

› WHITE PAPER

ENERGY POVERTY AND THE ENERGY TRANSITION

TOWARDS IMPROVED ENERGY
POVERTY MONITORING, MEASURING
AND POLICY ACTION

TNO innovation
for life

› Lucie Middlemiss (university Leeds)
Peter Mulder (TNO)
Marlies Hesselman (university Groningen)

› Mariëlle Feenstra (university Twente)
Sergio Tirado Herrero (Univ. Aut. de Barcelona)
Koen Straver (TNO)

› SUMMARY

This white paper explores the role of energy poverty in the energy transition in the Netherlands. Energy poverty means that a household does not have a sufficient access to modern energy services at home. It is often part of a vicious circle of financial, physical and mental health problems. The energy transition could worsen these problems because households have to invest in energy saving and sustainable technology, such as insulation or solar panels. As part of The Netherlands' climate and energy policy, there are numerous schemes available that can help households invest in sustainable technologies, which can lead to lower energy costs in the long term. However, many households affected by energy poverty face multiple barriers when trying to access these subsidies. Public support for the energy transition could be undermined if some households start falling behind. Conversely, addressing energy poverty could lead to a range of socio-economic benefits and help accelerate the energy transition. It is therefore highly recommended that energy poverty plays a key role in the implementation of the energy transition.

The Netherlands currently lacks a comprehensive framework for accurately measuring, monitoring and combating energy poverty. In this white paper, we outline three key recommendations to stimulate the development of an effective energy poverty policy in the context of the energy transition:

- I) To establish a multi-indicator framework for measuring energy poverty.
- II) To develop specific energy poverty policies.
- III) To integrate energy poverty policies into social, energy and built environment policies.

“To measure is to know. If you cannot measure it, you cannot improve it. When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.”

Lord Kelvin (1824-1907), physicist and mathematician

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‘Energy poverty is a multidimensional problem. It is an issue that goes beyond high energy bills for people on low incomes.’

1. INTRODUCTION

The transition to a sustainable energy system entails major changes in both the economy and society. Without introducing special measures, the costs and benefits of the energy transition are unlikely to be equally distributed amongst different groups in society. In other words, the energy transition will have major consequences on our prosperity and how this is distributed. Currently, there is an increased focus on the effects of the distributional consequences of the transition, particularly on the effect on low-income households. The Minister of the Interior stated recently that the government's main principle is that the energy transition must be "feasible, affordable and fair" (Ministry of the Interior and Kingdom Relations, 2020a).

The academic literature defines a fair or inclusive energy transition according to three basic principles (Carley & Konisky, 2020; McCauley et al. 2013): one in which everyone has access to affordable, reliable and clean energy services; everyone can participate in decision-making processes concerning changes in the energy system; and there is recognition of the problems caused by energy poverty and the unequal opportunities associated with the transition. The idea of a just energy transition therefore covers a wide range of issues.¹ In this publication we focus on one of these issues: energy poverty. To be more precise, we explore the potential impact of the energy transition on energy poverty in the Netherlands. Will the energy transition increase energy poverty levels or will it help address energy poverty? And what does this mean for energy transition policies?

CLEAN ENERGY FOR ALL

In this white paper, we argue that reducing energy poverty results in a range of socio-economic benefits and can help to accelerate the energy transition. However, there is a risk that the energy transition will lead to a higher incidence of energy poverty. Public support for the energy transition could be undermined if some households fall behind. It is therefore very important that energy poverty is given greater attention when shaping the energy transition process. The driving force behind the development of energy transition policies are The Netherlands' Climate Agreement and the Climate Act. Both of these have their origins in the EU Regulation on the Governance of the Energy Union and Climate Action (EU) 2018/1999, which obliges all EU Member States to submit a national energy and climate plan. This plan should provide an outline of the route to a carbon-free economy. An economy in which the transition to clean energy is encouraged and access to clean energy is secured and provided for all citizens. In its article 3(3)(d), the regulation specifically states that Member States must periodically report on energy poverty. Article 29 of the Electricity Directive 2019/944 also requires Member States to establish and publish a 'set of criteria for energy poverty'. Several Member States (including France, Cyprus, Ireland and Spain) have put in place instruments to meet these requirements. To date, however, the Netherlands lacks a comprehensive framework for accurately measuring, monitoring and combating energy poverty.

1 See also Carley & Konisky, 2020 and CE Delft (2019), Options for equitable climate policy.

The European Commission therefore advises the Netherlands to establish a national climate and energy policy strategy to combat energy poverty (EC, 2020). This is another reason why the subject of energy poverty deserves more attention when shaping the energy transition.

‘An equitable energy transition means that everyone has access to affordable, reliable and clean energy services, can participate in decision-making processes and that there is recognition of the problem of unequal opportunities.’

THREE SPECIFIC RECOMMENDATIONS

In this white paper, we make three recommendations for developing an effective energy poverty policy in the context of the energy transition:

- 1) To establish a multi-indicator framework to measure energy poverty.
- 2) To develop specific energy poverty policies to complement existing generic measures promoting energy transition.
- 3) To integrate energy poverty policies into social, energy and built environment policies, which requires a close cooperation between the various ministries involved.

These recommendations are based on research carried out by TNO [the Netherlands Organisation for Applied Scientific Research] on the effectiveness of Dutch energy poverty projects (Straver et al., 2017). We also draw on our experiences gained from knowledge networks on energy poverty, organised by TNO and RVO [the Netherlands Enterprise Agency] for various municipalities over the past few years. Lastly, for this white paper we consulted the rapidly growing international academic literature on energy poverty and studies recently published for the Netherlands, including studies by the PBL [the Netherlands Environmental Assessment Agency] (2018) and various consultancy agencies. The international team of co-authors from the Netherlands, Spain and the United Kingdom was assembled through the ENGAGER COST Action, an European network of energy poverty researchers and practitioners.

› ENERGY POVERTY PROFILE: **LOT**



LOT lives in Amersfoort with her child Eva (6). She was divorced last year and recently found herself in debt. She was left responsible for the mortgage, the costs of taking care of here child, groceries, and so on. Lot worked part time; her husband used tto be the one making a salary covering most expenses. With her small salary she was not able to pay all monthly bills, and within five months her first reminders for payment turned into debts.

There might be services, websites or municipality subsidies or advice

available to her, but she does not know where to find them or how to make use of them. The stress of taking care of here child and working as much as she can to make ends meet, makes it difficult to find the time to fill in these forms. She has debts with her energy provider, among others. She does not know how to pay these debts, or how to save energy. She pays around 150 EU per month on energy. To her, it is a fact of life and one of the many problems she's meaning to fix when things are less hectic.

