To achieve this, it is desirable to combine direct financial support with information and advisory services and (financial) support for investments in energy efficiency improvements. This can also be achieved by an adequate mix of instruments and measures. Whether direct financial support will reach all households in need depends on the requirements and the characteristics of the target group.

3.1.2. Energy efficiency support schemes

Combating underlying causes of energy poverty requires a focus on energy efficiency measures. This includes offering grants, subsidies, and other forms of financial support to undertake efficiency measures, such as home renovations that will lower fuel costs for the household or installing electricity saving devices to reduce electricity costs. This not only tackles the causes of fuel poverty, but also contributes to other environmental goals, such as reducing CO₂ emissions. In general, energy efficiency support schemes are large-scale governmental policies not specifically targeted at households identified to be living in fuel poverty. However, in the selected countries, as well as in Germany, there are also more targeted, smaller-scale and local instruments and measures that serve this purpose.

In the UK the Energy Company Obligation (ECO) creates a legal obligation on energy suppliers to improve the energy efficiency of their clients (Snell & Thomson 2013). The Home Heating Cost Reduction Obligation (HHCRO) stipulated under the ECO is known as the Affordable Warmth Grants scheme, replacing the Warm Front scheme in 2013 (Hough 2017). Ireland's energy efficiency policies are broadly similar to those in the UK, but notably have tailored schemes to a wider variety of recipients. The Housing Aid for Older People, for example, is targeted at seniors and the Warmth and Wellbeing scheme focuses on persons in energy poverty living with chronic respiratory conditions. In Denmark, energy providers are also obliged to implement energy efficiency measures for their clients, but without a social component as is the case in the UK. Another meas-

ure taken in Denmark and Sweden is reducing tax on energy efficiency work making it more affordable across the general population to carry out certain renovations (Pye et al. 2015). In Sweden there is also an emphasis on making energy efficiency improvement grants available to tenants, who are often reliant on homeowners to apply for and take advantage of these possibilities.

The Habiter Mieux scheme in France has been a long-standing program providing funding for thermal renovations in the private and social housing sector. Funding is provided by both the government and the three largest French energy suppliers EDF, GDF Suez and Total, which secures a steady stream of funding (Dubois 2015). Following lower than expected uptake, the program was reformed to include a higher level of subsidies (from €5,000 to €10,000), increased the income threshold for eligible households by 15-20%, and extended the eligibility to co-owners and non-occupant owners (Dubois 2015; Urgate et al. 2016). The scheme relies on a de-centralized structure, where local actors are in charge of identifying fuel poor homes (often social workers) and the implementation of the home improvements. While this requires funding for the training of these local actors, ultimately, the scheme benefits from a localized approach (Dubois 2015).

A common problem in the UK, however, has been providing adequate funding for these kinds of schemes. The Green Deal, for example, an innovative pay-as-you-save energy efficiency finance mechanism, which was considered to be a British flagship dramatically failed to deliver even a small portion of the desired number of home retrofits and was discontinued in 2016 (NAO 2016). The policy is considered to have been poorly designed with limited financial appeal (interest rate not attractive) and lack of sufficient engagement with consumers (Rosenow & Eyre 2016). While households in energy poverty would have been able to benefit from the Green Deal, it was not specifically designed for energy poor households.

Policy instruments that support the implementation of energy efficiency measures directly address factors that contribute to energy poverty by increasing the energy standard of housing or the efficiency of equipment. By reducing the energy consumption of the households they also contribute to the achievement of long-term energy and climate targets. Whether the desired target groups can be reached and the landlord/tenant dilemma resolved depends on the design of the respective measures and instruments. A target-group-specific orientation is important for households in danger of energy poverty, especially with regard to the specific barriers of this target group (no financial resources for investments, information deficits, multiple financial problems). Regarding the contribution of these policies to long-term climate goals, it is important that deep renovations are also incentivized.

In Germany, general programs offer low interest and easily accessible loans, however, they are not directly targeted at households at risk of energy poverty and it is not clear who exactly takes up these programs. If households across the board would participate, these policies would tend to be progressive (Schumacher et al. 2016), however, it is unlikely that households with smaller financial means do so to the same extent. Nationally, renovations of social housing is mandated under the housing support act (Wohnraumfördergesetz), which is not directly aimed at households in energy poverty, but does result in household savings for energy costs. Targeted measures are more clearly articulated on local levels. For example, between 2013 and 2015 the Wuppertaler public utilizes together with the NRW consumer association and the NRW ministry of consumer protection offered a “Mini-Contracting” system for refrigerator exchanges. This allowed low-income households to invest in energy efficient refrigerators through a low monthly contracting rate (Schneller et al. unpublished). With regards to electricity, there is a measure in Germany specifically targeted at low-income households: The Electricity Saving Check (Stromspar-Check), where trained advisors (previously long-term unemployed) come to the home, offer advice and install small electricity saving equipment. More recently, the program also included the scrappage program for old fridges

(Stromspar-Check 2017). The idea behind the Electricity Saving Check was taken up and extended to a number of other EU Member States as part of the Achieve (2014) project. Since 2013 a number of municipalities across Germany also offer an upgraded version of the Electricity Saving Check (Stromspar-Check Plus) which offers financial incentives for households to upgrade their refrigerators (Stromspar-Check 2017).

3.1.3. Information and guidance schemes

The effectiveness of any policy directed at alleviating energy poverty is reliant upon the information about those schemes being readily available to their target groups. Information and guidance measures can address the target group of low-income households directly. They can be understood as a low-threshold offer, which is mainly characterized by easy access. The advantage of information and guidance schemes is that they can focus directly on the cause of the problem and disclose appropriate assistance when they were adapted to the needs of households and local conditions. The French SLIME program (Service Local d'Intervention pour la Maîtrise de l'Énergie), for example, has been very successful in reaching vulnerable household through localized, sustained peer-to-peer and personalized advice. In the case of advice on saving electricity, for example, the information reaches many members within families when they are passed on in conversation (Zeroual 2015). In particular, personal consultation (peer to peer) has been understood as a successful tool. With regards to accessing the information offered, several issues have to be taken into account. In the case of pure online offers, households without an Internet connection may have access difficulties. Furthermore, multilingual information services should be available to include non-English speaking households.

Within the UK and Ireland, a number of charity organizations or NGOs take on the role of information dissemination in conjunction with government websites and helplines, which also provide a medium for applying for grants. The task of providing information on available schemes and policies in France, in contrast to the UK and Ireland, is taken on by the government and the industry. This highlights that there is no 'one fits all' energy poverty policy solution; where in Germany decentralized and bottom-up approach are appropriate to work within a subdivided energy industry, in France the state retains power over the energy sector and hence is dominated by top-down, nation-wide policies (Dubois & Mayer 2013). The energy company EDF, for example, works together with local authorities to 'propose to the most vulnerable households monthly appointments with energy advisors, and a kit composed of several energy efficiency devices (high efficiency bulbs, etc.) to optimize their energy consumption' (Pye et al. 2015, country report France, p.12).

In Denmark the BedreBolig program offers integrated advice and information for energy efficient home improvement work in conjunction with local contractors to simplify the decision making process. Energy companies are also obliged to set aside money for information campaigns. These strategies mean that the providers of electricity and gas have a more active role, and hence active interest, in providing (vulnerable) households with the most relevant information to save money and improve their homes. The Swedish Energy Market Inspectorate (2014) provides price comparisons and consumer and national contact points for inquiries and concerns regarding any electricity, gas and heating issues. In Sweden, as well as in Denmark, simplified energy bills are available, allowing customers a better overview of their energy consumption and highlighting possible areas for savings. Centralizing points of contact for raising concerns about the energy market allows for the regulator to monitor energy companies more closely and efficiently, as well as representing the interests of the consumers.

In Germany, information and guidance on saving electricity is provided through an online platform ('Stromsparinitiative', energy saving initiative) established in 2012. Consumers have the opportunity to have their consumption data checked and compared with average or optimal consumption. In addition, they receive recommendations on potential energy savings. Beyond online consultation, "energy checks" offer basic checks, building checks or heating value checks on site by qualified energy consultants. The best-known program in Germany for information and advice specifically of low-income households is the Electricity Saving Check (cf. Stromspar-Check 2017), which is detailed above (Section 3.1.2). Similar projects are also offered by individual federal states or municipalities. For example, the project "NRW fights energy poverty" of the NRW consumer association provides a combination of budgetary and legal consultation as part of an energy consultation (cf. Schneller et al. unpublished).

Energy efficiency effects or investments do not occur directly after the implementation of the measure often due to the lack of financial resources. For this reason, information and guidance measures should be linked to direct financial aid or other offers of investment support. Information and guidance can be used to achieve long-term improvements for low-income households, e. g. by saving energy or through better building refurbishment. However, it should be noted that the tenant/landlord dilemma does not play a role, since the measure is aimed at the target group - the tenants.

3.1.4. Other policies and measures

There are a variety of other policies taken to combat energy poverty by tackling the technological frameworks of energy provision and protecting vulnerable customers. Several countries, including the UK and Denmark, protect customers from gas and electricity disconnections. Energy UK, the trade association for the main domestic energy suppliers, has produced the Energy UK Safety Net guide, which sets up the standard procedures for energy companies dealing with customers who are in debt or who may be vulnerable (Energy UK 2016). For example, before disconnection energy suppliers will attempt to set up a payment plan that is most suitable to the customer and may install a prepayment meter to avoid customers accumulating debt. In France the Winter Truce puts a restriction on energy suppliers on disconnecting vulnerable customers between November and March (Pye et al. 2015). The Danish Energy Regulatory Authority regulates a non-profit regime governing the district heating market. This means there are a number of legal safeguards in place that regulate costs, length of contracts, and guarantees basic gas and electricity supplies with publicly owned energy companies. In Germany, rules and safeguards before a disconnection from the electricity and gas supply happens are also in place (Heindl & Liessem 2017). Furthermore, an online platform exists, where households can obtain information on comparative prices for electricity and gas (www.verivox.de).

The mentioned measures aim directly at the target group of low-income households and therefore help in a precarious situation at short notice. While avoiding disconnections from electricity and heating supply, does not address the causes of energy poverty or indeed financial hardship, it prevents additional problems for the affected households, who are often confronted with a multitude of problems that have a negative impact on daily life (Heindl & Liessem 2017). Losing access to electricity only further exacerbates these issues.

Pay-as-you-go meters, widely in operation in the UK, also provide more control over payment to consumers. They refer to a system of paying for gas and electricity that does not rely on prepayments for usage, and rather a meter which can be topped up as landlords/tenants wish. This system may be well suited for households who may not have the means to set up a direct debit or pass a credit check. It also means vulnerable customers are less likely to be affected by discon-

nection by the provider due to missed bills, hence protecting them from re-connection fees or further debt. Recent studies in New Zealand, however, have shown that customers on pay-as-you-go meters are more likely to self-disconnect to save money or because they do not have the funds and hence live in 'cold homes' (O'Sullivan et al. 2011). The advantage is that households with debts that cannot pay their electricity bills are supplied with electricity again and have cost control over the credit balance. In combination with information and advisory measures, efficiency gains are also possible here, but it does not address the investor-user dilemma.

Related to pay-as-you-go-meters is the roll-out of smart meters across Western Europe. Smart meters show users how much energy they are consuming and their spending on energy, potentially giving consumers more control over their costs and encouraging energy efficient behavior. In the UK, the government aims to have a complete rollout of smart meters by 2020, making them the standard across the country (House of Commons 2016). The installation of smart meters is supplier-led and mandated by the government. The Guardian (2017b) reported in June 2017 that the installation of Smart Meters may actually force energy bills to rise because of the extra cost energy companies incur in the installation process. In France, the 'Linky' meter for electricity and 'Gazpar' meter for gas have been introduced in 2015 and 2017 respectively. In this case, the cost of replacing existing meters with advanced meters is financed by the routing tariff charged by the system operators to the suppliers, which is integrated in their selling price (CRE 2013).

Germany wide, since early September 2017 all consumers using more than 10.000 kWh a year have to be fitted with smart meters. The government hopes to expand this to all consumers above 6.000 kWh by 2020. The cost of installing the meters will be levied onto the customer's bill at a maximum of 130€ per year (for consumers up to 20.000kWh). This plan is detailed in the law on digitalization of the energy transition (Deutscher Bundestag 2016).

3.2. Relevant aspects across all selected countries

A number of aspects have shown to be particularly relevant for the assessment of transferability to Germany. They refer to the time frame of policies and measures (short or long term), their ability to reach the desired target groups, their intervention approach (information based, financial incentives or a combination of both), their ability to address local conditions or conditions specific to a certain target groups, their compatibility with social systems and technical requirements and their ability to ensure continuity of activities and compatibility with policy goals. In the following discussion, we focus on these particularly relevant aspects.

The time frame of a given policy can provide either short-term or long-term solutions/relief to those affected by energy poverty. In general, short-term measures relate to financial support schemes such as the Winter Fuel Payment in the UK or the Energy Cheque in France. These short-term solutions provide necessary relief for those struggling to pay energy bills, but do not offer sustainable solutions to the underlying issues of energy poverty themselves. The focus on short-term solutions in the UK is centered around heating in particular to avoid arrears in payments for heating energy and it is hence necessary to provide this short-term relief during the winter months. In Germany, on the other hand, the heating system operates independently of the electricity system and is more difficult to disconnect for individual households. Moreover, heating costs of transfer recipients in Germany are covered through the social security system. In sum, this means that short-term measures are not as relevant in the German context as in the UK for example, because energy poverty measures need to address underlying causes of energy poverty and not address the acute (short-term) symptoms of heating related energy poverty.

Already it is clear that the different social welfare systems and 'technical' specificities of Germany need to be carefully considered to judge the appropriate transferability of policy instruments and measures. This refers in particular to the packaged welfare payments in Germany, which ensure a level of financial support for energy and in particular heating bills, and barriers to disconnection of heating, which is possible, but more difficult and a rarer occurrence in comparison to electricity disconnections. Structural aspects also make a significant difference. While in France, for example, the energy sector is highly concentrated it is subdivided in Germany among a large number of larger and small utilities. Furthermore, in France the state has strong intervention powers in the energy sector. Energy poverty in France is thus more oriented towards nation-wide, top-down policies, such as social tariffs (Dubois & Mayer 2013), while policy instruments addressing fuel poverty in Germany are more bottom-up and decentralized, often initiated and implemented by local actors (e.g. consumer advice agencies) or local authorities.

Long-term solutions typically include energy efficiency measures and legal measures. Ensuring the longevity of energy efficiency measures, however, requires an effective (and transparent) monitoring and evaluation system, in particular with respect to whether the target group can be adequately reached and whether funding is used efficiently, which in turn allows for the allocation of adequate and sustained funds. The Green Deal and ECO in the UK are examples of how inadequate policy design, financing and monitoring are interrelated and can undermine the potential of these schemes. The Green Deal was supposed to be a British flagship and deliver energy efficiency retrofits at large scale. However, due to deficits in design, low financial incentive and limited engagement of consumers, it resulted in a very low uptake and a subsequent dramatic overall reduction in home energy efficiency improvements because it crowded out existing, functioning measures (Rosenow & Eyre 2016). Public funding for the Green Deal was thus discontinued in 2016. The government ordered Evaluation Report reported that "neither we nor the Department can determine the impact of the schemes on fuel poverty" (p.11), which highlights the difficulty in accurately monitoring these schemes and, then, in turn managing value-for-money. Similarly, a report by the National Energy Action (NEA) shows that funding from ECO has been cut from £800m to £640m resulting in an all-time low in number of gas boiler replacements and no further boiler repairs (The Guardian 2017a). This demonstrates that adequate, and more importantly targeted and consistent, funding is key for energy efficiency schemes to be effective. It requires a sustained understanding of the characteristic of the target group and of the adverse impacts of inadequate funding. Additionally, instruments and measures need to combine information programs with financial support to reach desired target groups and induce changes in energy efficiency and behavior. Again, the British example refers specifically to heating, which as discussed above is not the main topic in Germany, nonetheless it provides key lessons for policy to put adequate interventions in place, with particular reference also to monitoring and evaluation so that instruments and measures can be reshaped to improve effectiveness and efficiency.

Unlike the other countries discussed, Germany's focus in terms of energy poverty has been targeted in particular towards climate goals. The Energiewende plays a central role in German energy policy and hence in energy efficiency scheme implementation as well. It can be argued that the related debate on rising energy prices has only raised the discussion on energy poverty which earlier had not played a role in energy markets. At the same time, Germany's priority on climate goals might come at the expense of social solutions. If, for example, home energy efficiency improvements, such as wall insulation or installing double glazed windows, are only understood as potential CO₂ reduction measures, we fail to acknowledge the social poverty associated with energy. An effort to adopt a socially aware or compatible energy strategy, would need to involve to combine social and energy efficiency efforts to address both energy poverty and climate goals

3.3. Detailed country assessments

The assessment is based on a more detailed literature review, internet research, and phone interviews. The appraisal is summarized by Member State in Table 3-1 to Table 3-5. It highlights the main positive aspects and limitations for each policy and measure and assesses the transferability to Germany.

3.3.1. Detailed assessment of policies and measures in France

France has implemented a large set of measures of energy poor households. The task of energy poverty has been on the agenda since 2007 (Schumacher, Cludius, Förster, Greiner et al. 2015). In France, the energy sector is still highly concentrated and the state has strong intervention powers (see also Section 7). This explains why France is more prone to the implementation of nation-wide, top-down policies such as social tariffs. The respective government’s decision to launch an energy transition has an impact on the fuel poverty debate. France has been engaged in the fight against fuel poverty for some years already and the energy transition offers a platform for the topic to come to the fore again (Dubois & Mayer 2013).

Table 3-1 Detailed assessment of policies and measures in France

Instrument / Measure	Positive Aspects	Limitations	Transferability
Direct financial support			
Energy Check Scheme Check that can be used to pay energy bills or specific expenses related to energy renovation. Is scheduled to replace social tariffs in 2018. Amount: Between 48 and 227 Euros a year depending on income and household size. Implemented by national government	Provides immediate remedy to pay bills. Target group selected based on income and household composition. Individuals do not need to apply or seek financial support themselves, the tax administration is responsible, thus it reaches consumers that are most vulnerable. Incentivizes sustainable long-term change and tackles the cause of energy poverty when checks are used for energy renovations.	No incentive for behavioral change Target group may be either too broad or too narrowly defined because income and household composition may not indicate vulnerability	Social policy instrument, in principle compatible with German system. Suited for transfer by adaptation, e.g. to cover additional groups who do not receive support under the current system, for example low income households just above the threshold for receiving social transfer payments.
Social electricity and natural gas	Specifically targeted at low income	Does not provide incentives for sus-	Social policy instrument, in principle

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>tariff (Tarif de Première Nécessité électricité and Tarif Spécial de Solidarité gaz naturel)</p> <p>Implemented by energy suppliers</p> <p>Starting year: 2004 and 2008 respectively. To be replaced by Energy Check.</p>	<p>households, dependent on household income and type of heating.</p> <p>Provides continuous remedy.</p>	<p>tainable longer-term change of situation, e.g. no incentive for energy efficiency improvement.</p> <p>Does not tackle the cause of energy poverty.</p> <p>Individuals need to apply, thus most vulnerable households might not be reached.</p>	<p>compatible with German system. Social tariffs are already offered by individual suppliers in Germany. Due to liberalized markets no federal regulation but individual company's voluntary action.</p>
<p>Solidarity funds for housing</p> <p>Financial aid to households who are incapable of paying for basic needs.</p> <p>Implemented by regional governments</p> <p>In operation since 1984.</p>	<p>Provides help to sustain daily life.</p>	<p>Not specifically targeted at energy issues, thus not incentive setting for energy efficiency improvement/behavioral change.</p>	<p>Social policy instrument, comparable to already existing German transfer system, thus in principle compatible with German system.</p>
Energy efficiency support			
<p>Habiter mieux scheme</p> <p>Financial support to homeowners of single family homes, low income landlords, collective housing (co-ownership) engaging in thermal renovation works.</p> <p>Strict conditions on types of homes, income and expected efficiency gains</p> <p>Supported by regional and local government, national housing agency, energy suppliers.</p> <p>Implemented by national government</p> <p>Starting year: 2007</p>	<p>De-centralized approach, local actors are in charge of identifying fuel poor households. Well trained local actors (energy ambassadors).</p> <p>Targets low income households, landlords, housing associations.</p> <p>Aims at thermal efficiency improvement of at least 25%.</p> <p>Reached renovations in 50.000 households between 2010 and 2015.</p> <p>Program shows flexibility for improvement, was reformed to increase thresholds of eligible households and subsidy level.</p>	<p>Despite subsidy low income homeowners might still lack access to capital to induce renovation (initially subsidy was too low to trigger renovations).</p> <p>Larger scale renovation might lead to increase in rent.</p> <p>Does not address landlord/tenant dilemma.</p>	<p>Compatible with German system. Well suited for transfer through adaptation or hybridization (for example hybridization with German Electricity Saving Check, which could be extended to heating energy or extended to offer deep renovations).</p>
<p>Social funds for thermal energy renovation (Fonds sociaux d'aide</p>	<p>Set-up with different funds for different purposes.</p>	<p>Despite support, lack of access to capital might still be a substantial</p>	<p>Compatible with German system. Well suited for transfer through ad-</p>