This publication is structured as follows. Following this introduction, in chapter 2 we briefly discuss the concept of energy poverty. In chapter 3, we examine the extent of the energy poverty problem in the Netherlands. In chapter 4, we explore the possible impact of the energy transition on energy poverty. In chapter 5, we map out an effective energy poverty policy and how this compares to the current policy. In chapter 6, we make three specific recommendations to help develop an effective energy poverty policy in the context of the energy transition.

› 2. WHAT IS ENERGY POVERTY?

Energy poverty is often associated with households in the poorest countries. In the context of this paper, energy poverty is defined as a lack of access to (affordable) modern forms of domestic energy such as electricity. As a result, households remain dependent on traditional biomass for cooking and heating (IEA, 2010). Energy poverty can therefore be a major obstacle to achieving the UN's Sustainable Development Goals (SDGs). The aim of the SDGs is to eliminate poverty, reduce inequality, provide access to sustainable and clean energy for all and ease the road to sustainable development.

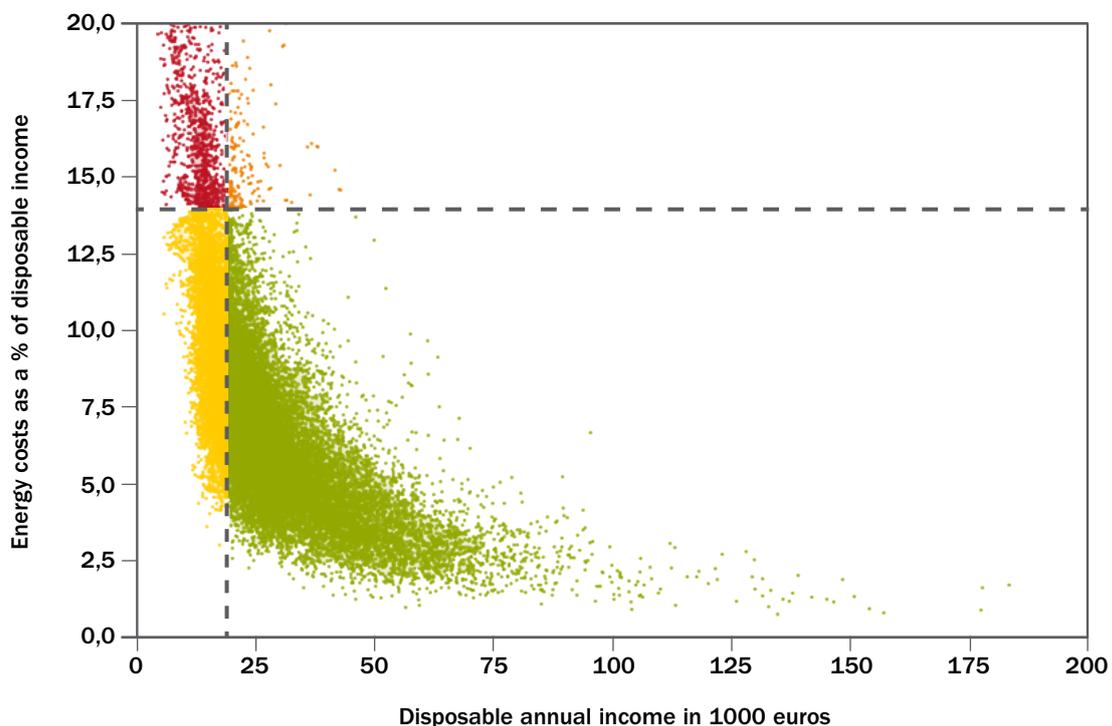
RICH COUNTRIES ARE AFFECTED TOO

Energy poverty is not only a problem in the poorest countries; it also occurs in high-income nations. The term energy poverty can be traced back to Brenda Boardman's research on 'fuel poverty' in the UK in the early 1990s. Her research showed that cold houses have harmful (health) effects on occupants, and that these effects are caused by a combination of factors: low incomes, high energy bills and poorly insulated houses (Boardman, 1991). Energy poverty means that a household does not have sufficient access to modern energy services at home. People in energy-poor households may decide not to turn on the heating because they want to save money, or they choose not to heat their food because gas is too expensive. It is a major problem throughout Europe. For example, between 50 and 125 million Europeans cannot afford proper indoor thermal comfort (European Commission, 2020b). Within the European Union, the problem is the most visible in Central, Eastern and Southern Europe. However, it is also recognised as a serious problem in countries like Ireland and France. In the Netherlands hundreds of thousands of households are living in energy poverty. People affected by energy poverty not only have insufficient access to heating, lighting and cooking, but also suffer physical and mental health problems (including long-term health effects for children) due to living in poorly insulated and ventilated homes. These problems can include health problems caused by extreme heat in summer and draughts and damp conditions during cold winters.

Without doubt, there is a strong link between the problem of income poverty and energy poverty. Households' financial difficulties lead to unpaid energy bills and the resulting stress leads to health problems that can have repercussions on income, and so on. Yet there is no perfect correlation between the two forms of poverty. Studies carried out in Spain, Hungary, Poland and the Czech Republic (Bouzarovski and Tirado Herrero, 2017; Tirado Herrero et al., 2018) have shown that not all income-poor because of their energy costs are not necessarily below the general poverty line. The opposite also occurs: low-income households that spend relatively little on energy and do not have any energy affordability problems (PBL 2018).

We illustrate this in Figure 1 for the Netherlands, where we correlate disposable household income with energy costs as percentage of disposable income (the energy ratio). We do so for tenants (bottom) and home owners (below).² The households in red are the most vulnerable: their disposable income is below the minimum income (of about 19 thousand euros) while they spend more than 10% of their income on energy costs. The households in the yellows have a low income, but also low energy costs – this one group is relatively large among tenants. The households in orange do have an income above the minimum, but also have higher energy costs – this group is relative big among home owners.

Tenants



² Data is from a representative sample of more than 67,000 households in the Netherlands. Source: the WoonOnderzoek Nederland (WoON) of 2018 (BZK / CBS, 2019).