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>aux travaux de maîtrise d'énergie (FSATME)) Part of regional action plans for housing for vulnerable households Constitutes the preventive counterpart of the Fund of Solidarity for Housing (FSL) scheme Implemented by regional governments Starting year 2009</p>	<p>Includes measures against energy poverty since 2010. Complements other programs, such as Habiter Mieux. Local character permits adaptation to specific conditions. Evaluation shows funding efficiency</p>	<p>barrier.</p>	<p>adaptation or hybridization, for example with the German Electricity Saving Check, which could be extended to heating energy.</p>
<p>Energy solidarity pact Offers roof insulation for 1 Euro to low income households. Implemented by business/industry – private financing In operation since 2013</p>	<p>More than 30.000 roofs already insulated. Private financing eases government budget.</p>	<p>Lack of knowledge about program, barriers to apply for it.</p>	<p>Transferable through copying or adaptation. Similar to the 100,000 Roof Solar Program implemented by German government (1999-2003), granting a low-interest loan for the installation of solar PV on the roof. Renovation and modernization of social dwellings in Germany is implemented by municipal housing construction companies</p>
<p>Roofs first Program Accelerate availability of high energy performance social housing, either through creation of new dwellings (10%) or renovation (90%). 3400 housing units financed in 5 years. Implemented by NGO In operation since 2012</p>	<p>NGO based program. Targets households below poverty threshold. Long-term solution based on improving existing housing stock and ensuring new social housing is energy efficient The aim is to bring back fixed expenses of tenants to an acceptable level, compatible with sustainable integration</p>	<p>Does not target energy poor households that live on the edge of the poverty threshold Financial stability of NGO may be questionable, due to reliance on donations (no steady flow of finance)</p>	<p>Compatible with German system. Well suited for transfer through adaptation or hybridization, for example through a link to existing funding opportunities on the federal and state level, e.g. through KfW offering low-interest loans or consulting for energy contracting (Bafa). Renovation and modernization of social dwellings in Germany is implemented by municipal housing</p>

Instrument / Measure	Positive Aspects	Limitations	Transferability
construction companies			
Information and guidance schemes			
<p>Service Local d'Intervention pour la Maîtrise de l'Energie SLIME</p> <p>Aims to identify vulnerable households, with regards to energy, to organize in-house energy performance diagnostics, to inform households about solutions, and to mobilize local actors</p> <p>In operation since 2015 4762 households assisted in 2016. Implemented by civic organizations</p>	<p>Nationally regulated but locally implemented allows for the program to be adapted to local needs by local actors</p> <p>Households are targeted and advised on a case-by-case basis meaning individual household needs can be effectively met</p> <p>Addresses the target group</p> <p>Minimum time-frame of 6 months ensures long-term advice and support for local households and generate information about energy efficiency</p> <p>Complementary to existing measures in France</p>	<p>Requires initiative from local actors to apply for the SLIME program</p> <p>Local expenditures are reimbursed through the Energy Saving Certificate initiative, where every €15 spent is equivalent to one energy certificate, which is valued by and can be used with your energy supplier. Since these prices are based on volatile market conditions this can be a precarious financial reimbursement.</p> <p>Does not address the investor-user dilemma</p>	<p>Compatible with German system. Well suited for transfer through adaptation or hybridization (however, comparable program already exists in Germany – the Electricity Saving Check (Stromspar-Check)).</p>
<p>Secours Catholique and EDF against energy poverty</p> <p>Raise awareness and support for vulnerable households. Information and tailored advice from EDF and NGO.</p>	<p>Provides comprehensive information about energy efficiency and understanding energy bills</p> <p>Centralized point of contact</p>	<p>Blanket approach (no specific energy vulnerable target group)</p> <p>No direct or peer-to-peer advice</p> <p>Does not address investor-user dilemma</p>	<p>Well suited for transfer through adaptation or hybridization (however, comparable program already exists in Germany – the Electricity Saving Check (Stromspar-Check)).</p>
Other measures			

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>Winter Truce Program Disconnection protection during winter period, reductions are allowed to a certain limit Implemented by energy suppliers/national government In operation since 2014</p>	<p>Provides protection to the most vulnerable customers during the most crucial heating period Addresses the target group National regulation of energy suppliers provides centralized safety net Short term measure against cut-off</p>	<p>Does not tackle underlying problems that put families in situations where disconnection happens Does not provide energy saving incentives</p>	<p>Compatible with Germany system. In Germany regulations exist that prevent instant disconnection; disconnection must be announced and the outstanding invoices must amount to at least 100 euros</p>
<p>Smart Meters: Linky Meter, Gazpar Introduction of smart meters Linky (for electricity) and Gazpar (for gas) The Government aims to replace 90% of all meters with smart meters by 2024</p>	<p>More detailed information available to customers about their energy consumption Potential to incentivize lower energy consumption Information dissemination Raise awareness for all households</p>	<p>The cost of the replacement of old meters by smart meters is integrated into the selling prices of the suppliers, meaning the cost is levied onto the consumer It does not specifically target energy poverty Smart meters shift responsibility to deal with energy poverty onto the consumer Does not tackle the cause of energy poverty directly</p>	<p>Preparation of information is low-threshold and therefore an inspiration for the Germany system, well suited for adaptation Already partially used in Germany, but not yet ready for roll-out due technical requirements for the energy data network.</p>

Source: See Section 8 for references for the individual instruments and measures

3.3.2. Detailed assessment of policies and measures in the UK

Fuel poverty has been on the agenda since the 1980s with a first definition (more than 10% of household income spent on energy) adopted then. Since 2013, the more complex Low-Income, High Costs indicator (LIHC) has been in use UK-wide. Different types of policies such as grants for improving the energy efficiency of buildings, financial support to vulnerable households and obligations for energy companies to support efficiency measures in low-income homes, have been implemented. Furthermore, the UK shifted the responsibilities to alleviate energy poverty onto to energy companies (Schumacher, Cludius, Förster, Greiner et al. 2015). See Section 7 for further information on energy use, the electricity and heating system, as well as social security in the UK.

Table 3-2 Detailed assessment of policies and measures in the UK

Instrument / Measure	Positive Aspects	Limitations	Transferability
Direct Financial Support			
Winter fuel payment Heating allowance of 100-300 pounds p.a. Available to all persons over 60 Operational since 1997 and government funded	Offers short term financial relief to households Avoids/Alleviates financial debt	Offers a blanket approach that is not specifically targeted at energy poor households Does not offer long-term solutions to energy poverty Does not provide energy saving incentives Does not address landlord/tenant dilemma Does not address special conditions at local level	Could be suited for hybridization, i.e. opening the reimbursement of heating costs in Germany to additional groups, e.g. older persons, who may not necessarily receive transfers and thus qualify for the current German reimbursement system.
Government Electricity Rebate Direct 12 pound government contribution to the electricity bill of consumers Implemented to lower the impacts of Government environmental and social policy costs on consumer energy bills Available to all domestic customers of licensed electricity suppliers Two year program lasting from 2014/15 to 2015/16	Direct financial rebate on household electricity bills No need to register for rebate, meaning targeted group widely benefited from the rebate	Not specifically targeted at low-income or energy poor households No incentives to improve energy efficiency Limited timeframe (only operational for two years)	Compatible with German system, well suited for transfer by adaptation, especially with focus on target groups. Would have to be implemented through electricity suppliers.
Energy efficiency support			
Energy Company Obligation Aims to reduce carbon emissions and tackle fuel poverty creates a legal obligation on energy suppliers to improve the energy	Through the obligation energy suppliers are invested in alleviating energy poverty Regularly monitored and evaluated by Ofgem	Subject to funding cuts in the last UK budget Requires legal intervention to incentivize the private energy sector Does not address the target group	Compatible with German system, but different to current practice where energy suppliers are not directly involved in achieving energy savings at the household level.

Instrument / Measure	Positive Aspects	Limitations	Transferability
efficiency of households comprised of three obligations: i) Carbon Emissions Reduction Obligation (CERO) ii) Home Heating Cost Reduction Obligation (HHCRO) iii) Carbon Saving Community Obligation (CSCO)	Provides long-term solutions by tackling household energy efficiency include a wide range of insulation and installation measures Targeted at home owners	Tenants need the permission of their landlords	
Affordable Warmth Grants Functions as the HHCRO under ECO Offers grants towards new boilers, cavity wall insulation and loft insulation Targeted at persons on low-income and on certain benefits	Long-term solution to energy poverty by focusing on energy efficiency in the home Targeted at broad group that includes precarious workers not on benefits Available both to homeowners and private tenants	Only targets private tenants not tenants in social housing Requires online applications which excludes non-internet users	Compatible with Germany system, well suited for transfer by adaptation. Comparable grants exist in Germany, which are, however, not directly targeted at low-income households.
Green Deal Offers finance plans for energy efficiency improvements including insulation, such as solid wall, cavity wall or loft insulation, heating, draught-proofing, double glazing renewable energy generation, such as solar panels or heat pump Eligibility is determined via an assessment of property (owned or rented) Discontinued because of low intake and a rapidly exhausted fund	Long-term solution to energy efficiency improvements Eligibility locally determined	Poorly defined goals meant implementation was difficult to monitor and evaluate Funding was not adequate to continue the scheme for more than four years Does not address the target group; households selected based on property and not income or benefits received Assessment of the property to use the Green Deal is necessary, you have to pay for an assessment	Compatible with German system, suited for inspiration due to the feedback/experiences on/with this instrument.
Information and Guidance Schemes			
Energy Best Deal Energy advice seminars including	Centralized way of providing information about all support available	Does not provide multi-lingual information	Preparation of information is low-threshold and therefore an inspira-

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>presentations and printed information leaflet</p> <p>Coordinated by Citizen's Advice, and supported by Ofgem and utilities</p> <p>Provides information about potential savings of switching energy providers, financial support that is available, and advice on energy efficient practices</p>	<p>Support from energy companies means accurate and up-to-date information is available</p> <p>Easy access (all materials are available online as well)</p> <p>Engages local volunteers and community in providing information sessions</p>	<p>Relies on volunteers to organize and run seminars</p> <p>Requires extensive outreach to make people aware of when and where information sessions are being run</p>	<p>tion for the German system, well suited for transfer through hybridization, for example with already existing structure of energy consulting of German Consumer Center) or with Electricity Saving Check.</p>
<p>Affordable Warmth Team Coventry</p> <p>Offer advice and information to owners, tenants and landlords</p> <p>Coventry one of the worst affected counties – 13% of households in fuel poverty; in some areas over 30% (2014)</p>	<p>Locally organized and implemented</p> <p>Targeted specifically at one of the worst affected areas</p> <p>Aimed at both tenants and landlords</p>	<p>Relies on local county to finance the information provision</p>	<p>Preparation of information is low-threshold and therefore an inspiration for the German system, well suited for transfer through hybridization, for example with already existing structure of energy consulting of German Consumer Center) or with Electricity Saving Check.</p>
Other measures			
<p>Pay-as-you-go Meters</p> <p>Gas and electricity meters which work on a top-up principle</p>	<p>Allows low-income families to be flexible in their payments</p> <p>Payments are only made for energy actually used (no need for pre-payment)</p> <p>Cost control for poor households</p> <p>Avoid cut-offs</p> <p>Directly addressed to the target group</p>	<p>Encourages self-disconnection when families want to save money</p> <p>Does not tackle underlying causes of energy poverty; does not encourage energy efficiency</p>	<p>Preparation of information is low-threshold and therefore an inspiration for the Germany system, well suited for adaptation</p> <p>Already partially used in Germany, but not yet ready for roll-out due to technical requirements for the energy data network.</p>

Source: See Section 8 for references for the individual instruments and measures

3.3.3. Detailed assessment of policies and measures in Denmark

Denmark has a low overall level of energy poverty (Thomson & Snell 2013). Energy poverty has not been defined in Danish law. Nevertheless, Danish electricity prices are high compared with other EU Member States, with more than 50% of the price consisting of taxes and levies. Energy taxes and carbon taxes were found to have regressive impacts in Denmark as lower income consumers bear a proportionally larger burden. Due to fixed price elements, small consumers also pay a higher electricity price than larger consumers (Eurostat 2017; Nierop 2013). Denmark has implemented fewer policies and measures directly addressing energy poverty, however, some of the measures aimed at energy efficiency improvement and price information are also relevant in the present context. See Section 7 for general and energy-related information on Denmark.

Table 3-3 Detailed assessment of policies and measures in Denmark

Instrument / Measure	Positive Aspects	Limitations	Transferability
Direct financial support			
Heating allowance for pensioners If heating costs exceed a defined level, pensioners will be reimbursed for up to three quarters of the total cost. Support declines with income. Managed by the government Public benefit	Provides immediate support for paying bills. Target group well defined. Administered by the same institution that distributes pensions, which should streamline the disbursement and thus help reach consumers that are most vulnerable.	Does not provide incentives for sustainable longer-term change of situation, e.g. no incentive for energy efficiency improvement or behavioral change May not tackle the cause of energy poverty (e.g. poor insulation if applicable, general household debt).	Could be suited for hybridization, i.e. opening the reimbursement of heating costs in Germany to additional groups, e.g. pensioners with low incomes, who may not necessarily receive transfers and thus qualify for the current German reimbursement system. In Germany: Heating allowance administered by different authority (local) than pensions (national). Need to assess administration options that do not lead to overlaps and/or inefficiencies.
Energy efficiency support			
Danish National Building fund (Landsbygge fonden) for social housing Managed by social housing organizations (comprises a total of approx.	Fund to subsidize housing associations for renovation works Modernization of the dwelling is included but not in focus Addresses the target group	Targeted at social family dwellings, social dwellings for the elderly and social dwellings for young persons, thus not directly targeted at the energy poor	Compatible with German system, well suited for adaption Renovation and modernization of social dwellings in Germany is implemented by municipal housing

Instrument / Measure	Positive Aspects	Limitations	Transferability
700 social housing organizations) Offers loans to support renovations carried out by social housing associations, including energy-efficient refurbishments	Provides incentive for energy efficiency		construction companies
Subsidies to improve or replace fuel fired heating Fund to subsidies oil-fired burners by heat pumps or solar heating Implemented by central government Financial mechanism	Sets incentive for energy efficiency improvement	Does not address the target group Does not address the landlord/tenant dilemma	Compatible with German system, similar programs already exist in Germany, for example the 'Marktanreizprogramm' from Bafa supporting the installation of thermal solar, biomass heating or heat pumps.
Tax deduction Addressed at home improvement services, green tax deduction involves home energy renovation works including insulation, change of heating system / boiler, solar panels Managed by the central government	Targeted at landlords and tenants Provides incentive for energy efficiency improvement	Does not address the target group	Compatible with Germany system, suited to hybridization, similar system has been in discussion for Germany, but not been implemented to date.
Information and guidance schemes			
"Better Houses"(Bedre Bolig) One-stop shop for information about energy-efficient refurbishments Inspired by Green Deal (UK) The scheme is a voluntary and market driven system, which promotes refurbishments of private residential buildings Set up by the local government together with industry associations. Responsible: Danish Energy Agency.	Approach to support energy renovation Homeowner has the possibility to find an educated and qualified energy advisor Sets incentive for energy efficiency	Not all municipalities have Better Home advisors who could support the residents in planning energy renovations. Does not address the target group Does not address the landlord/tenant dilemma	Compatible with German system, similar ideas of how to better incorporate the building industry are currently under discussion.

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>Simplified electricity bill Consumers can receive a simplified electricity bill upon request Run by the regulator</p>	<p>Better reflection of the different price components, consumers have a better understanding of the price elements and an incentive to be active on the energy market.</p> <p>Transparent information dissemination</p> <p>Raises awareness for all households, sets incentives for energy saving measures or energy saving behavior</p>	<p>Request is necessary, not an automatic process</p> <p>Does not directly address the target group</p> <p>Does not address the landlord/tenant dilemma</p> <p>Does not tackle the cause of energy poverty directly</p>	<p>Preparation of information is low-threshold and therefore an inspiration for the Germany system, well suited for transfer through hybridization.</p> <p>Would have to be implemented by the energy supplier responsible for the electricity bill. Some information on energy efficiency class is already available on the energy bill and could be complemented (also by further information on behavior related to energy savings).</p>
<p>Electricity price portal (http://elpris.dk/) Run by the regulator All electricity operators are obliged to declare their price and have to present information on all electricity products/ costs to consumers using less than 100,000 kWh per year</p>	<p>Domestic consumers receive information on all electricity products and prices</p> <p>Transparent information dissemination</p> <p>Incentive to make an active choice about the electricity supplier</p>	<p>Does not directly address the target group</p> <p>Does not address the landlord/tenant dilemma</p> <p>Does not tackle the cause of energy poverty directly</p> <p>No incentive for energy efficiency</p>	<p>Compatible with German system, a similar online platform already exists (https://www.verivox.de/).</p>
Other measures			
<p>Energy Efficiency Obligation for utilities Transmission and distribution system operators have to reach a certain yearly energy saving target, which they implement by subsidizing energy efficiency improvements of their clients, e.g. related to insulation or replacement of old boilers. Run by the regulator</p>	<p>Incentivize DSOs to take a lead role in helping customers use less energy through energy saving measures or energy saving behavior</p> <p>Generates demand for energy efficiency services</p> <p>System is highly flexible in terms of how targets are met</p> <p>Targeted at different sectors including residential sector</p>	<p>Does not directly address the target group</p> <p>Does not address the landlord/tenant dilemma</p> <p>Does not tackle the cause of energy poverty directly</p> <p>No requirements to achieve a certain amount of savings from residential or low-income customers</p>	<p>Compatible with German system; so far practice has been not to place obligation on suppliers. Could adapt for the context of energy poverty by setting a target for low income households.</p>

Instrument / Measure	Positive Aspects	Limitations	Transferability
Smart meters Goal: All households in Denmark should have a smart meter by 2020 Run by central government	Information dissemination Raise awareness for all households Sets incentives for energy saving measures or energy saving behavior	Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma	Preparation of information is low-threshold and therefore an inspiration for the Germany system, well suited for adaptation Already partially used in Germany, but not yet ready for roll-out due to technical requirements for the energy data network.
Free choice of electricity and gas supplier and simple to change from one supplier to the other No charge for change of supplier Change effective within 10 days Cannot bind costumers contractually longer than 6 months Default supplier and basic tariff Legislative	Incentive to become active in choosing supplier and switch to the cheapest one Energy cost saving potential	Information about different offers necessary Unawareness about changing possibilities and advantages Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma	Compatible with German system, suited to adaptation A very similar system already exists in Germany (liberalized energy market and free choice for energy supplier), however, issues with changing supplier for households that have been in arrears, who often have to stay on the relatively more expensive basic tariff
Disconnection safeguard In case of disconnection: Consumer needs to be notified two times before cut-off Supplier has to inform social services if children are part of the household	Addresses the target group Short-term access to energy security for low income households Protection of consumers	Does not address the landlord/tenant dilemma No incentive for energy efficiency No long-term solution for underlying causes of energy poverty or disconnections	Compatible with German system, suited to adaptation Supply regulations in Germany prevent instant disconnection, disconnection must be announced and the outstanding invoices must amount to at least 100 euros
Energy Supplies Complaint Board One stop shop for complaints from consumers for all energy supplies. Contact point for end-users, deals with complaints related to electricity, gas and heating.	Neutral board	Decisions are not binding or enforceable Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma	Compatible with German system, suited to hybridization, e.g. in combination with consulting activities of German Consumer Advocacy Center.

Instrument / Measure	Positive Aspects	Limitations	Transferability
Run by Consumer Council and the Association of Danish Energy Companies, DONG (Danish Oil and Natural Gas), HMN Natural Gas, Natural Gas Funen and the Danish District Heating Association.		dilemma No incentive for energy efficiency	

Source: See Section 8 for references for the individual instruments and measures

3.3.4. Detailed assessment of policies and measures in Ireland

Ireland has a relatively high share of population at risk of energy poverty. In 2011 it was estimated that 20 % of the Irish households experienced energy poverty in 2009 (Schumacher, Cludius, Förster, Greiner et al. 2015). Ireland has a legislated definition of energy poverty and is therefore one of four Member States where this is the case. To tackle the problem and to prevent and mitigate energy poverty two strands of policies and measures are important in Ireland: the thermal efficiency of buildings and providing financial support to enable households to meet their energy bills (Schumacher, Cludius, Förster, Greiner et al. 2015). See Section 7 for more general and energy-specific information on Ireland.

Table 3-4 Detailed assessment of policies and measures in Ireland

Instrument / Measure	Positive Aspects	Limitations	Transferability
Direct Financial support			
Fuel Allowance Payment of 22.50 Euro a week during winter months to persons dependent on long-term social welfare Starting year: 1989-ongoing Implemented by central government	Short-term support for vulnerable target group Specially targeted at low-income households Well implemented and long-lasting instrument Helps avoiding energy poverty and fuel debts	Need to claim well in advance (until March for the coming winter season) Other vulnerable households as target groups are missing Does not address landlord/tenant dilemma Offers no investment incentives Does not address special conditions at local level	Compatible with German system. Well suited for transfer by adaptation. However, in Germany heating costs reimbursed for households on long-term transfers.
Household Benefit Package	Addresses part of the target group	Other vulnerable households as	Could be suited for hybridization, i.e.