Homeowners

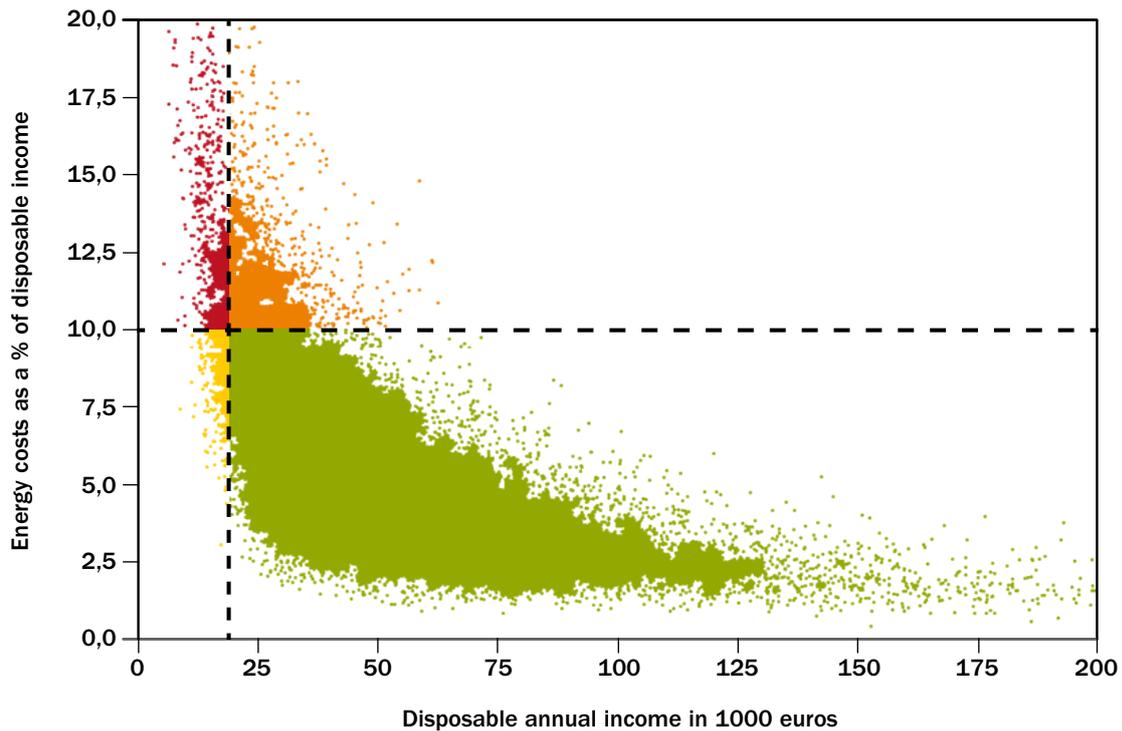
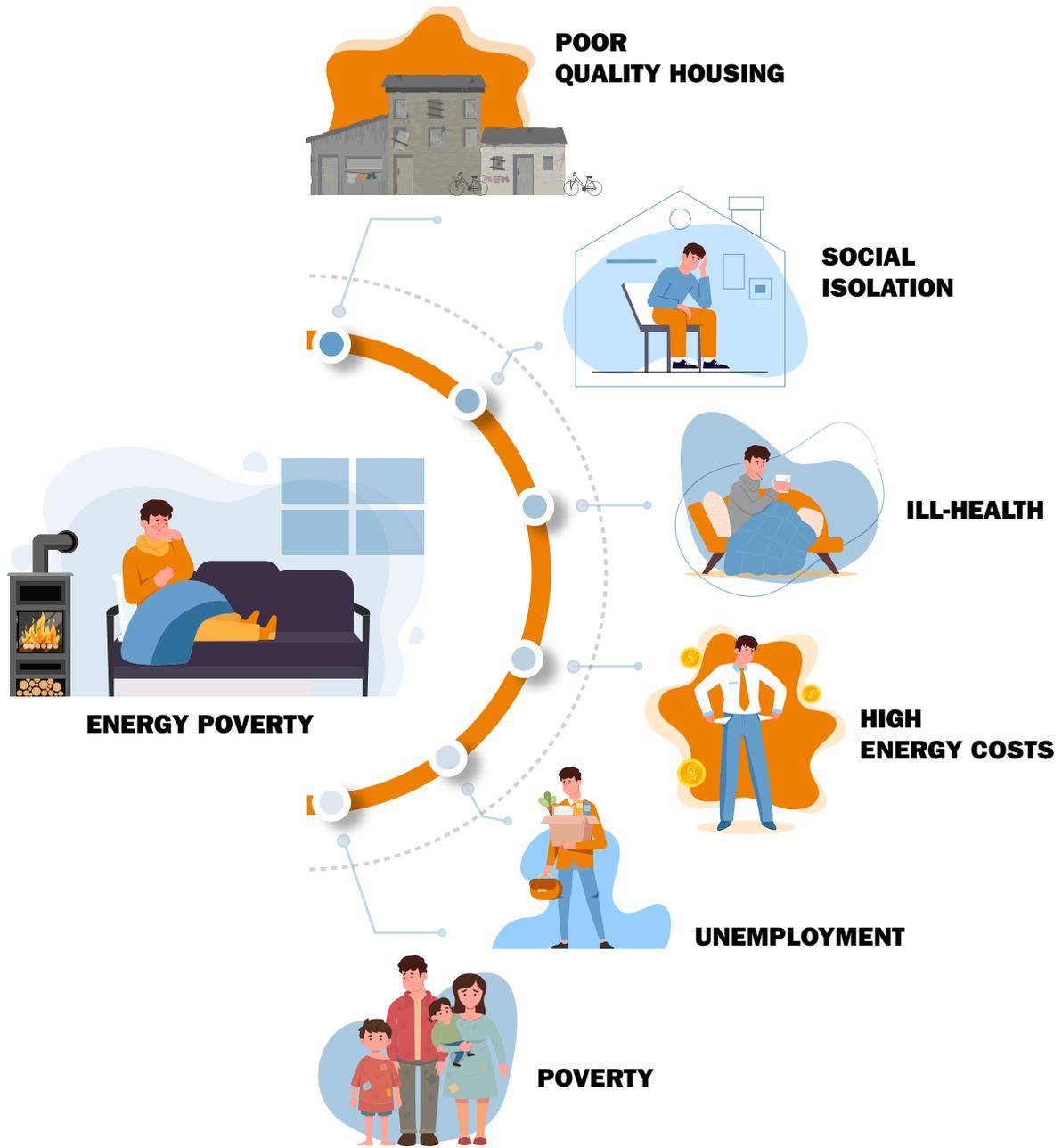


FIGURE 1: ENERGY COSTS VERSUS DISPOSABLE INCOME

‘Energy poverty does not only occur in the poorest countries; it is also a problem in high-income nations.’

RECOGNISING THE PROBLEM

There is no generally accepted pan-European definition of energy poverty, but many EU Member States recognise the scale of the problem and its negative consequences, such as serious health problems and social isolation. Recognising energy poverty as a problem in itself will help to understand the specific difficulties faced by households that are dealing with energy poverty. A good understanding of energy poverty requires us to look beyond the aspects that usually play an important role in explaining poverty and inequality (such as family income, level of education and socio-demographic factors). We must also consider the role of specific and structural causes of energy poverty, such as poorly insulated homes or high energy prices and taxes. Energy poverty has distinct impacts on the physical and mental health, social life and employment opportunities of people who are affected by it. A specific focus on energy poverty provides a better insight into specific solutions to mitigate energy poverty and to eradicate poverty.