<p>Provides financial assistance through the “Electricity Allowance” and “Natural Gas Allowance” (may only receive one) Each worth a €35 monthly credit Target group: Persons over 70 1989-ongoing Implemented by central government</p>	<p>Short-term relief Avoids energy poverty and fuel debts</p>	<p>target groups are missing Does not address landlord/tenant dilemma Offers no investment incentives Does not address special conditions at local level</p>	<p>opening the reimbursement of heating costs for household on long-term transfers in Germany to additional groups, e.g. older persons, who may not necessarily receive transfers and thus qualify for the current German reimbursement system.</p>
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Energy efficiency support

<p>Better Energy Homes, Better Energy Warmer Homes Fixed cash grants (up to one third of the total costs) to homeowners for insulation and heating system upgrades Homeowners who occupy dwellings built before 2006 2002-ongoing Implemented by central government</p>	<p>Offers investment incentives to homeowners Targeted at home owners in buildings with need of renovation Sets incentives for long-term energy efficiency improvements</p>	<p>Does not address the target group of low income households Does not address special conditions at local level Does not address landlord/tenant dilemma</p>	<p>Compatible with German system. Well suited for transfer by hybridization, for example with existing programs to support energy renovations (KfW) or heating systems based on renewable energy (Bafa).</p>
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<p>Warmth and Wellbeing Focused specifically on health and fuel poverty Provides grants for energy efficiency upgrades Home energy upgrades are carried out by Sustainable Energy Authority Ireland (SEAI) “Better Energy Warmer Homes” contractors Addressed to persons in energy poverty living with chronic respiratory conditions 2017-ongoing</p>	<p>Specifically targeted at low-income households with chronic respiratory conditions Sets incentives for energy efficiency measures of home owners</p>	<p>Does not address landlord/tenant dilemma The following measures are not available under the scheme: external wall insulation, internal drylining, central heating, windows, doors and renewable technology, therefore deep renovations not incentivized.</p>	<p>Compatible with German system. Well suited for transfer by hybridization, for example with existing programs to support energy renovations (KfW) or renewable heating systems (Bafa), which could include a component on fuel poverty or health issues.</p>
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Implemented by central government

<p>Better Energy Communities Scheme</p> <p>Energy Action Ireland – The Warm Charity</p> <p>Targets existing buildings and facilities in the community sector for energy upgrades through capital funding, partnerships, and technical support</p> <p>Communities need to apply for the grant independently</p> <p>In 2017 €30 million in grant supports have been allocated for community energy projects.</p> <p>Operates in areas vulnerable to energy poverty</p> <p>Since 1988 ongoing</p> <p>Implemented by government and charity</p>	<p>Local conditions adequately addressed</p> <p>Targeted at vulnerable areas</p> <p>Sets incentives to increase energy efficiency</p>	<p>Vulnerable households not addressed directly</p> <p>Does not address landlord/tenant dilemma</p> <p>High-level criteria for successful application</p> <p>Community concept is necessary, therefore a single household has no access to funding</p>	<p>Compatible with German system. Well suited for adaptation, for example to improve long-term community strategies regarding energy efficiency and avoiding energy poverty.</p> <p>Potential link to existing programs supporting energy renovations from KfW heating systems based on renewable energy (Bafa).</p>
<p>Housing Aid for Older People</p> <p>Used to improve the condition of an older person's home</p> <p>Persons over 66 who require necessary repairs or improvements to their homes</p> <p>Effective maximum grant is € 8,000</p> <p>Also covers repairs and improvements not necessarily associated</p>	<p>Targeted at landlord/tenant dilemma (see Section 3.4)</p> <p>Persons with medical need are prioritized</p> <p>Targeted at households with low income (graduated grant)</p>	<p>Only essential repairs should be undertaken, extent of energy efficiency improvement questionable</p> <p>Decision making process for access is unclear and possibly a barrier</p> <p>Level of assistance (care level) is one decision criterion, application will be prioritized based on medical need</p> <p>Cost of the work required have to be</p>	<p>Compatible with German system, dependent on current regulations and restrictions regarding housing support.</p> <p>Interesting as it tries to overcome landlord/tenant dilemma.</p>

with energy efficiency
2007-ongoing
Implemented by central government

included in the application form, this can be an additional administrative barrier
Not necessarily associated with energy efficiency

Information and guidance schemes

Keeping Well and Warm

Society of St. Vincent de Paul, Energy Action Ireland – The Warm Charity
Alleviating fuel poverty through outreach programs and working together with policy makers
Work mostly at community levels, but also work on several EU funded paper/projects
Implemented by government and charity
Since 1988 - ongoing

Easy access to information (internet or print)
Comprehensive advice (on saving energy, money, the energy bill, health issues, support opportunities and further contact points)
Compact and easy to understand

Does not address the landlord/tenant dilemma
Other barriers (financial) to carry out energy efficiency measures may still persist

Preparation of information is low-threshold and therefore an inspiration for the Germany System, well suited for transfer through hybridization with various advice and information programs available in Germany, including the Electricity Saving Check.

Source: See Section 8 for references for the individual instruments and measures

3.3.5. Detailed assessment of policies and measures in Sweden

Sweden is characterized by relatively low income inequality. Nevertheless, this Member State shows significant and continued increase in the price of all energy sources since 1990, in particular electricity heating costs, which has driven the expansion of district heating networks. This had led to a divergence in energy-related practices between households living in detached single dwellings, who pay their heating costs directly to the energy supplier, and households in multi-occupancy buildings, who normally have their heating included in their monthly rent (Thomson, Snell et al. 2017). The concept of energy poverty is not prevalent in Sweden, largely because of the nature of the Swedish welfare system (see also Section 7). Policies and measures mainly address social housing, offering financial support or are aimed at raising awareness.

Table 3-5 Detailed assessment of policies and measures in Sweden

Instrument / Measure	Positive Aspects	Limitations	Transferability
Direct financial support			
<p>Housing subsidy Housing subsidies for families with low income and children, dependent on housing and dwelling costs rent and heating costs included, ongoing Background: Lack of affordable housing, not energy poverty (no social housing system in Sweden) Implemented by central government</p>	<p>Addresses target group of low income households Provides short-term relief Low-income households often do not find a place to rent, therefore policy supports house ownership,</p>	<p>No incentive for energy efficiency improvements or changes in behavior.</p>	<p>Subsidy system is not readily compatible with German system, as Germany has a high share of tenants on the housing market. Living and heating costs are reimbursed through the social security system.</p>
<p>Social support Social policy instrument People with no income receive minimum income, electricity costs are included Implemented by local administration Ongoing</p>	<p>Addresses target group of people with no or low income Provides ongoing and short-term relief</p>	<p>Not all energy poor households may be reached No incentive for energy efficiency Does not address landlord/tenant problem Individual assessment by case worker according to the financial situation, decision making process could be non-transparent Demand for repayment possible</p>	<p>Compatible with Germany system, but a similar instrument (unemployment benefits and basic support) already exists in Germany in an adapted version</p>
<p>Negotiation of tariffs Housing management company Allbohus brings rental and electricity utility costs under a same invoice Allbohus negotiates preferential tariffs with electricity suppliers and passes them on to tenants. Fixed</p>	<p>Tenants of Allbohus save money</p>	<p>Not addressed to the target group specifically, but tenants of Allbohus in general No incentive for energy efficiency improvements or behavioral change</p>	<p>Compatible with Germany system through copying or adaptation. As Germany has a liberalized energy market, implementation depends on the willingness of electricity or heating suppliers to offer special tariffs for tenants of housing associations.</p>

Instrument / Measure	Positive Aspects	Limitations	Transferability
<p>costs are reduced since there is only one subscription to be paid for a general meter. Implemented by industry Local instrument Ongoing</p>			
<p>Billing support Cooperation with electricity suppliers in order to support consumers unable to pay their bills, trying to obtain partial payments implemented by civic organizations (Red Cross) Ongoing</p>	<p>Addressed to target group Short-term relief Acceptance of partial payments</p>	<p>No incentive for energy efficiency improvements Does not address landlord/tenant dilemma Offers no investment incentives No long term solution</p>	<p>Compatible with German system, through adaptation; German consumer protection agencies offer similar support; could also be offered by the energy supplier (installment payment)</p>
Energy efficiency support			
<p>Grants for converting heating systems Grants for biofuel-fired boilers and windows, subsidies for the installation of PV solar or thermal solar panels Implemented by central government Ongoing</p>	<p>Addressed at landlords and tenants Sets incentives for long-term energy efficiency improvements</p>	<p>Does not address the target group May still be too costly for target group Does not tackle the cause of energy poverty directly Does not address landlord/tenant dilemma</p>	<p>Compatible with German system, however similar grants already exist in Germany, for example 'Marktanreizprogramm' (Bafa) supporting new installations of thermal solar, biomass heating or heat pumps</p>
<p>ROT Program 50% reduction of labor costs if hiring a professional to carry out energy saving renovation works Addressed to landlords and tenants Implemented by central govern-</p>	<p>Sets incentives for energy efficiency improvements Addresses landlord/tenant dilemma Offers investment incentives Long-term</p>	<p>Does not address the target group</p>	<p>Compatible with German system, well suited for transfer through inspiration.</p>

Instrument / Measure	Positive Aspects	Limitations	Transferability
ment Ongoing			
KLIMP and LIP Orient local investments towards green programs, including energy 4-year-programs Blanket approach Implemented by local authority Ongoing	Set incentives for energy efficiency improvements Long-term	Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma The residential sector is only one of the addressees	Compatible with German system, can be an inspiration to support local investment in different sectors
Information and guidance schemes			
Price comparison, National contact point, Consumer contact, Information on consumption Information platforms where electricity suppliers are required to report prices and contract terms, consumers are guaranteed information about their consumption details Implemented by regulator Ongoing	Information dissemination Raises awareness for all households Set incentives for becoming active in changing electricity supplier and save money	Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma	A similar system already exists in Germany (Verivox, https://www.verivox.de/)
Municipal advice office Information in various municipalities on climate and energy Implemented by Central Government (Swedish Energy Agency) Ongoing	Information dissemination Raises awareness for all households May set incentives for energy saving measures or energy saving behavior	Does not address the target group Does not tackle the cause of energy poverty directly Does not address the landlord/tenant dilemma	Preparing information is low-threshold and therefore an inspiration for the Germany System, similar to Energy Consulting of German consumer advocacy groups.
Automatic Meter Management (AMM) suppliers are obliged to equip costumers with AMM	Information dissemination Raise awareness for all households set incentives for energy saving	Does not address the target group Does not tackle the cause of energy poverty directly Does not address the land-	Preparation of information is low-threshold and therefore an inspiration for the German system.

Instrument / Measure	Positive Aspects	Limitations	Transferability
suppliers can therefore develop and offer real-time contracts implemented by industry long term instrument ongoing	measures or energy saving behavior	lord/tenant dilemma Additional investment support may be necessary	

Source: See Section 8 for references for the individual instruments and measures

3.4. Main insights

In sum, our assessment reveals six essential aspects that policy instruments addressing energy poverty should fulfil in order to be applied in Germany. Ideally, instruments should

- (i) have a long-term focus and generate energy savings through efficiency gains and behavioral changes,
- (ii) address the target group of low-income households (including precarious employees who do not receive transfer payments),
- (iii) offer a combination of information and financial investment incentives where possible,
- (iv) be implemented preferably at local or regional level or even peer-to-peer, so that local conditions can be adequately addressed,
- (v) avoid the landlord/tenant dilemma (relevant, as Germany has a very high tenant market share),
- (vi) not replace social security policy, but rather design energy and climate policy in a way that distortive effects are minimized.

Not all of these aspects can always be handled simultaneously in a single instrument or measure. In many cases it is key to set priorities, e. g. when a direct relief of the energy-poor households is necessary in order to provide support for living expenses. However, it is essential to pay attention to all aspects in order to design an effective policy mix for the long term. Table 3-6 compiles and condenses the information from the country tables above into a selection of best-practice examples, stating the type of instrument or measure, empirical examples, recapping positive aspects and limitations, as well as transferability to the German system.

Table 3-6 Selected best-practice examples

Selected best-practice examples	Empirical examples	Why was this example selected?	Prevailing limitations	Transferability to the German context
Direct financial support				
Reimbursement of heating costs	<ul style="list-style-type: none"> - Household Benefit Package for people over 70 (Ireland) - Heating costs reimbursement for low-income households (Denmark) 	<ul style="list-style-type: none"> - Target group well defined -Extends direct and continuing support to additional vulnerable groups 	<ul style="list-style-type: none"> - Does not address causes of energy poverty -Does not contribute to long-term climate goals 	Hybridization of the current German reimbursement system (with the Irish and Danish systems)
Reduction of electricity prices / costs for certain groups	<ul style="list-style-type: none"> -Social tariff model (France) - Government Electricity Rebate (UK) 	<ul style="list-style-type: none"> - Target group well defined -Extends direct and continuing support to additional vulnerable groups 	<ul style="list-style-type: none"> - Does not address causes of energy poverty -Does not contribute to long-term climate goals 	Some German electricity suppliers already offer tariffs with social components; adaptation at national could be possible
Support for energy efficiency measures				
Support for renovation measures for homeowners with low income or little savings	<ul style="list-style-type: none"> - Habiter Mieux, social funds for thermal energy renovation (France) - Warmth and Well-being (Ireland) - Affordable Warmth 	<ul style="list-style-type: none"> - Targeted - Sustainably addresses one of the causes of energy poverty - Contributes to overall climate goals 	<ul style="list-style-type: none"> - Depending on design, access to capital may still be an issue - Not likely to incentivize deep renovations 	Adaptation of Irish, French and English examples

Selected best-practice examples	Empirical examples	Why was this example selected?	Prevailing limitations	Transferability to the German context
	Grants (UK)	- Often implemented locally	- Rent may rise due to deep renovations	
Electricity saving support (information and/or small investive measures)	- SLIME (France)	- Targeted - Addresses one of the causes of energy poverty - Contributes to overall climate goals - Often implemented peer-to-peer	- Number of households that are reached could be higher (scale up?) - Overall climate effects could be higher	Hybridization of the German Electricity Saving Check and similar programs in other countries
Information and guidance schemes				
Information on energy saving measures	- Keep Well and Warm and The Warm Charity information program (Ireland) - Secours Catholique and EDF (France)	- Targeted - Often local and peer-to-peer - Has the potential to reduce energy consumption in the long term	- Financial barriers to savings may remain	Similar programs already exist in Germany, can learn from implementation in other countries
Easier to understand electricity bills	- Denmark - Sweden	- Awareness raising - Incentives to reduce consumption - May induce behavioral change	- Does not directly address the target group - Financial barriers to savings may remain	Could be adapted to the German context
Other measures				
Consumer protection against power cut-offs	- Energy Safety Net (UK) - Winter Truce Program (France) - Denmark - Sweden	- Targeted - Provides immediate support and avoids exacerbating problems	- Does not sustainably address causes of energy poverty or reduce energy consumption in the long term	Some provisions already in place in Germany, can learn from implementation in other countries
Metering	- UK (pay as you go meter, smart meters) - Denmark (smart meters)	- Directly effective for target group - Cost control and direct feedback	- Does not tackle underlying causes of energy poverty - May encourage self-disconnection	Pay as you go already piloted in Germany, could be rolled out along with smart meters

Source: own compilation

On this basis, four exemplary measures and instruments were selected for an in-depth analysis of the potentials and effects in Germany. Specifically, we model two measures and instruments of the category "direct financial support" and two of the category "support for energy efficiency measures". Two of these tackle heating energy consumption and two electricity consumption and are defined as follows:

- 1) Expansion of the reimbursement of heating costs to other population groups: Hybridization of the current heating costs reimbursement in Germany with i) the Household Benefit Package for people over 70 from Ireland and ii) the heating allowance for households on small pensions from Denmark (direct financial support; heating energy).
- 2) Introduction of a cost reduction for basic electricity consumption: Inspired by the social tariff model in France and by social tariffs from some energy providers in Germany, e. g. Care Energie Sozialtarif, Sozialrabatt E. ON (direct financial support; electricity).
- 3) Support for renovation measures for homeowners on low income or with little savings: Adaptation of various measures and instruments, e. g. Better Energy Homes in Ireland,

Habiter Mieux in France, Affordable Warmth Grants in England (support for energy efficiency measures; heating energy).

4) Extension of the Electricity Saving Check (Stromspar-Check): Adaptation of the existing German energy savings check and measures and instruments such as the Keep Well and Warm and The Warm Charity information program from Ireland (support for energy efficiency measures; electricity) as well as the SLIME program in France (support for energy efficiency measures and information and guidance schemes, heating energy and electricity).

For measures and instruments from the fields of information and guidance schemes (3.1.3) and "other measures" (3.1.4), a quantitative impact analysis of the transfer to the German context is only possible to a limited extent. However, it is also possible to identify measures and instruments in these areas that would be suitable for transfer to the German context and for which positive effects can be expected. These include:

- 1) Integrated advisory services for energetic renovation measures involving craftsmen and industrial associations (copy/adaptation of the "BedreBolig" (better houses) from Denmark)
- 2) Consumer protection against power cut-offs (Energy Safety Net UK, Denmark, Sweden), including through pay-as-you-go meters (UK, Ireland), which avoid power cut-offs to prevent (further) debts.
- 3) Easier to understand electricity bills (Denmark, Sweden) and an integrated contact point for complaints concerning all types of energy supply (Denmark): this could improve the situation of households in evaluating their own consumption and expenditure, as well as in the event of disputes.

4. Application of candidate policy instruments and measures to the German context

In the following, we inspect the identified candidate measures in detail and conduct a potential and impact analysis of applying them in Germany. Based on our analysis we derive recommendations on whether (and to what extent) adaptation of best practice policies and measures from the selected countries are suitable to alleviate energy poverty in Germany.

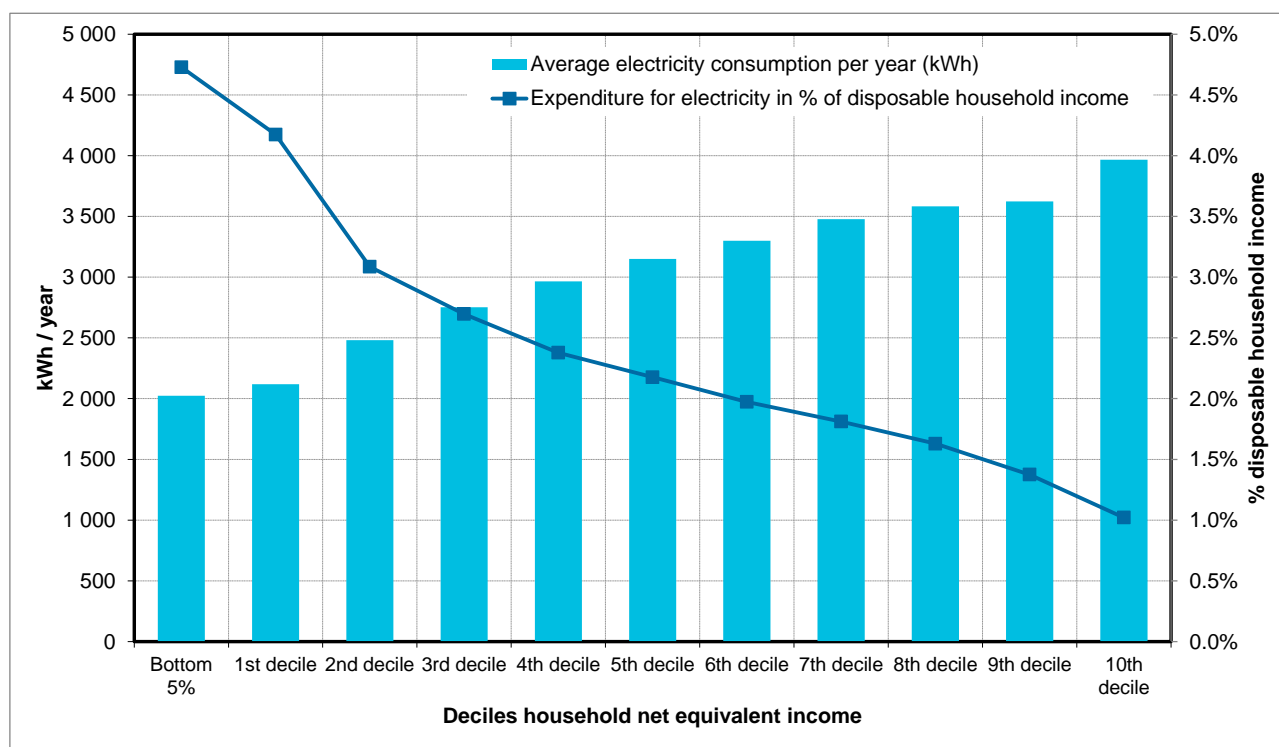
The core of our analysis is a microsimulation model based on the German Income and Expenditure Survey (EVS). The EVS is an administrative data source and contains detailed information on income sources and expenditure patterns of households, as well as information on other household characteristics, such as employment status and age of the household members. The survey is the largest of its kind in Germany covering about 60,000 households and is published every five years. Households are observed for one quarter reporting individual income and household level expenditures. The EVS is statistically representative for all of Germany (Schumacher, Cludius, Förster, Fischer et al. 2015).

4.1. Patterns of energy consumption and expenses in Germany

To gain an understanding of energy consumption and expenditure patterns in Germany, we use data from the German Income and Expenditure Survey (EVS) and show the current distribution of energy consumption and expenses across household groups. Income deciles are used as a proxy to characterize households.

Figure 4-1 shows electricity consumption of German households by net equivalent income decile.¹ While electricity consumption (measured in kWh) rises with income, the share of a household's net income spent on electricity falls. Lower income households spend a considerably larger share of their net income on electricity. This is a typical pattern for a good providing basic needs (refrigeration, washing, multimedia etc.) and for which households cannot adjust consumption deliberately (Day et al. 2016; Heindl 2017). Potential electricity savings would result in additional endowment for discretionary spending, i.e. spending on necessities, for lower income households compared to higher income households where it might contribute to savings or spending on luxury items. Conversely, an increase in costs for electricity presents a relative higher burden for low income households than for high income households.