DYNAMICS OF ENERGY POVERTY

3. WHAT IS THE EXTENT OF ENERGY POVERTY IN THE NETHERLANDS?

Measurement is the key to knowledge and recognition. In order to understand energy poverty in the Netherlands, we need to measure it properly, which is not a trivial task. Up until recently, research into energy poverty in the Netherlands has mainly been based on the affordability of energy bills. However, the affordability of energy bills does not depend solely on a household's energy expenditure. Disposable income and other necessary expenses also play a role. The most commonly used indicator of energy poverty is the so called 'energy burden': the percentage of energy costs as part of the total household income. It is often said that a household is energy-poor if it spends more than 10% of its income on energy costs (Robinson et al., 2018). After all, an energy burden above 10% means that for many households the affordability of their energy bills is at stake. Another frequently used indicator of energy poverty is therefore the percentage of households that are in arrears on their energy bills. Research into the financial situation of the Dutch population by NIBUD [the National Institute for Family Finance Information] showed that 38% of Dutch households have difficulty making ends meet (Schonewille & Crijne 2018). Where households make the decision to pay their bills late, it is the health insurance contribution that is most often left till last, followed by energy bills.

APPROXIMATELY 8% OF HOUSEHOLDS IN THE NETHERLANDS ARE ENERGY-POOR HOUSEHOLDS

In a study into the affordability of household energy bills in the Netherlands, the PBL (2018) uses two indicators that complement each other: the aforementioned energy quota and payment risk. The PBL rightly states that the energy burden alone is insufficient to measure energy poverty; for example, there are high-income households that have a high energy burdens because of their energy-intensive lifestyle. That is why the PBL also looks at payment risk. Payment risk means that a household does not have enough budget for living expenses after paying for housing and energy costs. Based on the combined data from these two indicators, the PBL (2018) estimates that in 2014, there were 269,000 households in the Netherlands with both a high energy burden and a payment risk. That equals about 3.5% of all households. There is also a group of 385,000 households (4.8% of the total) with a high energy burden but no payment risk.

This means that approximately 8% of households in the Netherlands had a high energy burden in 2014. A study by Ecorys (Schellekens, et al. 2019) concludes that in 2018, 9% of households in the Netherlands could be classified as energy-poor, in the sense that they spent more than 10% of their income on energy.³ A recent study by research agency Het Pon shows that 11% of households (homeowners and tenants) in the province of Utrecht spend more than 10% of their income on energy bills and/or have insufficient disposable income after paying housing and energy costs (Agterbosch et al., 2020).

³ The lower number identified by PBL can be explained by the fact that their study did not include a group of 900,000 households with specific circumstances that until recently made it difficult to assess their energy expenditure, namely: students, economic operators with a poor performance year, households sharing a property, households that include a home business owner, or people living in unusual housing, such as houseboats or 'accommodation for communal living'. Data from other countries show that such groups also experience problems with their energy expenditure.

COMPLEX AND MULTIDIMENSIONAL PROBLEM

Energy burdens and payment risk are therefore important aspects when measuring the extent of energy poverty. However, a proper understanding of energy poverty requires more than counting people on low incomes with high energy costs and people who have difficulties paying their energy bills (Trinomics, 2016). The academic literature also shows that energy poverty is a complex, multidimensional and dynamic problem. For example, there are households that do not have any difficulties in paying their energy bills because they ‘underconsume’ energy (referred to as ‘hidden energy poverty’, see box below) or because they face the ‘eat or heat’ dilemma. There is insufficient information available on this phenomenon in the Netherlands to be able to indicate how many households are affected. Another unrecognised aspect of the energy poverty problem is the extent to which people have or do not have access to energy-saving and sustainable technology. In the context of the energy transition, this aspect of energy poverty is therefore coming more into focus. Furthermore, as mentioned before, energy poverty often leads to a vicious circle of financial problems and physical and mental health problems. In other words, energy-poor households often experience all kinds of poverty as part of their daily lives. It is therefore impossible to identify energy poverty properly using only one single indicator.

‘Energy poverty is a complex, multidimensional and dynamic problem.’

GEOGRAPHICAL DIFFERENCES

Research also shows that there are large geographical differences in the manifestation of energy poverty. The previously mentioned study by research agency Het Pon for the province of Utrecht shows that the percentage of households for which energy affordability is a problem varies at district level from 2.9% to 29.7%.⁴ A geographical analysis by Mashhoodi et al. (2019) into the causes of energy poverty in various neighbourhoods in the Netherlands shows that both socio-demographic, housing and economic causes play a role. The study also shows that these causes differ widely between neighbourhoods. This confirms that the mechanisms underlying energy poverty are complex and multidimensional in nature. It also shows that effective energy poverty policies require a broader context. Instead of one-size-fits-all measures, policies should take into account the location-specific context of energy-poor households.

⁴ The criterion was that energy costs should not exceed 10% of a household's total expenditure.

The phenomenon of ‘hidden energy poverty’

‘Hidden energy poverty’ means that households deliberately consume too little energy in order to stay within their limited household budget. They use less energy than they actually need and would like to use. As a result, they might live in houses that are too cold or just heat a one or two rooms (e.g., the kitchen), which is referred to as ‘spatial shrinking’. We have to recognise that there are many types of households that suffer from hidden energy poverty. For example, research shows a strong feminisation of energy poverty: specifically single mothers with children and female pensioners living alone, are living in energy poverty. This is due to the income gap between men and women, the socio-cultural distribution of care responsibilities and the higher ratio of older women to men (Clancy et al., 2017).

‘The energy transition can exacerbate the problems of energy poverty and increase social inequality.’

› 4. THE EFFECT OF THE ENERGY TRANSITION ON ENERGY POVERTY

There are good reasons to believe that the transition to clean energy will, in the long term, reduce the total cost of the energy system, due to the large-scale use of efficient technology and reduced dependence on (imported) fossil fuels (Faaij and Van den Brink, 2019). However, this reduction in costs is not linear over time. In the short- and medium-term, the energy transition will lead to higher energy costs. This means that the energy transition may exacerbate the problem of energy poverty.

TRANSITION TO SUSTAINABLE TECHNOLOGY, ONLY FOR THOSE ON HIGH INCOMES?

The main reason for the increase in energy costs is the need to invest in new technology. Network operators need to invest in increasing the capacity of the electricity grid so that they can connect new wind and solar farms. Households also need to invest in order to be able to use new energy sources. For example, the switch from natural gas to electricity for heating promotes the use of more sustainable heating options such as heat pumps. Low-income households are expected to be reluctant to invest in such sustainable energy technologies due to their lack of financial means to afford the upfront investment. International research has shown that sustainable energy technologies – such as electric vehicles, solar panels, efficient appliances and LED light bulbs – are often only used by higher-income households (Carley & Konisky 2020). There is therefore a clear risk that the energy transition will not include all, but will lead to increasing inequality (Borenstein & Davis, 2016). Necessary investments in sustainable technology may also lead to increased energy poverty. A recent study by

Ecorys estimates that the cost of the ‘heat transition’ – the switch from natural gas to renewable sources for domestic heating – will lead to a significant increase in the number of households spending more than 10% of their income on energy costs. According to Ecorys, in the worst-case scenario this percentage could be as high as 18% of Dutch households (Schellekens et al., 2019).