Figure 4-1 Electricity consumption by income group

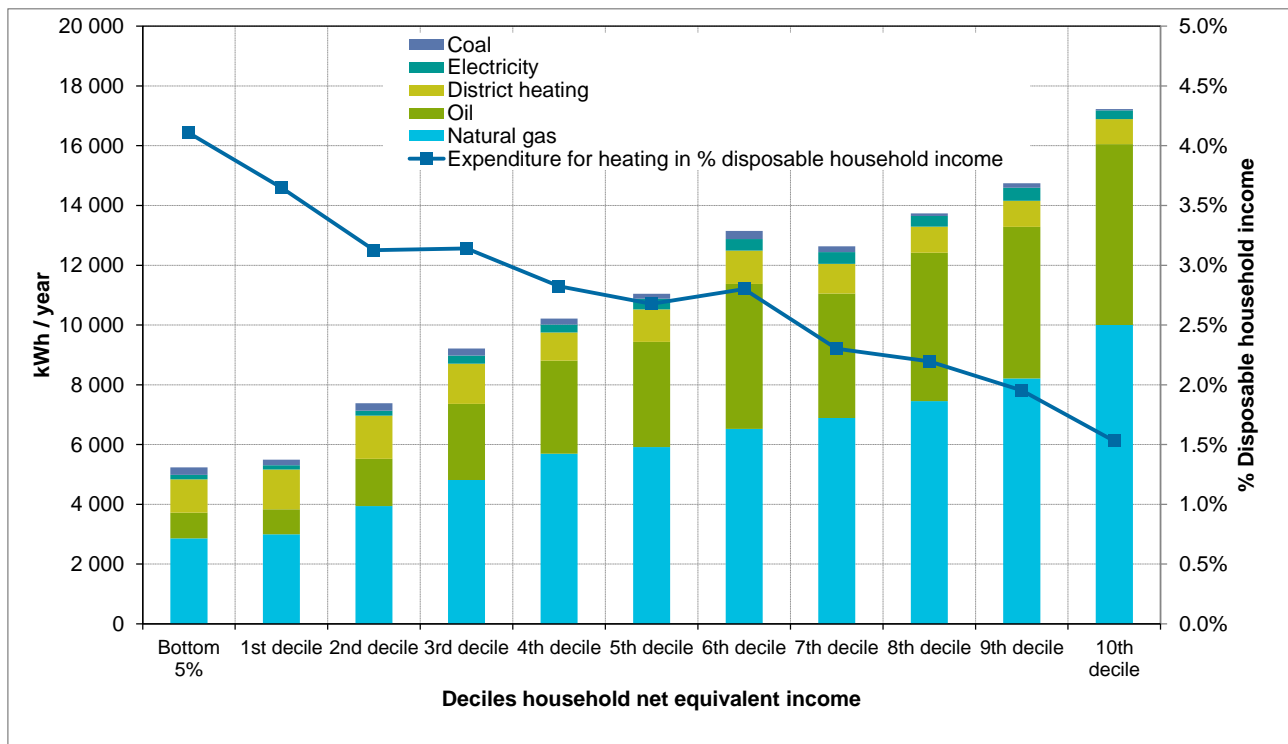


Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

Consumption of and expenditure for heating energy is plotted in Figure 4-2. This figure differentiates the type of heating that is used in households. District heating turns out to be much more common in low income households which tend also to live in apartment buildings. Heating oil and natural gas are the most common heating fuels in higher income households, which often live in single family houses. As for electricity, consumption of heating energy rises with income, while expenditure measured as share of net income falls. The pattern is similar to the one for electricity, consumption of heating energy, however, is more highly correlated with income levels. While households on high incomes use about twice the amount of electricity compared to households on low incomes, they use about three times the amount of heating energy. Greater living space and higher room temperatures would explain this pattern. Both in the case of electricity and heating energy, physical and financial savings potentials are thus distributed asymmetrically.

¹ The new OECD scale is used to construct equivalent income weights; the following weights are applied: Main income earner = 1, additional household member older than 14 = 0.5, younger than 14 = 0.3.

Figure 4-2 Heating energy consumption by income group



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

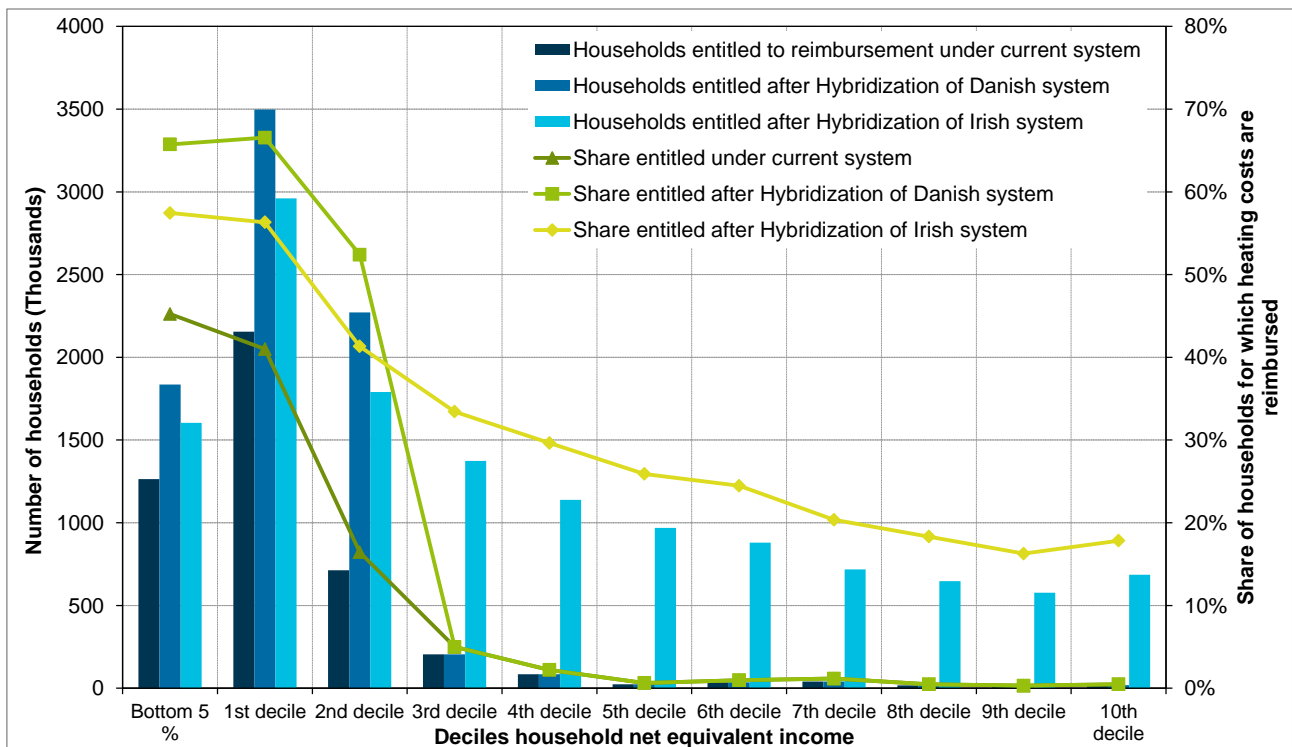
With respect to energy poverty in Germany, we consider the first and second income decile to be at highest risk. The share of income these households spend on electricity and heat is high. For the lowest income group it amounts to up to 5% for electricity and another 4% for heating. However, not all low-income households are affected in the same way. Heating energy costs are reimbursed to the recipients of transfer payments. This means if households are eligible for transfer payments (and do actually apply), heating expenses are paid for by local authorities (except in cases where heating energy considerably exceeds average consumption). However, low-income households that do not qualify for transfer payments (they may just exceed the thresholds) need to carry the full burden themselves (Cludius et al. 2015; SGB II 2011/2017; SGB III 2011/2017). Electricity costs are handled differently in Germany. They need to be covered by households themselves independent of their income. This means if households qualify for social transfer payments to cover daily needs, electricity expenses are to be covered out of this transfer payment in competition with other daily need expenses. Any savings in electricity costs thus immediately benefits individual households' disposable budget.

Understanding the difference in transfer schemes between electricity and heat helps understand why many measures in Germany that alleviate energy poverty have primarily focused on reducing electricity consumption, as these measures immediately increase households' budget to cover day-to-day expenses. However, reducing heating energy consumption of low income households has come into focus, since a reduction of heating energy expenses i) helps local authority's budgets through reduced payments for the reimbursement of heating costs (BBSR 2017), and ii) helps households which receive no transfer payments but are just above the thresholds and can thus be considered at precarious income levels. These households immediately benefit from savings.

4.2. Extending the reimbursement of heating costs to additional groups

Households living in Germany and receiving long-term unemployment or basic social security support are, in general, reimbursed for heating costs. This applies to a total of around 3 million households. The recipients of heating cost reimbursement are concentrated in the lower income deciles and represent approximately 40% of households in the first income decile and 15% of households in the second income decile (Figure 4-3). Two further scenarios are modelled in which additional households are entitled to reimbursement of heating costs. On the one hand, we add those households eligible under the Danish model (cf. Section 3.3), i.e. households on low pensions (defined as pensioners in the lower two income lines). On the other hand, we adopt the target group of the Irish Household Benefit Package and extend the reimbursement of heating costs to all households whose head of household is 70 years or older.

Figure 4-3 Households that receive reimbursement for their heating expenditure by income decile



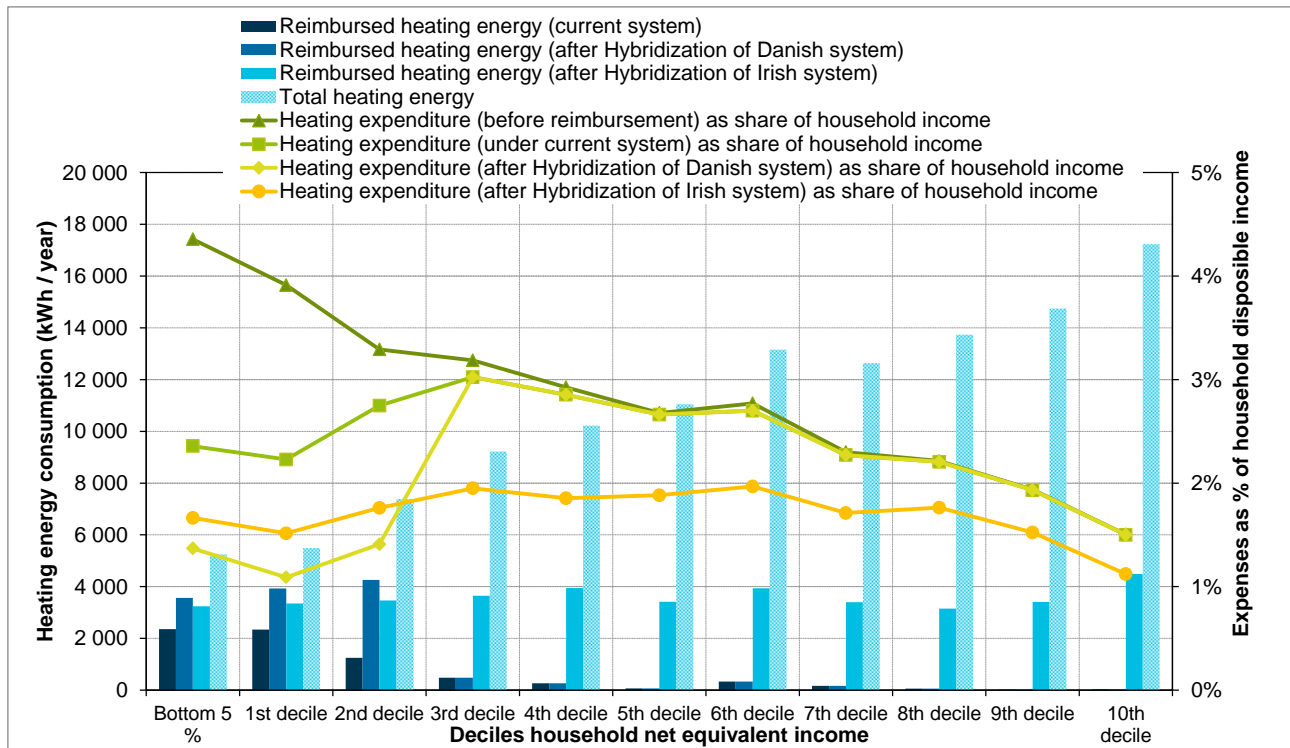
Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

In both scenarios, the number of households entitled to reimbursement of heating costs increases. When hybridizing the Danish system, as expected, additional recipients are concentrated in the first two income deciles. In the case of hybridization of the Irish approach, they are spread across all income groups, but with a more pronounced increase in the lower deciles (Figure 4-3).

Figure 4-4 shows the amount of heating energy eligible for reimbursement and financial impacts (measured in % of disposable income). The curves describing financial impacts show the current regulation in Germany leads to a more equitable (progressive) distribution of expenditure. In the case of hybridization of the Danish approach, household in the lowest two income deciles receive additional support. When the Irish approach is hybridized, the entire curve becomes flatter. However, since households across the board are supported, the cost of such a system would be much larger than under the current system. They would increase from about €2 billion under the current

system to about €3.5 billion when pensioners on low incomes are included. When all households are included, where the household head is more than 70 years old, costs increase to €11 billion.

Figure 4-4 Reimbursed heating energy and resulting heating expenditures as a share of household income under the different scenarios



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

Note: Quantities shown in this graph exclude energy used for heating water. For expenditures, this separation is not made (the share of heating energy used for water amounts to 10-20%).

The reimbursement of heating costs contributes to the short-term relief of the households reached, but does not combat the causes of energy poverty. Rehdanz & Stöwhase (2008) show that the reimbursement of heating costs leads to a higher relative heating energy consumption for those households. As noted above, it is therefore important to combine the heating cost reimbursement with information and guidance schemes. Another possibility is the consideration of climate policy objectives (if possible) in social security regulations. The planned introduction of a climate component in the housing allowance is one example (BBSR 2017).

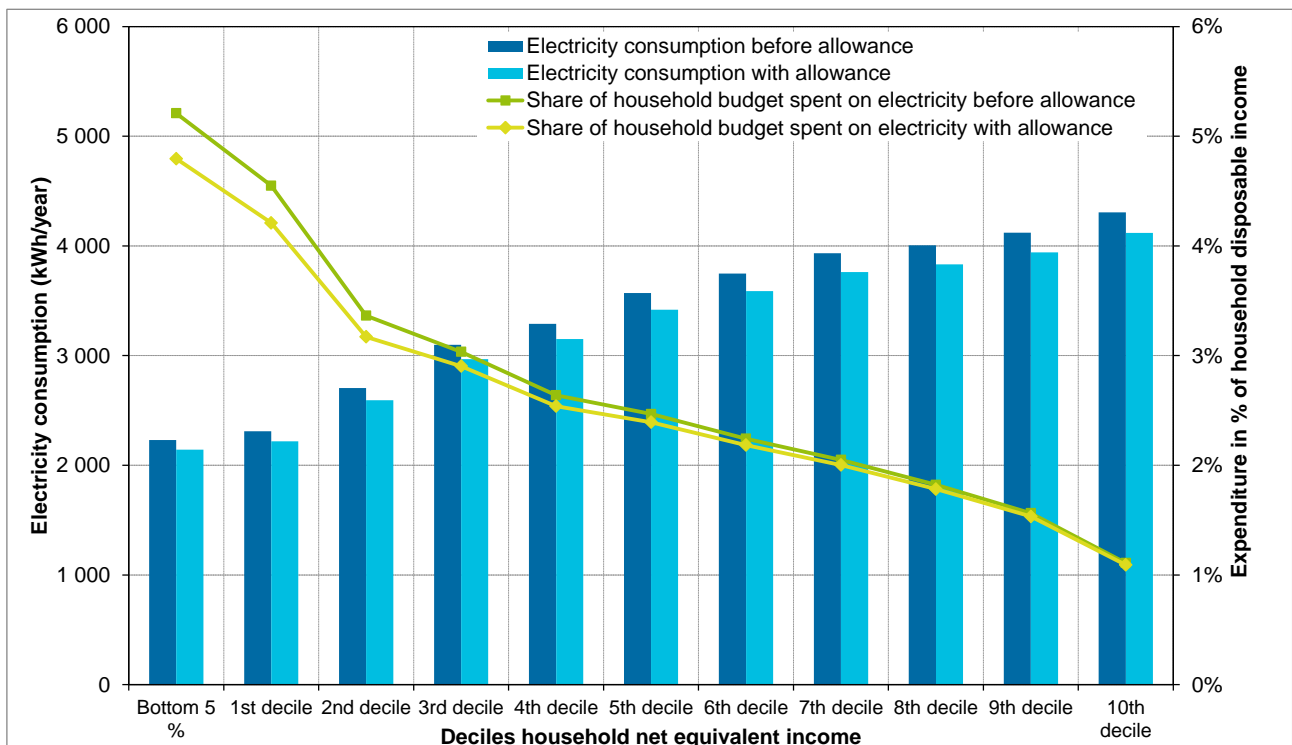
4.3. Introducing an electricity allowance

With the aim of reducing household electricity prices in Germany, there have been discussions about reducing electricity price components that are determined by the government, such as the various taxes and levies (Neuhoff et al. 2013). Any reduction in electricity prices will generally benefit low-income households relatively more than high income households as they spend a larger fraction of their household budget on electricity (Section 4.1).

France has a social tariff system of electricity in place, while UK government ran a rebate program for two years. In Germany, some electricity suppliers offer special conditions for certain groups. In the spirit of these considerations, we model a reduction of the electricity price amounting to 5 ct/kWh for the first 1000 kWh of household consumption per year. This represents about a third of

the mean yearly electricity consumption of the first two income deciles. We grant this allowance to all households and model this exemption as budget neutral to the government, i.e. the electricity price for the first 1000 kWh is reduced by 5 ct/kWh (which is similar to the level of the current renewable levy), but rises for the remaining household consumption. We also take into account the expected reduction in electricity consumption by the households that now have to pay a higher electricity price for their remaining consumption and those households that consume less than the threshold of 1000 kWh and may therefore increase consumption due to the lower marginal price of electricity. In this context, we apply a uniform own-price elasticity for electricity of -0.431 as estimated by Schulte & Heindl (2017).

Figure 4-5 Electricity expenditure and percentage of household budget spent on electricity without and with an electricity allowance



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

In our model, the electricity price for the remaining consumption exceeding 1000 kWh/year rises by 2 ct/kWh to 25 ct/kWh (compared to the reduction to 18 ct/kWh for the first 1000 kWh for all households). Total electricity consumption by all households decreases by 4%. As Figure 4-5 shows expenditures for electricity for all households are reduced after the reform as compared to before. This is due to two factors i) the lower electricity price for the first 1000 kWh and ii) the reduction in electricity consumed due to a higher electricity price on the remaining kWh. Measured in the share of household budget spent on electricity, low-income households benefit relatively more from the allowance than high-income households, which points to the progressivity this measure.

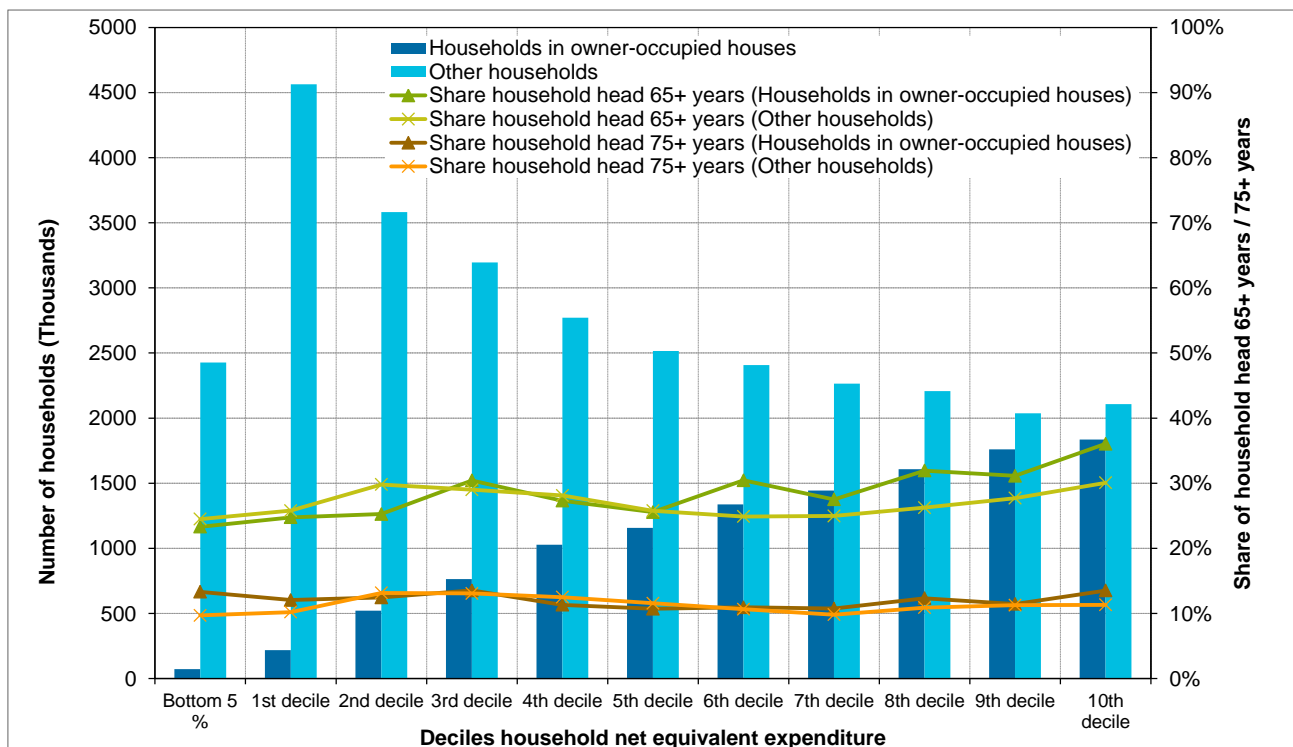
The design of the allowance could be further refined to take into account household composition (i.e. the number and age of household members), cf. Neuhoff et al. (2013) who discuss this option and state that in the case of a more differentiated allowance, electricity suppliers would have to collect information on the composition of households they deliver electricity to.