RISING ENERGY COSTS

Inequality in access to sustainable technology increases social inequality in several ways. Households that are unable to invest in sustainable energy technologies will face rising energy costs. This is because they will continue to rely on fossil fuels, which are going to be increasingly more expensive in a bid to encourage households to switch to renewable energy (see next chapter). Moreover, by not investing in sustainable technologies, these households do not benefit from grants and other schemes on offer (e.g. tax and mortgage relief). They also miss out on other side-effects of sustainable technology. These include increased home comforts through better insulation or, in the future, limited access to parking spaces or environmental zones in large cities. In other words, the impact of the energy transition on energy poverty and social inequality cannot be measured solely on the basis of energy bills.

DIFFERENCE BETWEEN TENANTS AND HOMEOWNERS

Inequality in access to sustainable technology is mostly caused by investment costs acting as a barrier for low-income households. Furthermore, there are other impediments to investing in sustainable technology, such as tenure status. Tenants, unlike homeowners, have fewer options regarding investments and legal decision-making power to make their homes more sustainable. There are also major differences between landlords: housing associations differ from private landlords in this respect, and even within these two categories there are differences. While some housing corporations and private landlords are frontrunners when it comes to making their housing stock more sustainable, others are less ambitious. Barriers to making housing more sustainable can also be created by ‘mixed ownership’ conditions, whereby private homeowners and housing corporations share property in the same complex. When measuring (the risk of) energy poverty and developing an energy poverty policy, it is therefore useful to make a distinction between homeowners, tenants in social housing and tenants in the private sector. These three groups have access to different types of grants and are subject to different legislation and therefore have different options at their disposal for investing in efficient energy technologies.

Another reason for potentially uneven outcomes of the energy transition is that many energy-poor households do not have the information, skills or resources to take advantage of the grants and schemes on offer. Even if they are especially designed for them. It is difficult to persuade households with debts, or people with low-literacy skills, to take advantage of generic schemes for energy efficiency or tackling damp and insulation problems. These barriers need to be tackled effectively through well-designed energy poverty policies.

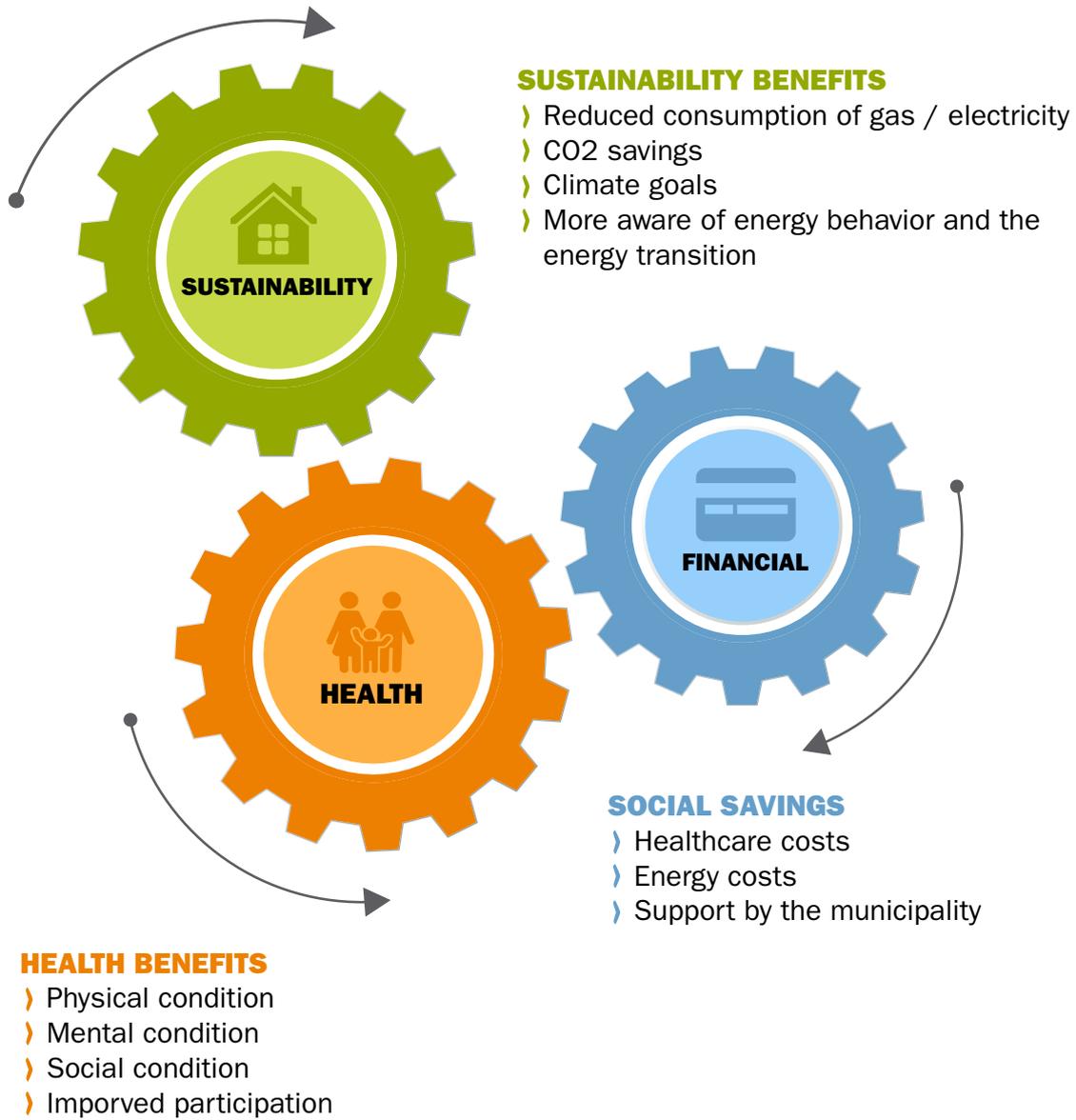
› ENERGY POVERTY PROFILE: JAN AND RIET



JAN AND RIET are a couple in their eighties. They live in Rotterdam, in relatively small older people's apartment built in the nineties. Their rented house is decorated with old fashioned furniture, and their electrical appliances are also old. They have regular contact with their children, but because the children live far away, this is mostly on the phone. They are aware of the fact that sustainable measures can make their household more energy efficient but they lack the network to reach the right services. Since their children live far away and since they do want to disturb their busy lives, they are hesitant to ask for their help.

They both worked their whole lives in the catering industry which has left its marks on their physical condition.

For the last few years, Riet has endured joint aches. Together with a couple of hours a week of assistance from social care, Jan takes care of her at home. Since this takes up most of his time, reducing their energy use or installing energy saving measures are a low priority. Together they live from their old age pension, which is just about enough to sustain them. But they have a relatively high energy bill, since Riet's condition requires a stable temperature in the house all year around. They know how to live economically, but their high energy bills have resulted in them being in debt with their energy provider. With Riet's condition and their lack of access to direct energy saving services, these debts have become less of a priority.



BENEFITS OF TACKLING ENERGY POVERTY

› 5. ENERGY POVERTY AND ENERGY POLICY

THERE IS A LACK OF A SPECIFIC ENERGY POVERTY POLICY AT NATIONAL LEVEL

The Netherlands' national climate and energy policy focuses mainly on generic measures for households. For example, the Dutch government recently reformed the energy tax system. The aim of this reform is not to combat energy poverty, but to make the switch to a sustainable energy supplier more economically attractive for all households. This reform consists of three elements. Firstly, the tax on natural gas will gradually increase, while the tax on electricity will decrease. This measure will incentivize switching from natural gas to electricity and the use of more sustainable heating options, such as a heat pump, more attractive. Secondly, the Sustainable Energy Surcharge (in Dutch: Opslag Duurzame Energie, ODE) – an additional tax that finances the subsidy scheme for promoting renewable energy generation⁵ – will increase in the coming years. Thirdly, in order to compensate for rising energy costs resulting from the above-mentioned reforms, the existing tax reduction on energy bills (a fixed annual energy tax refund) will be increased from € 257.54 to € 435. As a result, the tax part of households' energy bills will be lower in 2020 than in 2019. The purpose of this measure is to prevent an excessive increase in energy bills during this phase of the energy transition. In total, this involves a tax reduction of €3.4 billion.

SIMPLY PROVIDING SUPPORT FOR PAYING ENERGY BILLS IS NOT A LONG-TERM SOLUTION.

Governments that focus their energy poverty policies solely on providing support in paying energy bills are not effectively combating the problem of energy poverty, because alleviating payment problems does not guarantee that households will save energy or will invest in energy efficiency measures. It can even, to a certain extent, remove the incentive to do so. Therefore, such an approach does not provide sustainable benefits for the household or the energy transition in the longer term. The generic tax reform described above illustrates this well. It is true that energy-poor households also receive a general rebate on energy taxes, but this only helps to reduce the increase in their energy costs and not in making their homes more sustainable. At the same time, energy-poor households that are unable to invest in sustainable technologies face rising energy costs due to their continuing dependence on fossil fuels, which will be increasingly taxed. About 6.5 million households (the vast majority) in the Netherlands are not in energy poverty and are more than able to pay their energy bills. Nevertheless, they also benefit from the significant flat-rate tax reduction on their energy bill. This amounts to about 20% of the average household's energy bill.

⁵ The SDE + and SDE++ schemes.

GENERIC PROGRAMMES

Alongside energy pricing measures, the national climate and energy policy in the Netherlands provides for various generic programmes, policies and regulations aimed at making the built environment more sustainable. Some examples of these are the Programma Aardgasvrije Wijken (PAW), the Regeling Reductie Energiegebruik (RRE), Expertisecentrum Warmte (ECW), the Nationaal Warmtefonds and the Subsidie Energiebesparing Eigen Huis (SEEH). To date, these and related schemes have failed to specifically focus on energy-poor households, even though the professed aim is for the energy transition to have a cost-neutral effect for as many households as possible in a wide variety of situations.⁶ Even implementation of the Climate Agreement in the built environment is only now starting to focus on vulnerable residents and lower income groups. At the start of 2021, for example, the Nationaal Warmtefonds will provide an energy-saving mortgage for financially vulnerable households who want to make their homes more sustainable as part of a neighbourhood-based approach, paying according to their financial means and ensuring that no residual debt remains at the end of the term of the loan.⁷ However, most of the existing schemes still fail to recognise the complex interplay between the personal situation, income situation and housing situation of energy-poor households. For example, most schemes presume financial self-reliance and a relatively high level of skills. However, many energy-poor households do not meet these criteria.

‘An effective approach is to prioritise energy efficiency improvements for the least energy efficient housing stock where the most vulnerable households live.’

TARGETED ENERGY POVERTY POLICIES LEAD TO SIGNIFICANT SOCIAL BENEFITS

What entails an effective energy poverty policy? A promising strategy is to prioritise energy efficiency improvements for the least energy efficient housing stock where the most vulnerable households live. This was done, for example, by KAW Architects for a housing corporation in Oost-Groningen (Bijker, Depenbrock & Heuff, 2019). Although energy efficiency can be achieved through renovation, often providing targeted advice to households about cost-saving measures and air quality has a big role to play. Increasing the energy efficiency of these homes often results in the largest energy savings per m². Moreover, increasing the energy efficiency of precisely these homes brings with it many non-energy related benefits. After all, for these homes, increased energy efficiency leads

⁶ For example, in the Sociaal Huurakkoord of 2018, both Woonbond and Aedes (Association of Social Housing Organisations) agreed that the energy transition for tenants will be as cost-neutral as possible in terms of housing costs. This means that increases in rent or service charges due to renovations must not exceed the average energy bill savings due to the renovations.

⁷ See Letter to parliament from the Minister of the Interior on the state of affairs of the Klimaatakkoord Gebouwe Omgeving, 28-09-2020 (Ministry of the Interior and Kingdom Relations (2020a).

to the relatively sharpest reduction in energy costs. It also results in the strongest health gains by reducing problems associated with damp and insulation, especially in combination with targeted advice regarding cost-saving measures. Increasing the energy efficiency of these homes can therefore lead to all kinds of positive cumulative effects and therefore reduce financial as well as physical and mental health problems.

BOTH AT NATIONAL AND AT MUNICIPAL LEVELS

In the Netherlands, such an approach to energy poverty has to date been developed almost exclusively at municipal level. TNO has analysed the effectiveness of a number of these municipal projects (Straver et al., 2017). The study looked at the logistical dimensions of the project, at the effectiveness of the different types of interventions, at the actual and potential savings and possible improvements for this type of municipal project. It concluded that these projects result in three types of benefits: they save energy, reduce household expenditures and can potentially generate new jobs. Energy savings for households were found to average €100 per year, and sometimes even higher for certain energy-poor households (such as single-parent households). Projects run by the municipalities of Utrecht and Arnhem achieved average savings for households between €150 and €250. These amounts do not include the additional co-benefits in terms of health and general welfare.