4.4. Supporting renovation measures in low-income households

In several of the investigated countries (e.g. France, Ireland and the UK, cf. Section 3.3) there are support schemes in place for improving energetic efficiency of the home targeted at low-income households. In Germany, several programs (most prominently those administered by the KfW) that offer low-interest credits and financing for energy efficiency measures in private households, which are not, however, targeted specifically at households on low incomes. It has to be taken into account that the German building stock is relatively more efficient than in some other countries and renovation needs may differ. Furthermore, it is important to stress the importance of the rental market in Germany compared to owner-dominated markets in other countries.

Since, at least in a first step, it may be easier for owner-occupiers of houses to carry out energy efficiency measures that are supported by a government program we want to investigate in this section the potential target group for such a program. In particular, we ask the questions: How many households live in owner-occupied houses in the different income deciles? Which other characteristics do these households exhibit, e.g. related to their age that may impede or benefit their carrying out of efficiency measures in their home?

Figure 4-6 Number of households in owner-occupied houses and age structure

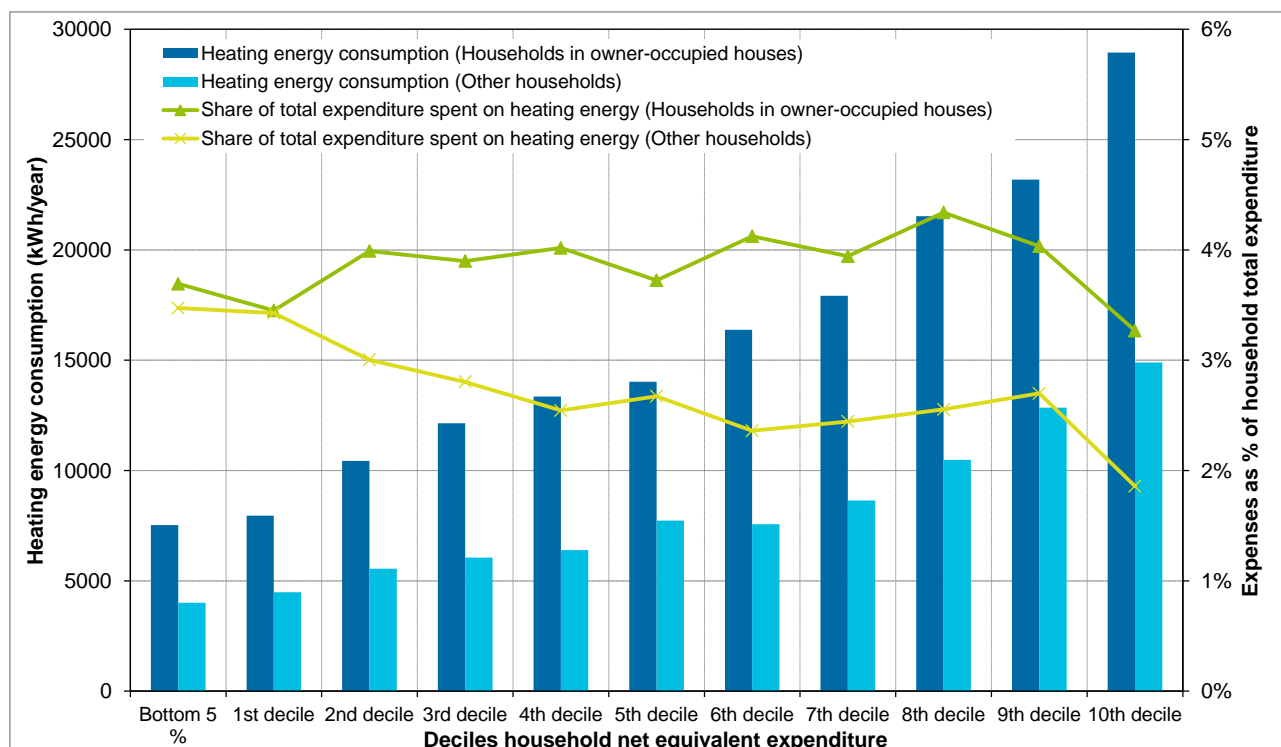


Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

For the analysis carried out in this section, households are sorted into expenditure deciles (instead of income deciles; see Section 9 for detailed explanatory notes). The analysis shows that the number of households owning a house increases with income (Figure 4-6). However, even in the first decile around 200,000 households live in their own house, in the second decile this figure increases to around 500,000 households and in the third decile to around 750,000. Figure 6 also shows the proportion of households in which the head of household is older than 65 or 75 years of age, as this may be an important indicator for the willingness to carry out (deep) renovation measures.

Figure 4-7 illustrates that the heating energy consumption (measured in kWh) of households living in their own house is generally greater than of households renting or living in their own apartments. The share of heating expenditure compared to total household expenditure does not differ between the two groups in the first decile. From the second decile onwards, however, it is larger for homeowners than for other households.

Figure 4-7 Heating energy consumption and expenditure of households in owner-occupied houses vs. other households



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

It can be concluded that support for energetic renovation measures targeted at households with little financial means would tap into important savings potentials (energetic and financially). Due to the ownership structure in the lower deciles, it seems sensible to offer such support not only to owners of houses, but also of apartments, in order to effect considerable savings. Experience gained with instruments in other countries (Better Energy Homes in Ireland, the Habiter Mieux Program in France or the Affordable Warmth Program in the UK) can inform decisions about the design of such an instrument, in particular regarding barriers that need to be overcome. In Germany, first considerations in this direction are made, in particular regarding the setting up of a fund out of which renovation measures in households on low incomes could be financed (cf. Grießhammer 2018).

4.5. Extending the Electricity Saving Check (Stromspar-Check) to additional groups

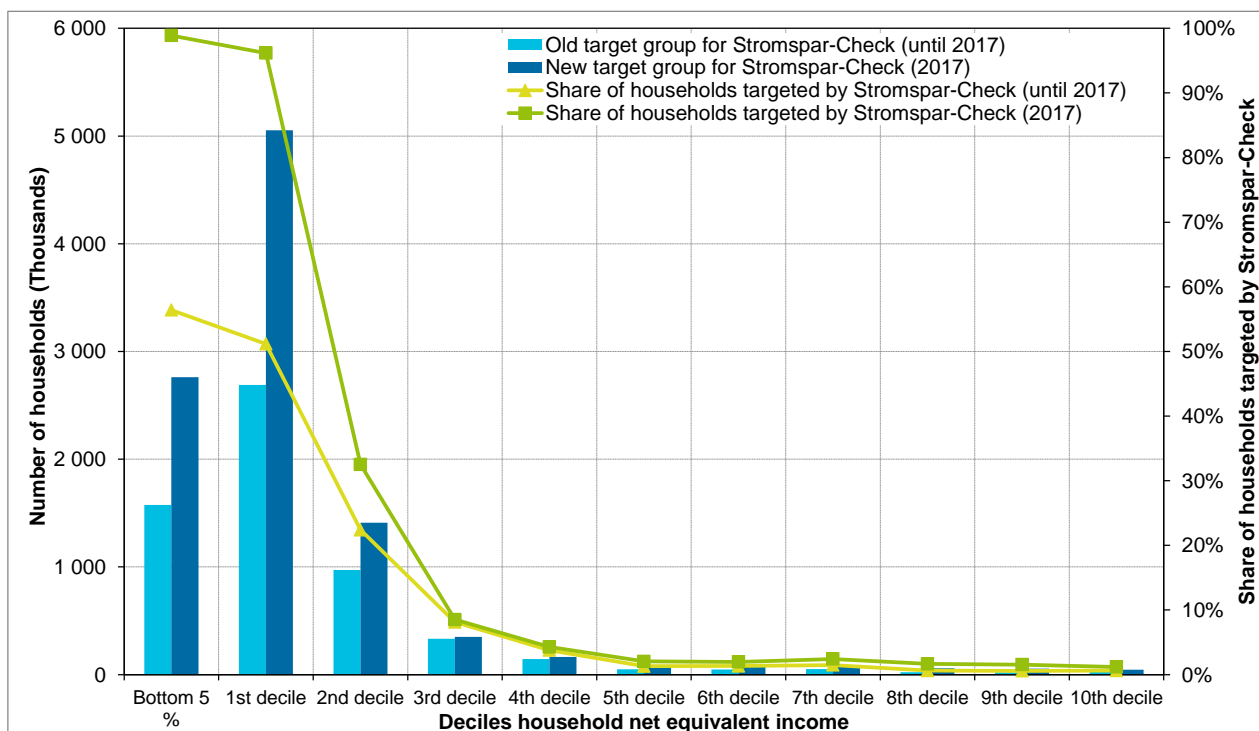
Under the Electricity Saving Check, households with low incomes receive advice on saving energy and water in their own homes, as well as "emergency aids" such as switchable plugboards, LEDs, etc., as well as advice on how to save energy and water. Since the beginning of December 2008, approx. 250,000 households have been advised nationwide (Stromspar-Check 2017). Similar pro-

jects are also running across Europe and in the context of the Achieve (2014) project, this idea was piloted successfully in a number of other countries.

Until 2017, the Electricity Saving Check was open to all households receiving transfer payments in the form of long-term unemployment benefits, basic security or housing benefits. For some time the extension to additional target groups had been discussed (Grießhammer & Seifried 2012) and since mid-2017, the target group of the instrument were expanded to include households that receive child allowance as well as households on low incomes or pensions who do not receive transfers.²

As a result, the target group of the instrument increased from approximately 4.5 million to 8.5 million. Especially in the first income decile, almost 100 % of households can now benefit from this instrument, as opposed to about 50 % under the old rule. Also in the second decile, the proportion increases from approx. 20 % to approx. 60 % (Figure 4-8).

Figure 4-8 Households targeted by Stromspar-Check until 2017 and from 2017 onwards

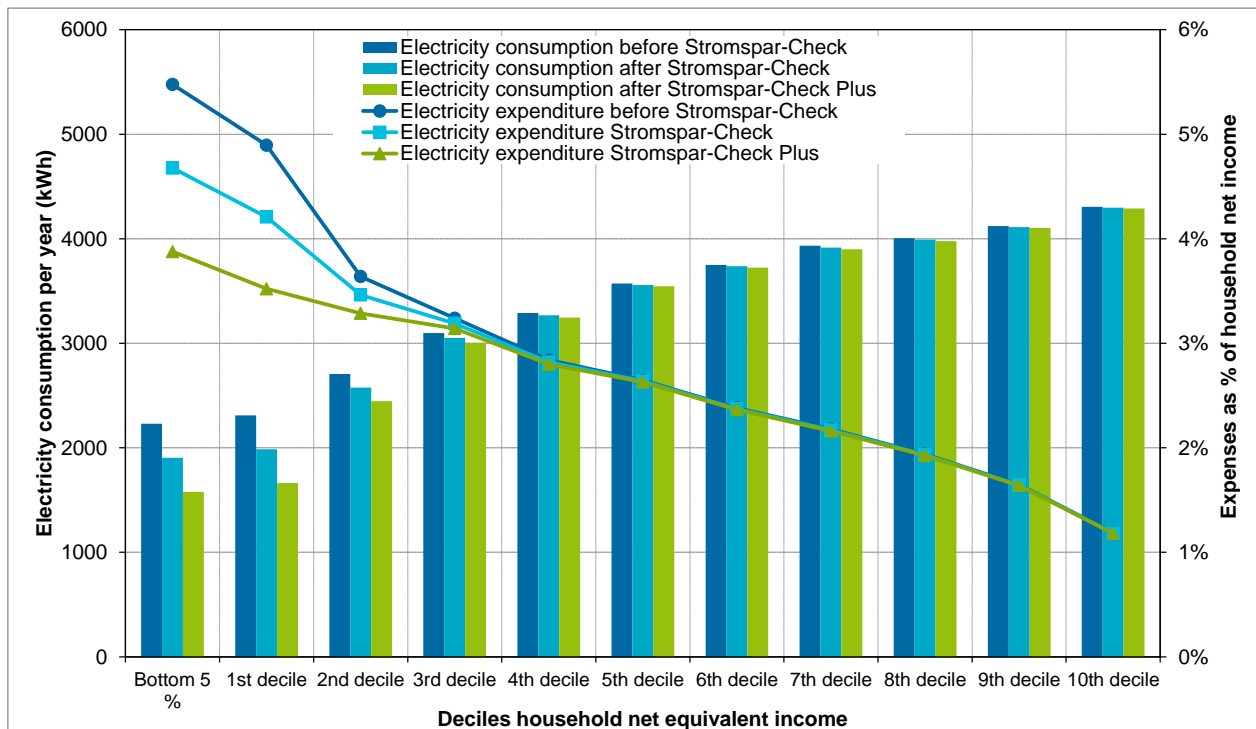


Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

Seifried & Albert-Seifried (2015) and Tews (2012) estimate the electricity savings from the instrument at 14-15% of total consumption. Moreover, the Electricity Saving Check Plus (a scrapping program for old refrigerators) is estimated to lead to additional savings of around 15% (Seifried & Albert-Seifried 2015). Figure 4-9 shows the savings that can be achieved for an average household in the different income deciles. The instrument is clearly progressive, as the relative spending of low-income households on electricity is reduced, while the spending of high-income households remains unchanged.

² Households on low pensions are defined – in the context of this analysis – as pensioners in the first two income deciles. Low income is defined as income below the limit for income seizure („Pfändungsgrenze“) (<http://www.stromspar-check.de/aktuelles-erfolge/aktuelles/01-06-2017.html>).

Figure 4-9 Impact of Stromspar-Check and Stromspar-Check Plus on an average household of the consumption deciles



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

5. Conclusion

The aim of this project is to learn from best practice in instruments and measures to combat energy poverty in five selected European countries and to present a first impact analysis of their potential implementation in the German context. Our assessment identifies six essential aspects which should be met (at least in part) in order to recommend an application in Germany. Measures and instruments should (i) have a long-term focus and generate energy savings through efficiency gains and behavioural changes, (ii) address the target group of low-income households (including households just above the income threshold who do not receive transfer payments), (iii) offer a combination of information and financial investment incentives where possible, (iv) be implemented preferably at the local or regional level or even peer-to-peer, so that local conditions can be adequately addressed, (v) avoid the landlord/tenant dilemma (relevant, as Germany has a very high tenant market share), (vi) not replace social policy but focus on energy efficiency and behaviour in a way not to distort distributional effects.

Not all of these aspects can always be handled simultaneously in a single instrument or measure. In most cases priorities need to be set, e. g. when a direct relief for energy-poor households is necessary in order to provide support for daily needs. However, it is essential to pay attention to all aspects in order to design effective measures or instruments for the long term.

On this basis, the following four instruments/measures were selected as examples for an in-depth analysis including a microsimulation analysis of their impact should they be implemented in Germany.

- 1) Extending the reimbursement of heating costs to other population groups: This could be envisaged as a hybridization of existing practices in Germany and the Household Benefit Package from Ireland or the reimbursement of heating costs for low-income households from Denmark. Our microsimulation analysis reveals that under the current heating cost refund scheme in Germany, 60% of households in the first income decile and 85% of households in the second income decile do not receive heating cost subsidies. The analysis also shows that heating energy costs for low-income households represent a significantly higher burden in relation to disposable income than for higher-income households. Heating cost reimbursement reduces this regressive effect, especially for households in the first income decile, but the second decile still shows an above-average burden. Expanding the reimbursement of heating costs to include households with low pensions in line with the Danish model would significantly ease the burden on additional low-income households. If the reimbursement is extended to include all households with a head of beyond 70 years of age, the burden on households would be reduced in all deciles. However, such a general expansion would lead to considerable additional costs for municipalities. In order to reduce costs for municipalities, sustainably address the causes of energy poverty and comply with climate policy goals, it is advisable to combine reimbursement with information or support measures, such as a heating energy check or energy advice. Moreover, it would be desirable to consider climate policy issues - as far as possible - in social policy, an example being the planned climate component in housing subsidies.
- 2) Introducing an electricity allowance: This measure is inspired by social tariff models such as those currently used in France, but also by a number of electricity providers in Germany. In our microsimulation, we consider a cost reduction of the basic electricity consumption in form of a reduced final consumer price for the first 1,000 kWh of household electricity consumption per year. This concession is granted to all households, but is budget neutral in the sense that remaining household consumption is priced higher to compensate for revenue shortfalls and to induce shifts in energy consumption. The analysis shows that this measure leads to declining electricity expenditure for all households as a result of a lower price for basic electricity consumption on the one hand and lower overall electricity consumption on the other, due to the higher price that applies for consumption above 1000 kWh. In terms of disposable income, low-income households experience higher relative benefits, rendering the measure progressive. The measure therefore particularly targets the group of low-income households and also reduces overall electricity consumption, thus contributing to the achievement of long-term energy and climate targets. Further factors such as household composition or increased electricity needs must be taken into account in the exact design. Depending on the threshold level for basic electricity consumption, it may be important to combine the allowance with information and support measures in order to bring about efficiency gains and behavioral changes even in households below this threshold.
- 3) Supporting renovation measures in low-income households: Programs have already been established in other EU countries to promote energy efficiency measures for low-income households, such as the Better Energy Homes Program in Ireland, Habiter Mieux in France or the Affordable Warmth Grants in the UK, all of which could be adapted for the German context. Microsimulation for Germany shows that support for energetic renovation measures targeted at households with little financial means would tap into important savings potentials (energetic and financially). Therefore, it is advisable to offer support for financially weak homeowners and to draw on the experience of other Member States, in particular with regard to possible obstacles. It should be noted that the ownership structure in Germany differs from that of other EU countries as Germany has a much higher proportion

of tenants in contrast to homeowners. Additional design elements or measures would be needed to overcome this particular barrier.

- 4) Extending the Electricity Saving Check: The existing Electricity Saving Check has been extended to additional groups (beyond the target group of transfer recipients) in June 2017 which resulted in a doubling of eligible households. Microsimulation analysis shows that this can further increase the positive effects of the Electricity Saving Check, especially in the lower two income deciles. So far, 5-10% of eligible households have used the Electricity Saving Check. The idea of the Electricity Saving Check has been adopted for a project at EU level and implemented and followed-up upon in various Member States.

Other relevant instruments/measures which were not investigated by microsimulation but still provide positive examples of potential transferability include integrated information and guidance schemes for energy renovation measures involving craftsmen and industrial associations, as practiced in Denmark and discussed for Germany. Increased consumer protection measures to prevent power cut-offs are another example. They are currently implemented in the UK by installing pre-paid meters, but also in Denmark and Sweden. Heindl & Liessem (2017) examine in this context the reasons for power cut-offs in Germany and point out that not only financial, but also cognitive and psychological factors play a role, which can be addressed by information and counselling measures. Furthermore, the simplified presentation of electricity bills, such as those available in Denmark or Sweden, or the Danish model of an integrated contact point for complaints about energy supply of any kind, are among the measures and instruments that could be considered for transmission to Germany.

Energy poverty is a difficult and complex phenomenon and through this research project we identify a number of avenues for further research that is needed to fully address this issue.

- 1) There is no unified, EU-wide definition of energy poverty and consequently no universal measurement of energy poverty either. In order to identify target a comprehensive, cross-country evaluation of definitions and indicators of energy poverty is needed.
- 2) Learning from experiences in other countries is very valuable. However, existing policy instruments and measures are often not adequately evaluated or these evaluations are difficult to access. A meta-analysis of existing evaluations in different countries could illustrate the state-of-play in this area. Furthermore, examining existing evaluation criteria as well as producing an evaluation catalogue, which can be applied internationally would provide a means to more consistently evaluate existing measurements and ultimately, produce more effective instruments and measures to tackle energy poverty.
- 3) Several country-specific aspects need to be considered when determining transferability of measures and instruments from one country to another. On the one hand, this requires a more comprehensive understanding of criteria which need to be considered when evaluating transferability. This includes taking into account the social welfare system, examining the landlord/tenant dilemma, understanding how social and energy policy can work together, and many other aspects. On the other hand, this also means understanding aspects which are specific to Germany and identifying countries with similar conditions. This refers specifically to heating costs and the landlord/tenant dilemma. Heating costs are covered by the state through social welfare payments, meaning that further research is needed to identify groups that are not covered by such welfare payments but are at risk of or already affected by energy poverty. The landlord-tenant dilemma is particularly prominent in Germany because of the high rate of rented homes and, hence, requires research into how other

countries with a similar distribution of owning and renting households address issues around incentivizing and rent regulation.

- 4) Identifying and reaching the right target group is key for instruments and measures to be effective. Further research needs to consider how specific groups in society, e.g. precarious employees, are affected by energy poverty, again with particular reference to the interaction between energy and social policy.
- 5) Information dissemination is the prerequisite for a functioning instrument or measure. Examining how information is best distributed for which target group and under what circumstances is needed. Moreover, it is also important to understand the limitations (e.g. financial) on the part of the provider of the information.

There is no simple solution that addresses all of the target groups, provides short- and long-term aid and incentives, reduces or avoids poverty in socio-political terms and contributes to the achievement of energy and climate policy goals. It will continue to be a challenge to pursue all these objectives in an integrated approach. To this end, it is important for social policy to think along with energy and climate policy and, conversely, for energy and climate policy to be designed in a socially compatible manner. The transformation of energy systems requires socially acceptable thinking beyond its system boundaries. An exchange of experience and mutual learning across political and geographical borders can prove to be the way forward.

Disclaimer: The contents of this report are based on research conducted in the framework of the project “Perspectives of citizen participation in Germany’s energy transition taking into account distributional issues” on behalf of the German Federal Ministry of Education and Research. The views expressed in this paper are strictly those of the authors and do not necessarily represent the opinion of the German Federal Ministry of Education and Research or partner institutions in charge of other parts of the research project.

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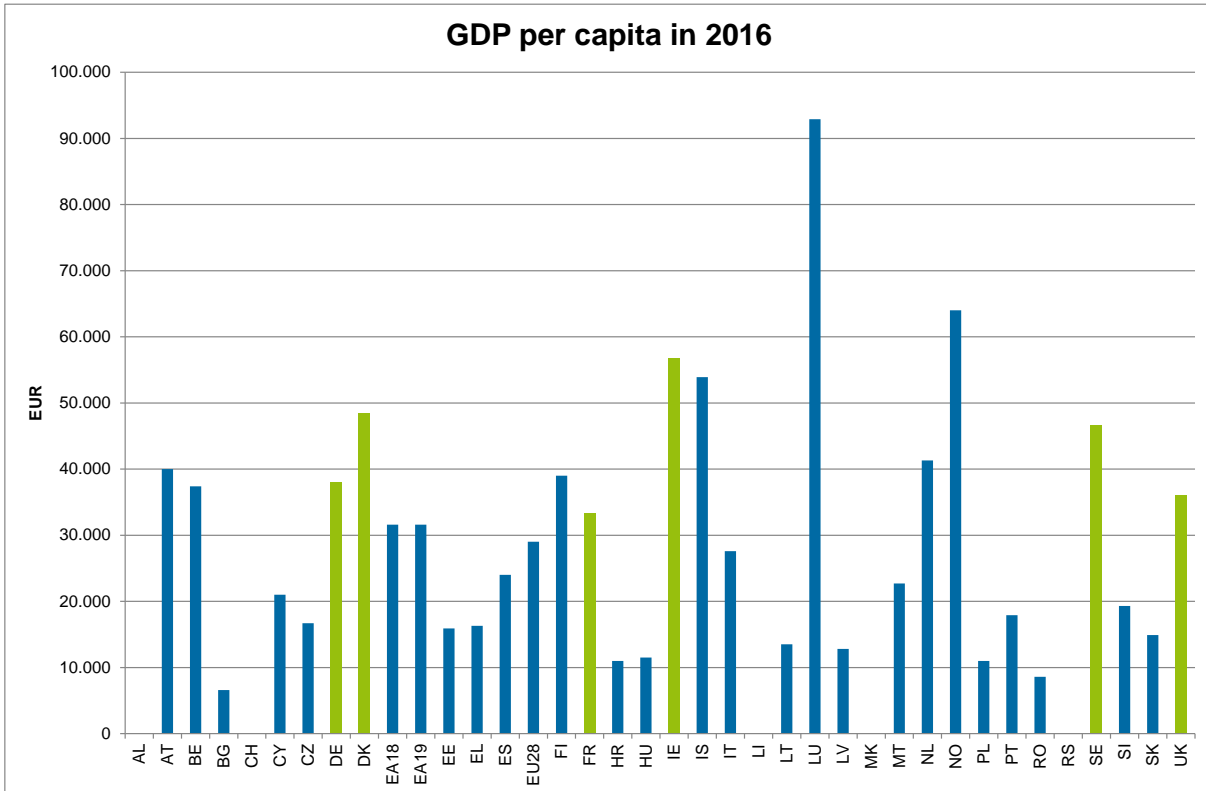
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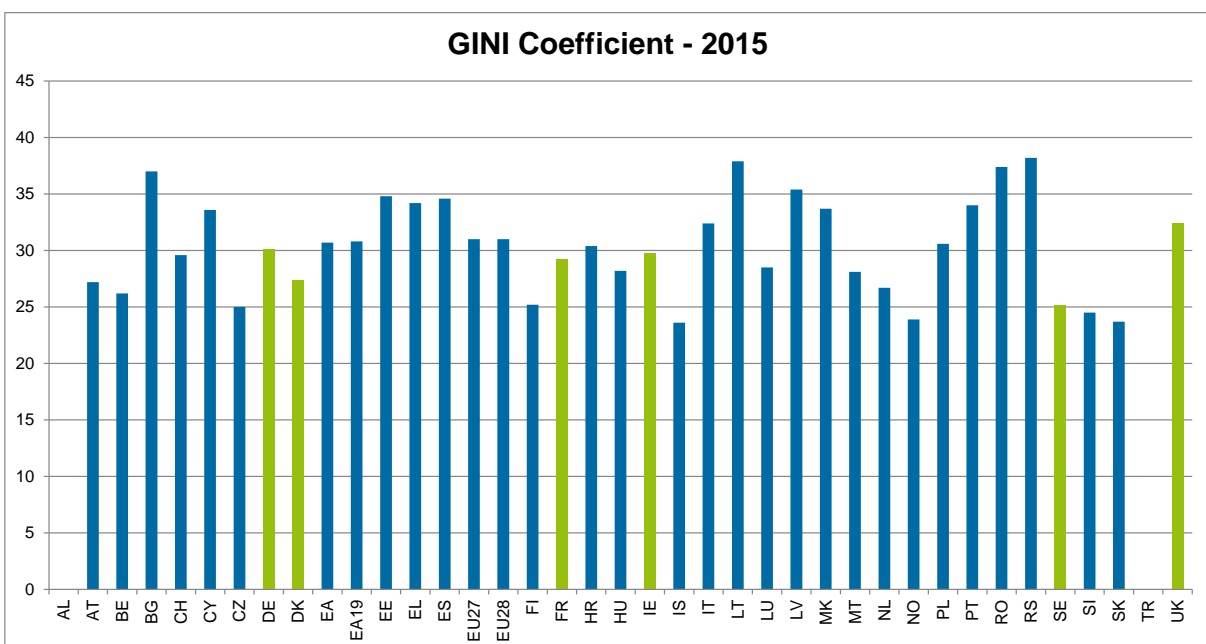
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7. Annex 1 Country Factsheets

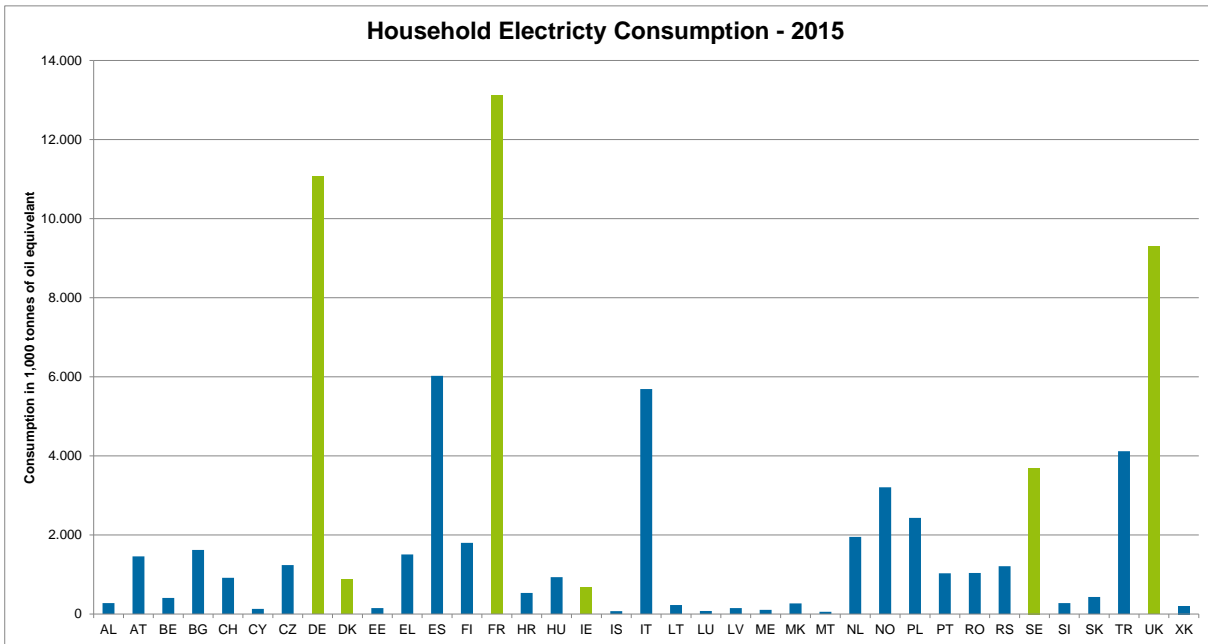
Country Overview



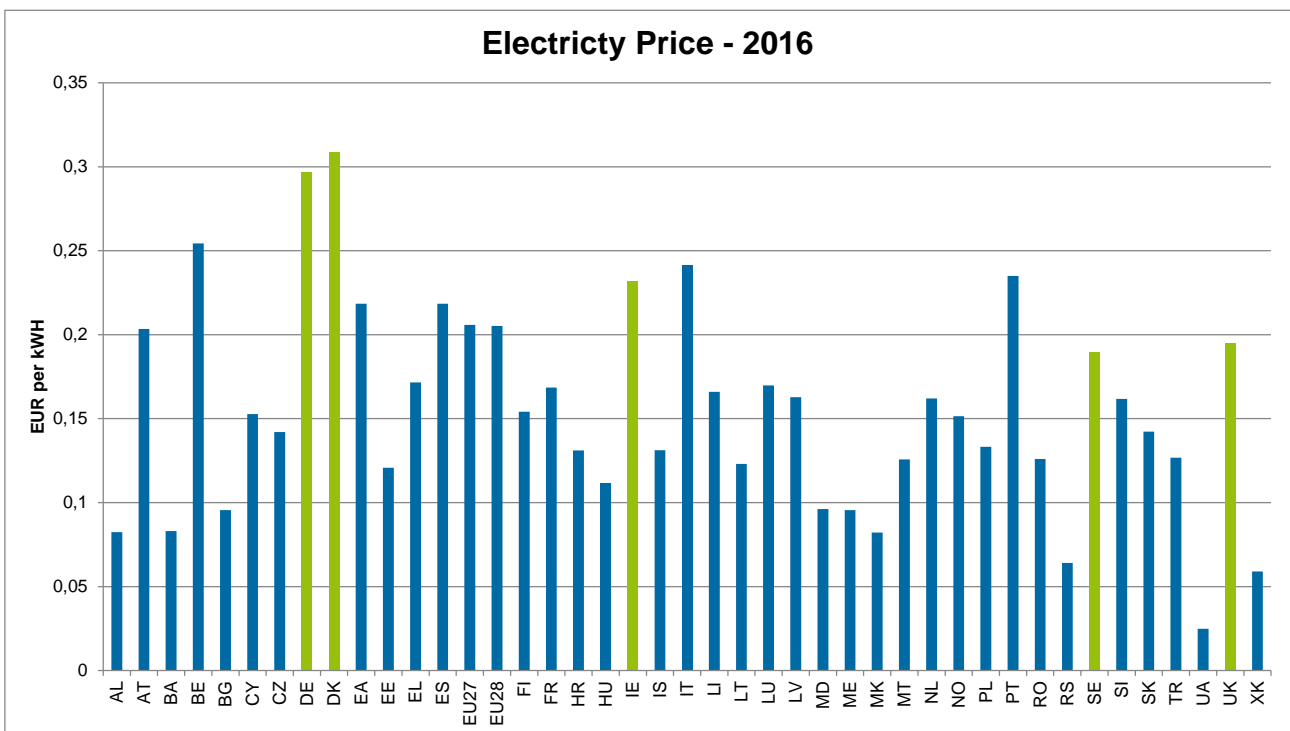
Source: Eurostat; own illustration



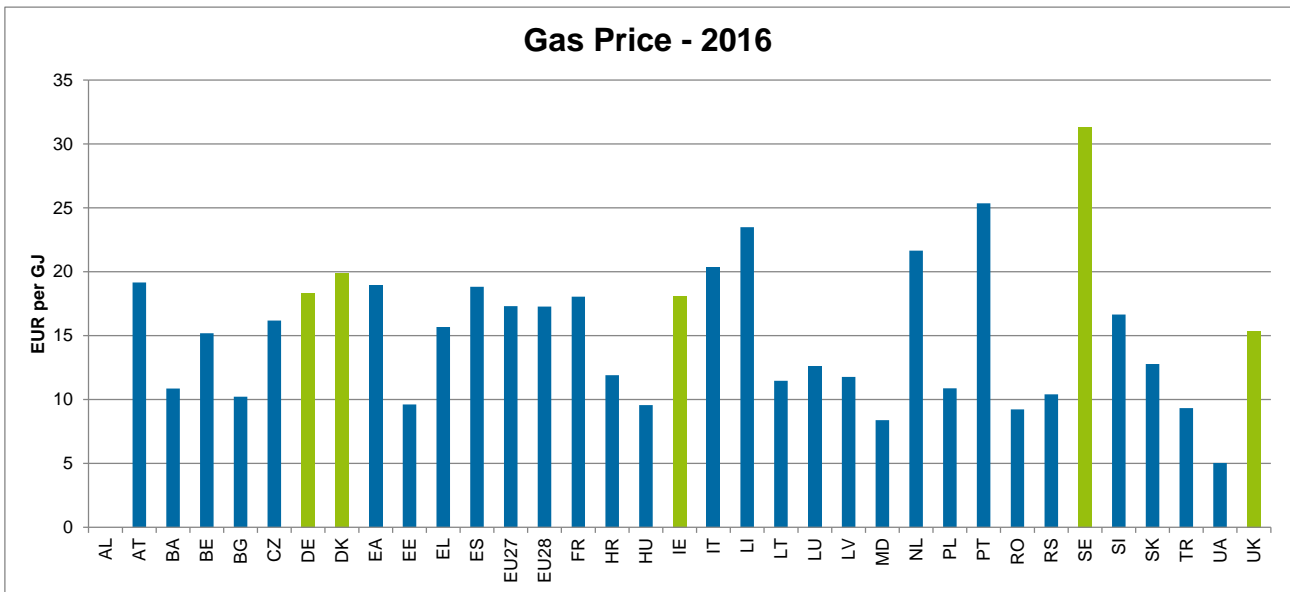
Source: Eurostat; own illustration



Source: Eurostat; own illustration



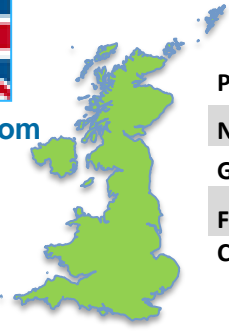
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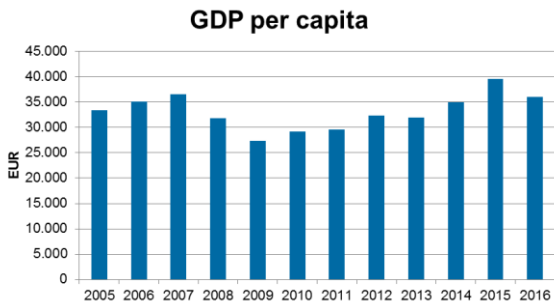
United Kingdom



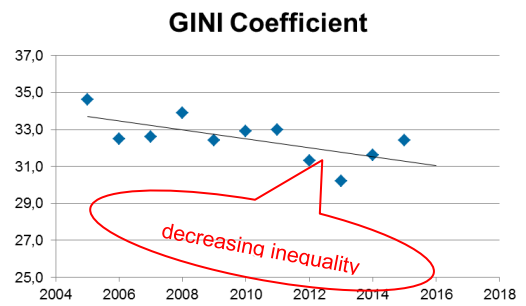
Population 2016		65 Mio.
Number of households 2016		26.4 Mio.
GDP per capita 2016		36,100 Euro
Final energy consumption of households 2016		38,035,000 TOE
Consumption of electricity per capita 2014		5,130 kWh

Source: Eurostat 2017, Worldbank 2017

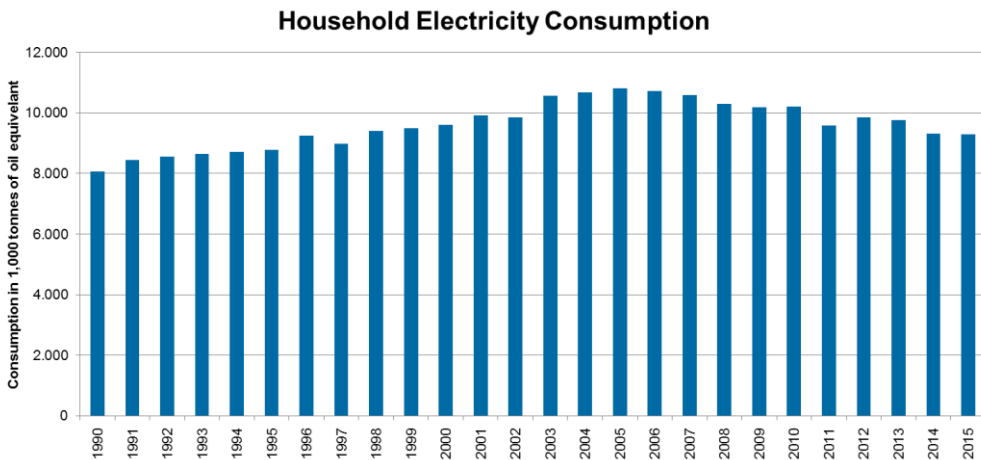
General Information



Source: Eurostat 2017



Source: Eurostat 2017

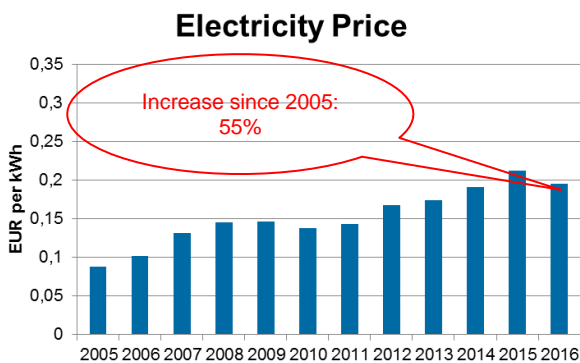


average electricity consumption continued to fall, by 0.8 per cent to 3,889 kWh in 2016

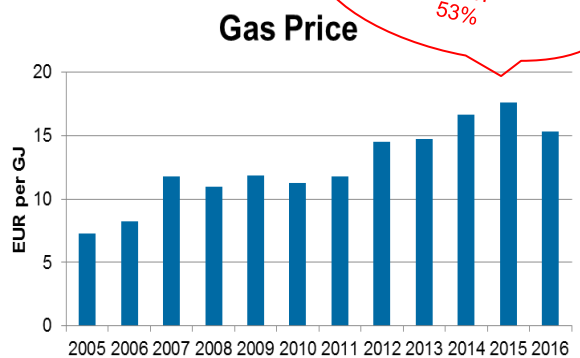
dominated by number / usage of appliances along with appliance efficiencies

Source: BEIS (2017) Energy Consumption in the UK

Source: Eurostat 2017



Source: Eurostat 2017



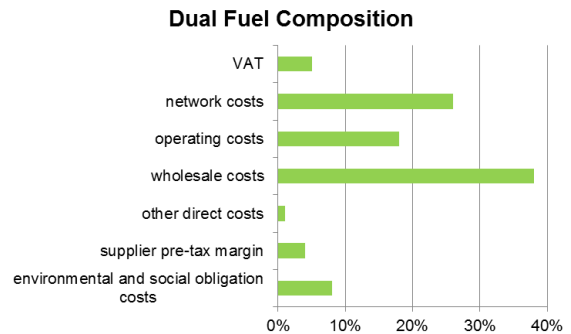
Source: Eurostat 2017



Heating and Electricity System

From 2014 to 2015 **final domestic energy consumption** increased by 3.6% largely due to lower mean temperatures; a rise in gas consumption in particular reflects additional heating requirements. Gas makes up the largest amount of energy use at approx. 25,000 ktoe, while electricity only makes up 9,300 ktoe of total energy use in 2015.

Gas is used domestically for space and water heating, while electricity is used for lighting and appliances. **Utility bills** are composed of electricity and gas bills; a combined bill where electricity and gas are provided by the same supplier is known as the dual fuel bill. **Financial support** from government funded schemes such as the Energy Company Obligation (ECO) and the Warm Home Discount are levied onto customer bills as environmental and social obligation costs.



Social Welfare System

welfare

In 2015-16 the UK government spent **216.6 billion pounds on welfare**, 0.3 billion less than the previous year. There are a number of benefits that can be claimed in the UK, including housing benefits, jobseeker's allowance, pension, etc. The Universal Credit (UC) was introduced in 2017, replacing some benefits and tax credits with one single monthly payment. This, however, includes a reduction of work allowances within the UC, and has been criticized for IT design troubles and management failings. The Resolution think-tank evaluating the UC wrote that the 'the suspicion is that UC has shifted from becoming a vehicle of genuine reform designed to improve jobs and earnings prospects for lower income workers to a simple exercise in cost-cutting.'

income

Technicalities

Energy UK, the trade association for the main domestic energy suppliers, has produced the Energy UK **Safety Net guide**, which sets up the standard procedures for energy companies dealing with customers who are in debt or who may be vulnerable. For example, before disconnection energy suppliers will attempt to set up a payment plan that is most suitable to the customer and may install a prepayment meter to avoid customers accumulating debt.

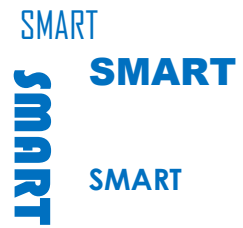
A **pay-as-you-go tariff** that requires consumers to add funds their electricity and gas meters before they can be used. This is the most expensive way to pay for gas and electricity and is often used by low-income households who do not pass a credit check to use the monthly or quarterly direct debits.