International research also shows that targeted policies lead to significant co-benefits not only for energy-poor households but also for society as a whole. Several analyses show that the social benefits of increasing the energy efficiency of low-energy homes far outweigh the investment costs. For example, an evaluation of investments made by the Irish Government in improving the energy efficiency of homes of energy-poor households calculated that the cost/benefit ratio of these investments was on average 2.5. That means that for each euro invested, on average 2.5€ of benefits were generated. This figure results from the sum of energy savings and emission reductions, increased living comfort and health improvements, expressed in monetary units (Scheer, 2013). Several such analyses have been published, including one for New Zealand, which have comparable results (see for example Chapman, 2009; Clinch and Healy, 2001). These and other studies show that non-energy related co-benefits are about three times higher than the actual energy saving benefit. Without question, the households in question feel these additional benefits. However, there are also wider economic benefits for society as a whole, for example as a result of better educational outcomes and higher labour productivity. Of all the non-energy related co-benefits, one often stands out – the effect on children's health, for example by reducing asthma caused by damp and poor indoor air quality (Heffner & Campbell 2011).

TAKING THE LEAD: THE MUNICIPALITIES

It is surprising that in the Netherlands, local authorities are currently frontrunners in terms of energy poverty policy. Local authorities are the driving force behind the debate on energy poverty that they observe in their local communities. A large coalition of municipalities are actively developing strategies, action plans and regional agreements (often with limited financial resources and staff time). For example, the municipality of Arnhem plans to implement a three-year energy poverty programme which will benefit at least 2,500 energy-poor households. Municipalities such as Leeuwarden and Breda share best practices and experiences – facilitated by TNO and RVO – and therefore play a key role in combating energy poverty (VNG, 2018).

‘An important co-benefit of making housing more sustainable is the reduction of asthma in children.’

FRAGMENTED APPROACH

This means that the fight against energy poverty in the Netherlands is characterised by a fragmented approach through small projects that are not embedded in a national framework. The development and implementation of energy poverty policy lies almost entirely with local authorities. This has two major drawbacks. Firstly, each municipality in turn has to reinvent the wheel when developing a policy. This slows down actual achievement of the energy transition targets and the support provided to vulnerable households (ECN, 2017). Secondly, the limited size of many of the projects undermines the usefulness and need for thorough research for policy decision-making. As noted before, improving the energy quality of a home can contribute to the objectives in the social domain. These include improving physical and mental health, increasing disposable income, increasing living comfort and increasing labour productivity (Mzavanadze et al. 2015). By thoroughly researching and monitoring these multidimensional effects, the welfare gains achieved from local energy poverty projects can be better mapped out. This can contribute to the development of effective policy, for example by improved prioritisation of investments.

FROM LOCAL TO REGIONAL AND NATIONAL

In order to achieve this, it is very important that municipalities are supported by higher levels of government. The good news is that in the Netherlands, the provinces, which form the next level of the country's administration, are now involved in the subject of energy poverty. In particular, the provinces Groningen, Friesland and Drenthe (which have formed a group) and the provinces Utrecht and South Holland (VNG, 2017) are financing and encouraging research, are launching provincial programmes and are helping municipalities with their energy poverty initiatives. We recommend that these initiatives at municipal and provincial level are reinforced by national efforts. This can be done by investing in stimulating cooperation, coordinating knowledge transfer within the provinces and providing funds for research into energy poverty and the evaluation of energy poverty policies.

‘The battle against energy poverty in the Netherlands is still characterised by a fragmented approach.’

› 6. THE NETHERLANDS' APPROACH TO COMBATING ENERGY POVERTY

It is a major challenge to reduce CO₂ emissions and replace fossil fuels with sustainable alternatives, whilst still ensuring a safe, consistent and affordable energy supply. In the Netherlands, this transition should be shaped by an increased focus on energy poverty. After all, there is a risk that the energy transition will lead to an increase in energy poverty. Public support for the energy transition could be undermined if some households fall behind. Conversely, a reduction in energy poverty could lead to a range of socio-economic benefits and help accelerate the energy transition. To date, however, the Netherlands lacks a comprehensive framework for accurately measuring, monitoring and combating energy poverty. The European Commission has advised the Netherlands, in line with the EU Regulation on the Governance of the Energy Union and Climate Action (EU)2018/1999, to establish a national climate and energy policy to combat energy poverty (EC, 2020). In response to this, we make three recommendations to aid the development of an effective energy poverty policy in the context of the energy transition.

‘Simultaneously accelerating the energy transition and reducing energy poverty can lead to a range of social benefits.’

1. DEVELOPING A NATIONAL MULTI-INDICATOR MEASURING INSTRUMENT

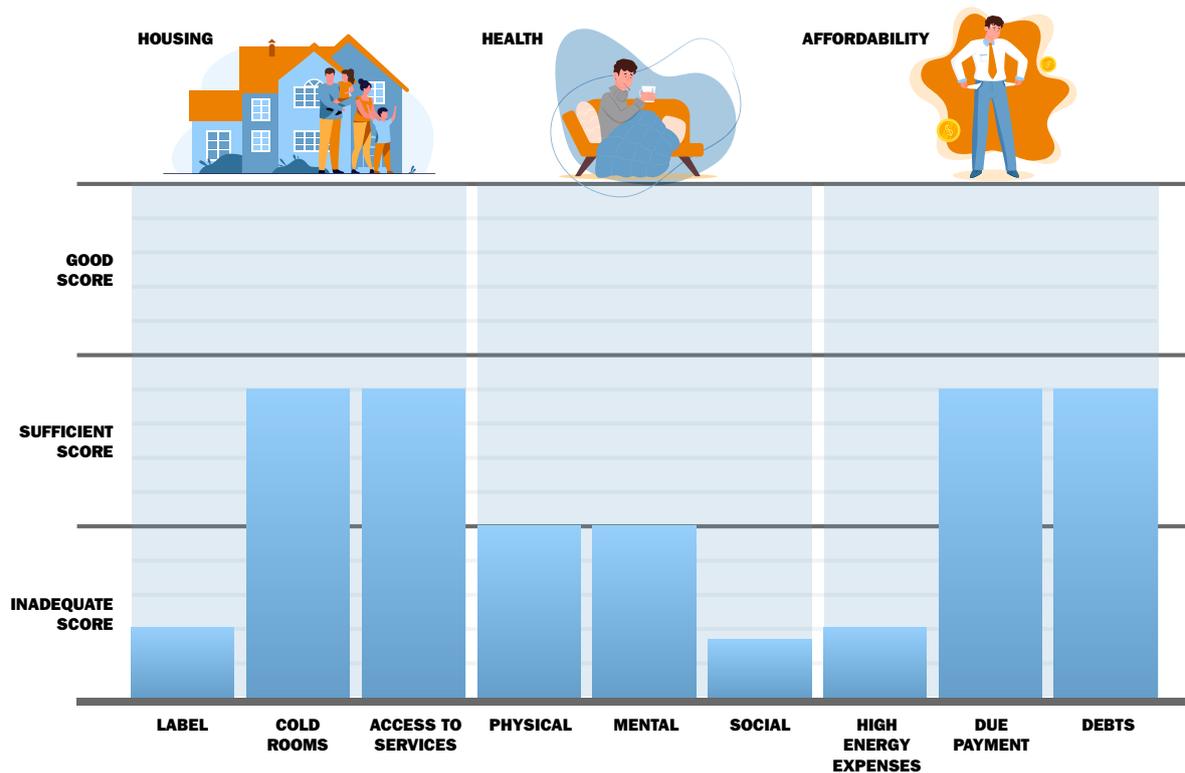
We urgently need to develop a multi-indicator framework at national level. Such a framework is lacking at present, but would significantly help in identifying and monitoring the energy poverty problem. The results could be used to develop and evaluate targeted and effective energy poverty policies.