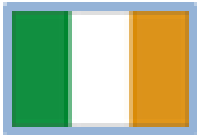
Smart meters show users how much energy they are consuming and their spending on energy. This gives consumers more control over their costs and may encourage energy efficient behavior. By the end of 2020 the UK government aims to have a complete rollout of smart meters across the



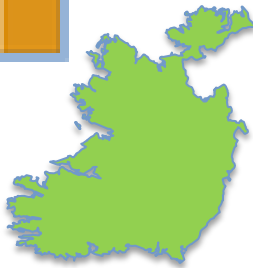
country, making them the standard across the country. As of 2016 4.9 million meters operate across Britain.

The installation of Smart Meters is supplier-led and mandated by the government. The Guardian reported in June 2017 that the installation of Smart Meters may actually force energy bills to rise because of the extra cost energy companies incur in the installation process. There is also a “Stop Smart Meters! (UK)” campaign group that warns of the risks of connecting your energy supply to the “Smart Grid” and protecting privacy.





Ireland

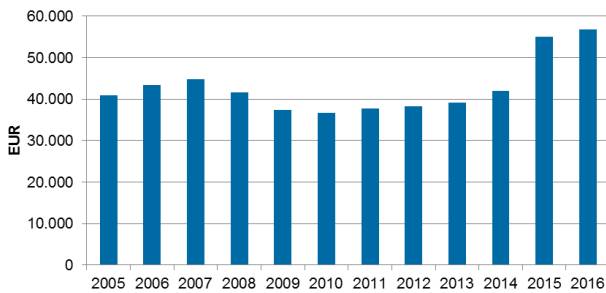


population 2016		4,7 Mio.
number of households 2016		1,7 Mio.
GDP per capita 2016		56,800 Euro
Final energy consumption of households 2016		2,667,000 TOE
consumption of electricity per capita 2014		5,721 kWh

Source: Eurostat 2017, Worldbank 2017

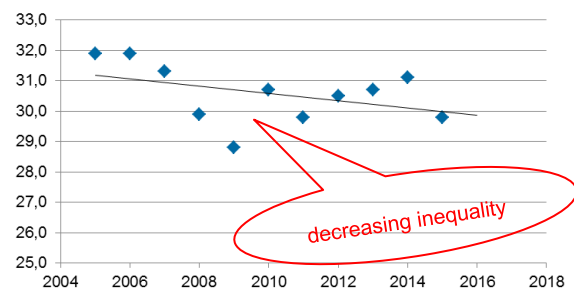
General Information

GDP per capita



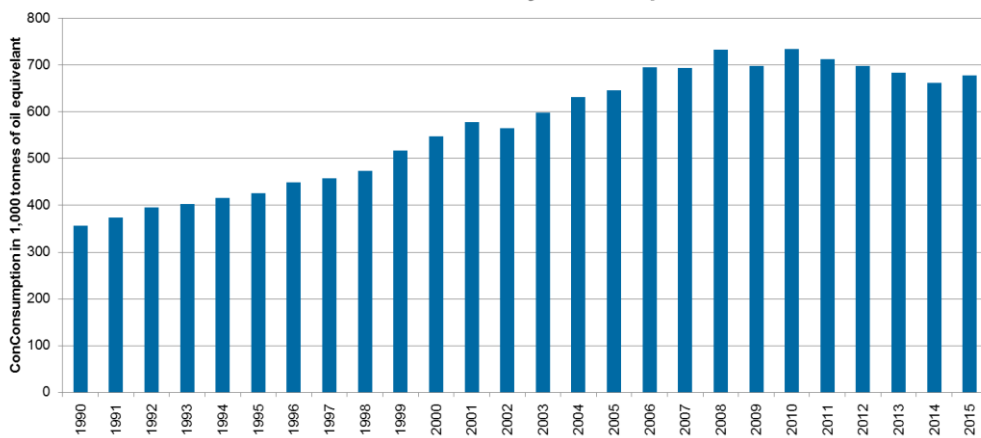
Source: Eurostat 2017

GINI Coefficient



Source: Eurostat 2017

Household Electricity Consumption

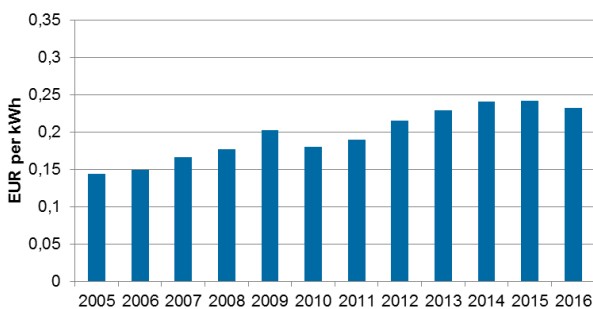


Source: Eurostat 2017

increase in the use of domestic appliances
 revision of building regulation had impact on residential final energy use
 electricity consumption increased: 2.5% in 2015

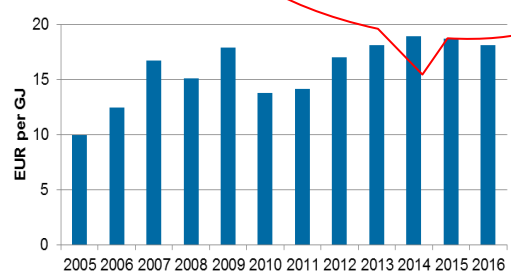
Source: SEAI (2016) Energy in Ireland 1990-2015

Electricity Price

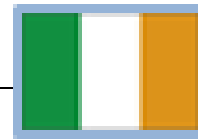


Source: Eurostat 2017

Gas Price

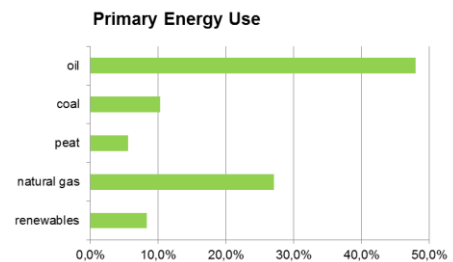


Source: Eurostat 2017



Heating and Electricity System

Ireland relies largely on **Natural Gas, Oil and Coal** to produce energy. Even though oil is being phased out from the energy sector oil products meet over half of Ireland's energy needs (2014). Electricity bills are made up of four key **components**: Generation, Networks, Retail, and a Public Service Obligation Levy. The cost of energy poverty measures is not levied onto the customer's bill (unlike in the UK).



Source: SEAI 2016

Social Welfare System

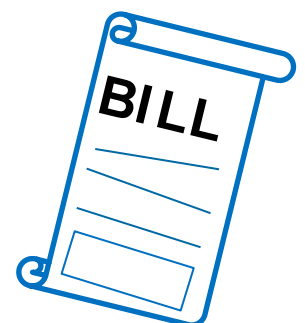
In Ireland most employees and employers pay social insurance contributions (PRSI) into the national **Social Insurance Fund**³. It is from this fund that the following social welfare payments are made. The social welfare system in Ireland is divided into **three main types of payments**. These are:

1. **Social insurance payments**: given to people who satisfy specific social insurance contribution conditions. This includes Jobseeker's Benefits and the State Pension
2. **Means-tested payments**: designed for those who do not have enough PRSI contributions to qualify for social insurance-based payments. A means test is when the government examines all sources of income and savings to determine entitlement to payment. The Jobseeker's Allowance is an example of this kind of payment
3. **Universal payments**: Universal payments are paid regardless of a person's income or social insurance record. They are dependent on the claimant satisfying specific personal circumstances. The Child Benefit is an example of a universal payment.

Technicalities

Paying **utility bills** varies from provider to provider. Generally, the options outlined in the UK report are the same as in Ireland. Options include paying by direct debit, paying a bill (sent every two months), and pre-payment meters. Pay -as-you-go meters are often used in low-income homes and may be installed as part of a payment plan developed to stop disconnection. There are several energy providers such as Prepaypower and Pinergy who only offer a **pay-as-you-go** tariffs. The Commission for Energy Regulation has set out **guidelines** that aim to protect electricity and natural gas consumers. Each energy supplier has their own code of practice agreement. According to this guideline:

*"Suppliers are required to assist customers in genuine financial difficulty in making a payment plan. Payment plans are a method of assisting customers who are experiencing financial difficulties in paying their bills. In addition, the code sets out the procedures that suppliers must follow before disconnecting a customer."*⁴



³http://www.citizensinformation.ie/en/social_welfare/irish_social_welfare_system/social_insurance_prsi/social_insurance_in_ireland.html

⁴ <http://www.cer.ie/customer-care/electricity/consumer-codes>



France



population 2016



67 Mio.

number of households 2016



29 Mio.

GDP per capita 2016

33,300 Euro

Final energy consumption households 2016

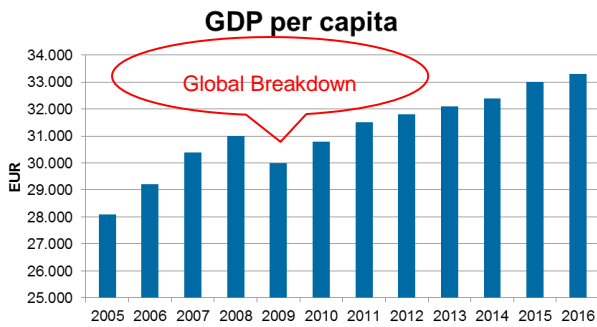
39,832,000 TOE

consumption of electricity per capita 2014

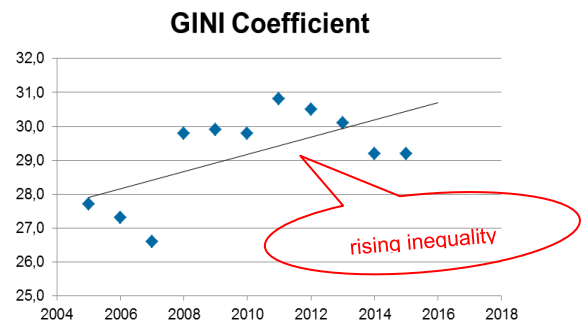
6,938 kWh

Source: Eurostat 2017, Worldbank 2017

General Information

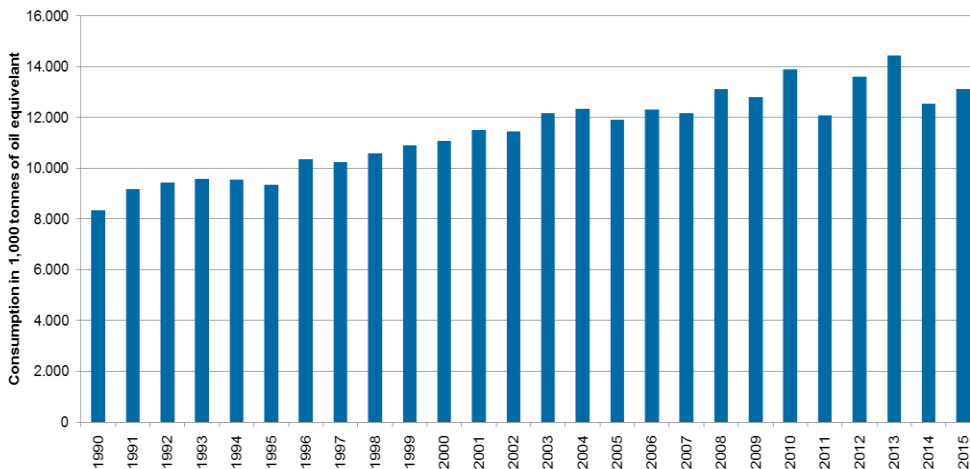


Source: Eurostat 2017



Source: Eurostat 2017

Household Electricity Consumption

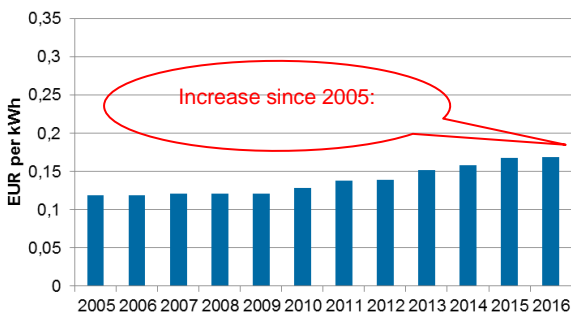


weather impacts power consumption
 aftermath of recession affected consumption levels negatively

Source: RIE (2016) Electricity Report

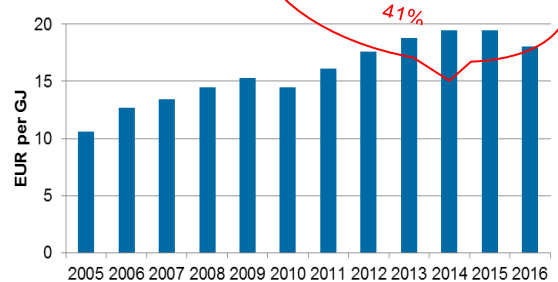
Source: Eurostat 2017

Electricity Price



Source: Eurostat 2017

Gas Price



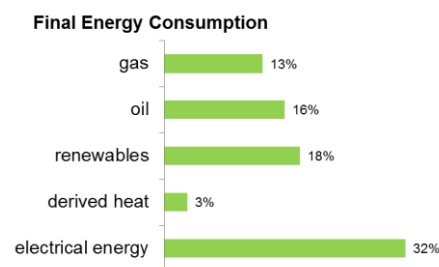
Source: Eurostat 2017



Heating and Electricity System

The state-owned companies EDF and GDF dominated the monopolized energy market in France until 2007 when the French government gave into pressure from the EU to allow for a competitive energy market. In 2011 **over 60%** of electricity produced by EDF came **from nuclear power plants** in France.

Total per capita energy consumption is 6,519 kWh. Final energy consumption per household amounts to 42 Mtep, breaking down into 16% oil products, 13% gas, 32% electrical energy, 18% renewables, 3% derived heat. There are **social tariffs** available based on income, household composition, and consumption.



Source: Pye et al 2017

Social Welfare System

taxes

The social welfare system is managed by a network of local, regional and national institutions. There are two **social welfare taxes on income**, "Contribution Sociale Généralisée" (CSG) and the "Contribution pour le Remboursement de la Dette Sociale" (CRDS), which finances the general scheme. The system provides a range of benefits ranging from disability, childcare, and unemployment. Social security in France is divided into four branches: illness; old age/retirement; family; work accident and occupational disease.

income

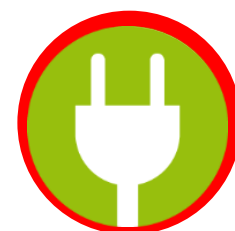
There are five main elements to the **French social security system**⁵:

welfare

- the general scheme (régime général), which covers most employees and students;
- self-employed scheme (régime autonome) and sickness insurance;
- unemployment and supplementary pension schemes;
- agricultural schemes (régime agricole);
- special employee schemes (régimes spéciaux), for civil servants and military personnel, for example.

Technicalities

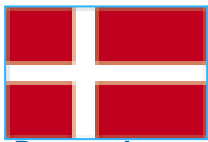
France is gradually rolling out **smart meters** for both gas and electricity, which will see 28 million meters installed by 2021⁶. The government aims to replace 90% of all meters to smart meters by 2024. The cost of replacing existing meters with advanced meters is financed by the routing tariff charged by the system operators to the suppliers, which is integrated in their selling price. EDF provides a particular service to clients at **risk of disconnection** known as service limiter (SL). Clients that default on payments are not automatically threatened with disconnection, but a limit on the amount of electricity that can be consumed.



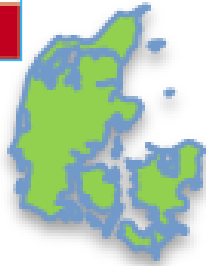
Source: own compilation

⁵ https://www.expatica.com/fr/about/A-guide-to-French-social-security_101168.html

⁶ <https://www.metering.com/features/smart-meters-101-frances-linky-electricity-meters/>



Denmark

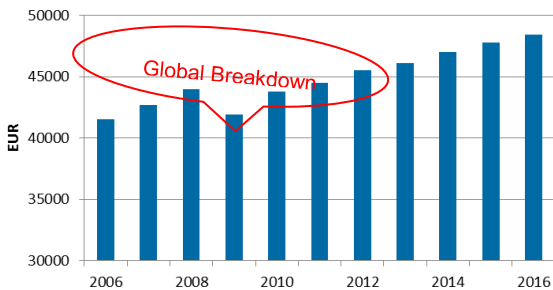


population 2016		5,7 Mio.
number of households 2016		2,3 Mio.
GDP per capita 2016		48,400 Euro
Final energy consumption of households 2016		4,4463,000 TOE
consumption of electricity per capita 2014		5,858 kWh

Source: Eurostat 2017, Worldbank 2017

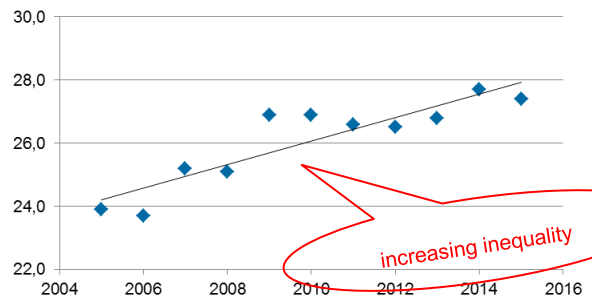
General Information

GDP per capita



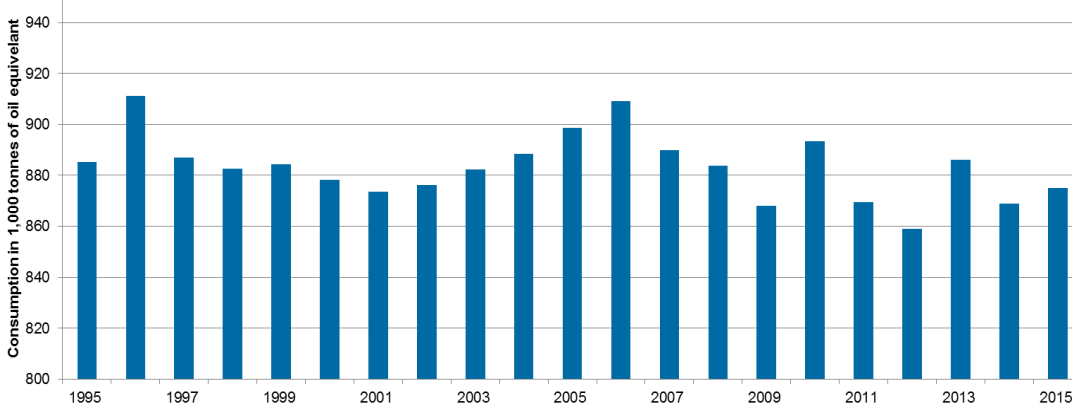
Source: Eurostat 2017

GINI Coefficient



Source: Eurostat 2017

Household Electricity Consumption



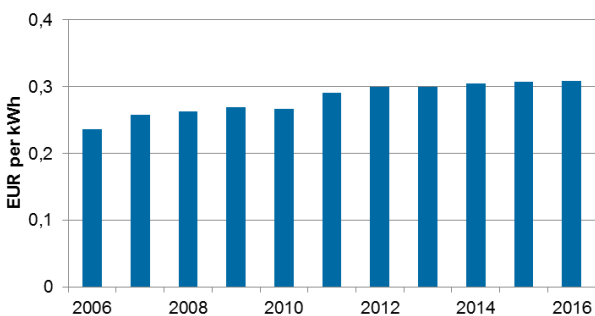
electricity consumption for appliances and lighting etc. increased by 16.7% between 1990-2014

significant fall in electricity consumption for heating

Source: DEA (2014) Energy Statistics

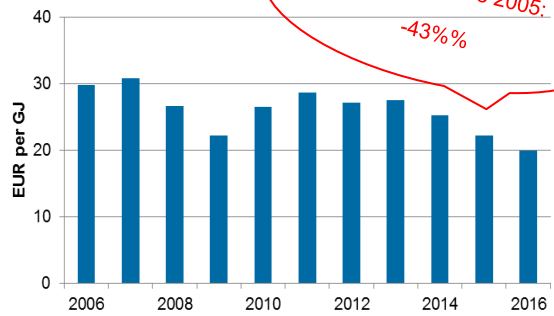
Source: Eurostat 2017

Electricity Price

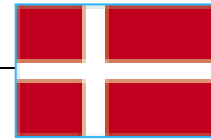


Source: Eurostat 2017

Gas Price



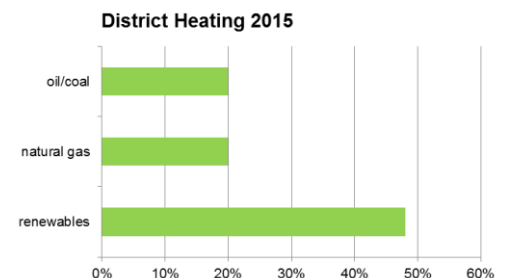
Source: Eurostat 2017



Heating and Electricity System

Denmark has the highest energy consumption per dwelling for space heating in the EU, with 1.42 Toe/dwelling. This comes up to **total energy consumption** in Danish households of 4.4 Mtoe. About 63% of households in 2014 were supplied by district heating. Of this, 48% comes from renewable energy, 20% from natural gas, and 20% from oil/coal.

80% of Denmark's **housing stock** was built before 1990 making it a relatively old housing stock. Often the heating provision in older buildings is based on oil and gas. In 2013 these forms of heating were prohibited and in 2016 oil and gas heating in existing building was also banned, resulting in less than 30% of the housing stock still sourcing heating from oil/gas. Household energy consumption per heated square meter was reduced by 30% during the last thirty years from 1980-2010 thanks to energy efficiency measures.



Source: DEA 2017

Social Welfare System

welfare

Denmark has an extensive social welfare system that has led to one of the lowest income disparity statistics in Europe. In terms of the labor market, Denmark relies on a system referred to as '**Flexicurity**' which gives employers flexibility in staff turn-over and laid-off employees are provided with job training and guidance to pursue new carriers. In Denmark the social welfare system is heavily decentralized and hence reliant on municipalities and regions to implement and administer the provisions issued on the state level. The cost of the social welfare system is levied onto the population through high tax rates. Every citizen needs to register with their local government authority and are then provided with a social security number that ensures that all residents have **access** to a range of benefits, such as maternity benefits, disability benefits, unemployment support etc.

flexibility

taxes

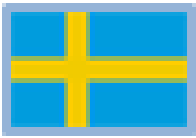
Technicalities

In Denmark you are **automatically supplied** with electricity or gas if you are registered with your local authority. It is a requirement to register with the state; otherwise it is impossible to connect to an energy supplier. If no specific supplier is selected, DONG Energy supplies you with electricity and/or gas. Bills are paid in advance based on estimated energy use and reimbursed once a year.

The Danish government aims to roll out **smart meters** in all households by 2020. Already more than 50% of all households have a smart meter, indicating that Denmark is due to meet its 2020 goal. The environmental ministry anticipates a 2% reduction in energy consumption due to the use of smart meters with estimated savings of around DKK180 (€24) per year for the average homeowner.



Source: Fotolia, own compilation



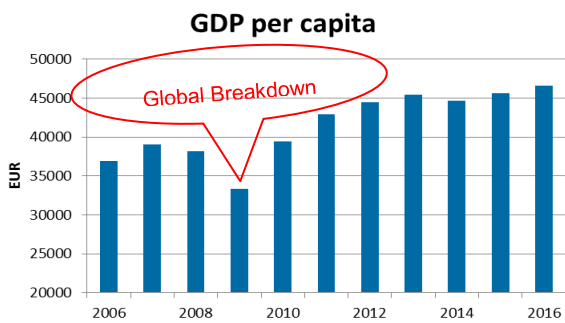
Sweden



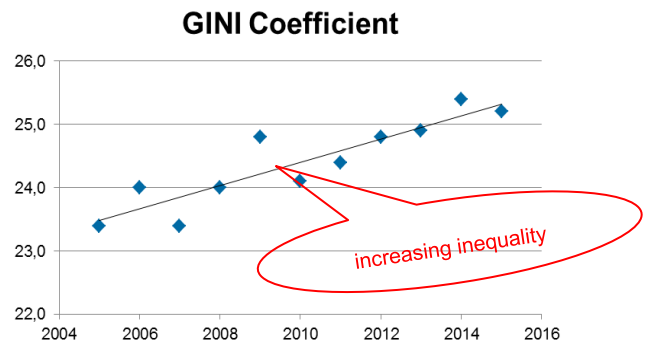
population 2016		9,8 Mio.
number of households 2016		4,8 Mio.
GDP per capita 2016		46,600 Euro
Final energy consumption of households 2016		7,462,000 TOE
consumption of electricity per capita 2014		13,480 kWh

Source: Eurostat 2017, Worldbank 2017

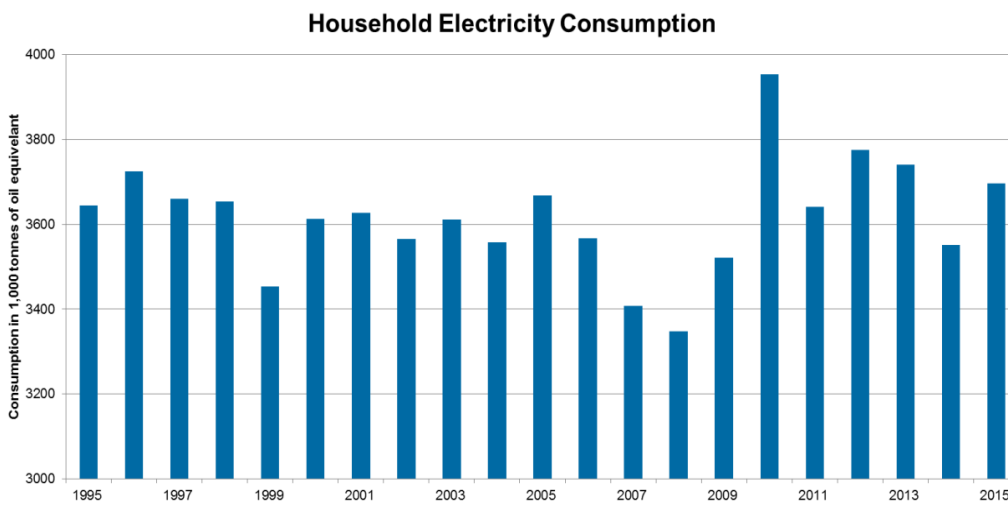
General Information



Source: Eurostat 2017



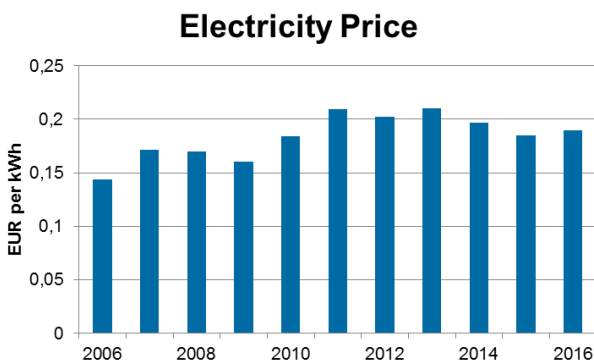
Source: Eurostat 2017



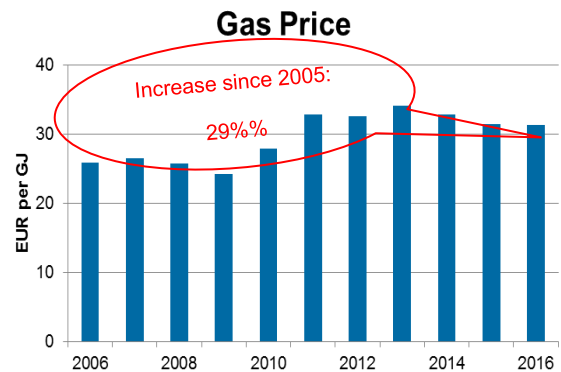
51 percent of Swedish household customers prefer flexible price contracts, increasing trend within the last years

Source: EI (2017) The Swedish Electricity and Gas Market 2016

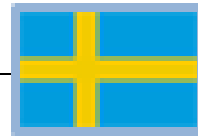
Source: Eurostat 2017



Source: Eurostat 2017



Source: Eurostat 2017

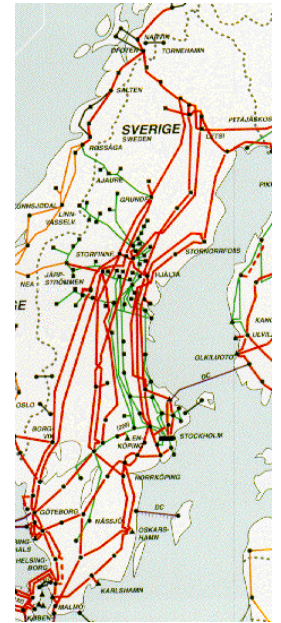


Heating and Electricity System

Hydroelectric and nuclear power provide the majority of Swedish energy with over 50% coming from nuclear power plants. In the first half of 2016, the average **electricity price for households** was 18.94 euro cents per kWh and rose to 19.36 euro cents the following year⁷. In terms of heating, Sweden operates on a district heating system and is dominated by biomass. In the late 1970s and 80s, low electricity prices and powerful electricity companies that marketed electric heating resulted in the installation of a great number of electric boilers and resistance radiators. Electricity is still the main competitor to district heating, but now in the form of heat pumps⁸.

Svenska Kraftnät is a public authority that operates Sweden's power grid and is responsible for managing supply and ensuring reliability in the **Swedish electricity network**. In its role as supervisory authority, Ei is responsible for monitoring Svenska Kraftnät. Local and regional network companies are responsible for maintaining networks at a level where reliable supply can be guaranteed. The Swedish electricity network operates as a regulated monopoly. The Swedish Energy Market Inspectorate (EI) supervises the network companies' revenues to assess whether they are reasonable⁹.

Swedish Electricity Grid



Source: www.geni.org

Social Welfare System

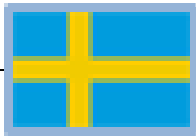
The Swedish Social Insurance Agency is responsible for the Swedish social security system and encompasses many separate benefits. **Social security** is managed centrally by both private and state organizations and is financed through **taxation**. The main benefits available to Swedish citizens are:

- Barnbidrag": Monetary support for children up to 16 (support also available for older students)
- "Föräldrapenning": Benefits to be able to be home from work to take care of their children for up to 480 days per child. It also includes special benefits to care about sick and disabled children.
- "Bostadsbidrag": Housing allowances for anyone who otherwise can't afford housing.
- "Sjukpenning", "Sjukersättning", "Aktivitetssättning" and "Handikappersättning": Benefits if you are ill or disabled and can't work.
- "Arbetslöshetsersättning": Benefits for unemployed (time limited to 300 days, five days a week, which means 60 weeks)
- "Ålderspension", "Garantipension": Benefits for those who have retired.
- "Försörjningsstöd": Benefits for anyone (and their children) who otherwise can't get a reasonable standard of living. This is given out purely on a need-basis and handled by each municipality's social service

⁷ <https://www.statista.com/statistics/418124/electricity-prices-for-households-in-sweden/>

⁸ https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/res-h_policy_introduction_and_development_of_swedish_dh_systems_en.pdf

⁹ https://www.ei.se/PageFiles/310277/Ei_R2017_06.pdf



Technicalities

Sweden's EI ensures fair treatment of **vulnerable customers** and regulates codes of conduct for dealing with those customers.

The first wave of **smart meter** roll-out finished in 2009 and is to be followed up a second, where outdated meters are replaced and new ones installed. The goal is to have a complete smart meter roll out until 2020. The future energy market will become interactive and the meter will serve as a gateway between consumers and the grid. The big challenge will be in managing the complexity in the new system¹⁰

Roll Out
Energy
SMART
 Meter

¹⁰ <https://www.metering.com/news/second-wave-smart-meter-rollouts-begins-italy-sweden/>

8. Annex 2 References for individual policy instruments and measures

Table 8-1 **References for individual policy instruments and measures in France**

Instrument / Measure	Reference
Energy Scheme	Check https://www.humanite.fr/le-cheque-energie-pour-qui-comment-quand-607408
Social electricity and natural gas tariff	http://www.dossierfamilial.com/consommation/energies/gaz-electricite-les-tarifs-aides-56339
Solidarity funds for housing	https://www.caf.fr/allocataires/vies-de-famille/se-loger/proprietaire/le-fonds-de-solidarite-pour-le-logement-fsl
Habiter mieux scheme	Pye et al (2015); Dubois (2015)
Social funds for thermal energy renovation	http://www.ademe.fr/expertises/batiment/passer-a-laction/outils-services/fonds-sociaux-daide-travaux-maitrise-lenergie
Energy pact	solidarity https://www.pacte-energie-solidarite.com/lutter-contre-la-precarite-energetique-pacte-energie-solidarite/ Pye et al (2015)
Roofs first Program	http://www.fondation-abbe-pierre.fr/nos-actions/produire-du-logement-tres-social/toits-dabord-engagement-durable-pour-le-logement-dinsertion
Service d'Intervention pour la Maîtrise de l'Energie SLIME	Local http://www.preca-energie.org/wp-content/uploads/2015/05/2015-CLIME-CLER.pdf
Secours Catholique and EDF against energy poverty	http://www.secours-catholique.org/que-deviennent-vos-dons
Winter Truce Program	Pro- http://droit-finances.commentcamarche.net/faq/7730-treuve-hivernale-et-expulsion-dates-et-locataires-protoges
Smart Meters: Meter, Linky, Gazpar	Linky https://www.theguardian.com/money/2017/jun/24/smart-meters-spying-collecting-private-data-freedom-of-information-act british https://www.actu-environnement.com/ae/news/projet-decret-calendrier-deploiement-linky-objectifs-22380.php4

Table 8-2 **References for individual policy instruments and measures in the UK**

Instrument / Measure	Reference
Winter fuel payment	http://researchbriefings.files.parliament.uk/documents/SN06019/SN06019.pdf https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/554084/winter-fuel-payment-official-statistics-winter-2015-to-2016.pdf
Government Electricity	https://www.ofgem.gov.uk/system/files/docs/2017/01/ger_annual_report_sy2.pdf

ty Rebate		
Energy Company Ob- ligation		Hough (2017)
Affordable Warmth Grants		http://www.affordablewarmthgrants.co.uk/grants/warm-front-scheme.htm http://www.affordablewarmthgrants.co.uk/questions-about-affordable-warmth
Green Deal		https://www.nao.org.uk/wp-content/uploads/2016/04/Green-Deal-and-Energy-Company-Obligation.pdf https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/271608/Waves_1_2_and_3_plus_wave_1_follow_up_-_full_report__P23_-_24_-_FINAL.pdf
Energy Best Deal		http://www.changeworks.org.uk/sites/default/files/Helping_vulnerable_people_in_Scotland.pdf
Affordable Warmth Team Coventry		March 2017 Progress Report – Ambitions and Progress (Citavi)
Pay-as-you-go Meters		https://www.gov.uk/guidance/smart-meters-how-they-work https://www.theguardian.com/business/2017/jun/26/smart-meter-rollout-household-bills-rise

Table 8-3 **References for individual policy instruments and measures in Denmark**

Instrument / Measure	Reference
Heating allowance for pensioners	Pye et al (2015) https://www.borger.dk/pension-og-efterloen/Tillaeg-til-folke--og-foertidspension/folkepension-varmetillaeg
Danish National Building fund	https://lbf.dk/om-lbf/english/
Subsidies to im- prove or replace fuel fired heating	Pye et al (2015)
Tax deduction	Pye et al (2015)
“Better Hous- es”(Bedre Bolig)	http://go-refurb.eu/better-house-targeting-single-family-houses/
Simplified electricity bill	https://www.retsinformation.dk/forms/r0710.aspx?id=175185
Electricity price por- tal	https://en.energinet.dk/Electricity/Energy-data
Energy Efficiency Obligation for utili- ties	https://www.greentechmedia.com/articles/read/how-denmark-turned-an-efficiency-obligation-into-opportunity Pye et al (2015)
Smart meters	https://www.kamstrup.com/en-en

Free choice of electricity and gas supplier and simple to change from one supplier to the other	Pye et al (2015)
Disconnection safeguard	http://fuelpoverty.eu/2014/07/02/energy-poverty-in-denmark/ Pye et al (2015)
Energy Supplies Complaint Board	https://www.en.kfst.dk/consumer/

Table 8-4 **References for individual policy instruments and measures in Ireland**

Instrument / Measure	Reference
Fuel Allowance	http://www.welfare.ie/en/Pages/820_National-Fuel-Scheme.aspx
Household Benefit Package	http://www.welfare.ie/en/Pages/Household-Benefits-Package.aspx#elec
Better Homes, Better Energy Warmer Homes	http://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/citizens/Pages/Better-Energy-Programme.aspx
Warmth and Wellbeing	https://www.dccae.gov.ie/en-ie/energy/topics/Energy-Efficiency/citizens/Pages/Warmth-and-Wellbeing-pilot-scheme.aspx https://www.seai.ie/grants/home-grants/warmth-and-wellbeing/
Better Energy Communities Scheme	http://www.seai.ie/Grants/Better_Energy_Communities/
Housing Aid for Older People	http://www.citizensinformation.ie/en/housing/housing_grants_and_schemes/housing_aid_for_older_persons_scheme.html
Keeping Well and Warm	https://www.hse.ie/eng/services/publications/olderpeople/warmwell.html

Table 8-5 **References for individual policy instruments and measures in Sweden**

Scheme/Policy	Reference
Housing subsidy	http://www.sabo.se/om_sabo/english/Sidor/Publichousing.aspx
Social support	Pye et al (2015)
Negotiation of tariffs	Pye et al (2015)
Billing support	Pye et al (2015)
Grants for converting heating systems	http://www.iea.org/policiesandmeasures/pams/sweden/name-24061-en.php Pye et al (2015)

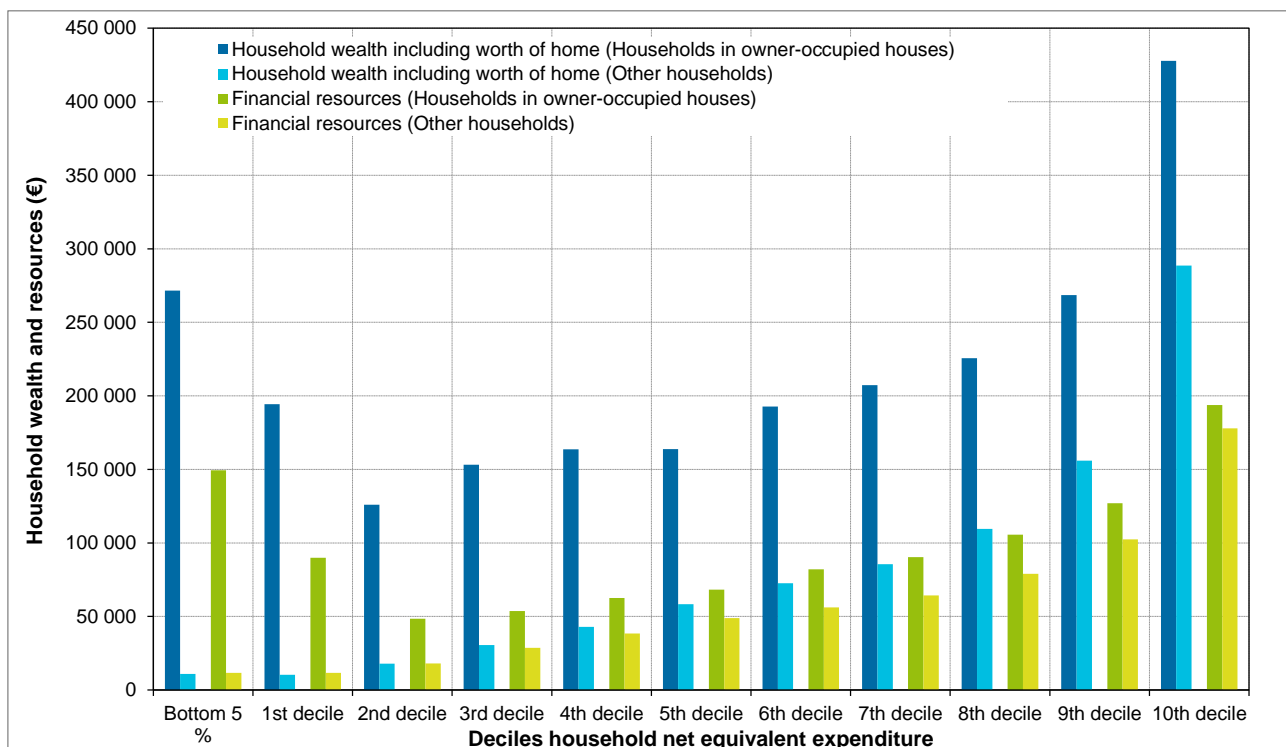
ROT Program	Pye et al (2015)
KLIMP and LIP	http://www.eukn.eu/e-library/project/bericht/eventDetail/local-investment-programmes-lip-and-climate-investment-programmes-klimp-1-1-can-be-3/ Pye et al (2015)
Price comparison, National contact point, Consumer contact, Information on consumption	Pye et al (2015) http://www.scpclearinghouse.org/initiative/hello-consumer-halla-konsument-swedish-consumer-agency
Municipal advice office	Pye et al (2015)
Automatic Meter Management (AMM)	https://www.energyagency.at/fileadmin/dam/pdf/veranstaltungen/SmartRegions-Mai-Patrikainen.pdf https://www.capgemini.com/pl-pl/resources/fortum-deploys-automatic-meter-management-across-860000-customers-in-sweden/

9. Annex 3 Household wealth

In Section 4.4, households are classified by expenditure instead of income. This is due to the fact that there are relatively few homeowners in the lowest income deciles and these are represented in the data set by very few observations (approx. 70 observations among the lowest 5% of the income distribution and approx. 100 observations in the first decile). Such a low number of observations can lead to distorted results, especially if these observations have special characteristics. An analysis of the wealth of low-income homeowners shows that there is a high average wealth among homeowners on very low incomes (Figure 9-1). This may be the case, for example, if a household is temporarily deprived of income but nevertheless has a high level of wealth, or if a household that no longer has a regular income lives off its savings instead of a regular pension.

As Section 4.4 looks at those households in need financial support for carrying out energy renovations, we use the classification of households by expenditures. It can be argued that today's expenditures approximate revenues over the entire lifespan better than today's income, because households usually even out their expenditures (although this does not always hold as Schreiber & Beblo 2016 show). When all households are considered (Sections 4.2, 4.3 and 4.5) there is hardly any difference between the two approaches (i.e. income vs. expenditure deciles). In the case of the consideration of a small target group of low-income homeowners, as is the case in Section 4.4, there is. Figure 9-2 shows how wealth is distributed along expenditure deciles and that this classification is more likely to capture those households in need of financial support for renovating their homes, which is why it is used for the analysis carried out in Section 4.4.¹¹

Figure 9-1 Wealth and financial resources along income deciles



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Laender: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration

¹¹ As one limitation it has to be noted that wealth, in particular financial wealth, is not very well documented in household surveys such as the EVS (Beznoska et al. 2017).

Figure 9-2 Wealth and financial resources along expenditure deciles



Source: Research Data Centre (FDZ) of the Federal Statistical Office and statistical offices of the Länder: Income and Expenditure Survey 2013 (EVS 2013); own estimation and illustration