In response to the Directive (EU)2019/944 on common rules for the internal market for electricity, EU Member States are now developing quantitative measurement frameworks to better identify energy poverty. Many countries focus on one or more indicators that highlight a component of energy poverty (EU Energy Poverty Observatory, 2020). We illustrate this approach for different EU countries in the box-outs below. The Netherlands has followed this trend of focusing on a limited number of indicators, including the commonly used energy (energy costs as a percentage of total household expenditure) and arrears on energy bills.

In this white paper, we argue that focusing on these primary indicators does not do justice to the complex and multidimensional nature of energy poverty. These metrics underestimate the social consequences of energy poverty. Furthermore, they do not sufficiently recognise that combating energy poverty leads not only to financial benefits but also to a reduction in emissions, increased living comfort and health benefits. As the adage goes, what is not measured is not managed. If the effects and benefits of combating energy poverty are under the radar, they are likely to be underestimated in policy-making decisions.

The multidimensional nature of energy poverty calls for a multi-indicator framework for effective measuring and monitoring. This will lay the foundation for developing and monitoring effective policy programmes aimed at combating energy poverty. The rise or fall in energy poverty incidence over longer periods of time needs to be mapped out by charting progression according to several indicators (e.g. step-by-step improvements of a home's energy label). In specific terms, this calls for the selection of a set of indicators that can identify both the causes and effects of energy poverty.⁸ Such tiered, multi-indicator frameworks are meanwhile gaining greater recognition in international literature (Kagimu & Ustun, 2016) and deserve to be replicated.

⁸ An example of the variety of indicators can be found at the European Energy Poverty Observatory or in the overview report by Thema, J. and Vondung, F. (2020).



EVERYDAY LIVES

We therefore recommend developing a tiered, multi-indicator policy framework to measure energy poverty in the Netherlands (see box-out). This framework needs to include both indicators on energy use and the energy efficiency of energy-poor households as well as indicators on the financial and living situation of energy-poor households. Such a framework would offer the possibility of establishing and monitoring specific policy objectives relating to an affordable and equitable energy transition. It would be beneficial to use this to include the long-term development of energy poverty in the annual Climate and Energy Outlook (in Dutch: KEV).

Alongside collecting better quantitative data on energy poverty, we should also invest in qualitative monitoring methods on energy poverty. There is a growing section of social science research that deals with understanding energy poverty by looking at the everyday lives of people who experience it every day (Middlemiss and Gillard, 2015). This type of research (focused on ‘lived experiences’) uses qualitative methods, such as longitudinal interviews and focus groups, and documents the experiences of people confronted with reduced access to energy services. It provides an in-depth knowledge of the dynamics of energy poverty by providing insight into how people deal with it, the considerations they take into account and how different policies affect their lives. We argue in this white paper that energy poverty affects not only the financial situation of households, but also their physical and mental health, social life and job productivity. These effects can reinforce each other and lead to a negative spiral. The combination of qualitative and quantitative research helps us obtain a clearer picture of these mutually reinforcing effects and to develop policies accordingly.

2. DEVELOPING POLICIES FOCUSED MORE SPECIFICALLY ON ENERGY POVERTY

The Netherlands' national climate and energy policy consists of mainly generic measures which are not specifically aimed at energy-poor households. We recommend developing a targeted energy poverty policy alongside the generic measures at both national and local level. However, this policy should not primarily focus on support in paying energy bills. We need to get a better understanding of how to use policy instruments to prevent energy poverty. Furthermore, it is important that in the context of the energy transition we step up our efforts to eliminate the various barriers to the uptake of energy-efficient, sustainable energy technologies by energy-poor households.

It is a well-known fact that the uptake of new sustainable technologies in general is a long-term process, with many households continuing to use existing technologies for a long time, even when the new technologies have become cost-effective.⁹ There are many reasons that can explain this behaviour: lack of information and knowledge, doubts about the technology combined with a certain degree of irreversibility of an investment, the value of deciding to wait because the learning curve will reduce the cost of a technology over time, complementarity of the use of different technologies, lack of access to a simple or favourable financing scheme, and so on. In this white paper, we argue that in the case of energy-poor households, there are sometimes other specific barriers to adopting new energy-efficient technology – for example, the lack of authority as a tenant to invest in the home, the lack of financial self-sufficiency or a lack of skills to organise such an investment. Removing these barriers requires a smart combination of policy instruments that take into account the multidimensional nature of the energy poverty problem.

A specific, promising and targeted policy strategy is to prioritise energy efficiency improvements to the least energy efficient housing stock where the most vulnerable households live. Making these homes more energy efficient is expected to lead to relatively many benefits in several areas at once: the energy quality of the housing stock (reducing both energy consumption and CO₂ emissions), health (improving home comfort and saving on healthcare costs) and reducing the financial burden (reducing energy bills and creating room for productive spending). Developing such a policy strategy requires combining information about the built environment with information about the personal and socio-economic characteristics of households.

A good first step in developing targeted energy poverty policies is to evaluate existing schemes and programmes from the perspective of energy poverty. An example of this can be found in the latest parliamentary letter on the progress of the climate agreement for the built environment (Ministry of the Interior and Kingdom Relations (2020a)). Additionally, the experiences of energy-poor households should play an important role in the policy development process. This is already happening in Scotland (Scottish Government, 2018), where they use the previously mentioned lived experience approach. Such an approach also offers the opportunity to directly monitor policy as experienced by households: by setting up qualitative panel studies, with a cohort of a diverse group of households, and by conducting longitudinal interview

⁹ A phenomenon also called the energy efficiency paradox (Jaffe and Stavins 1994). See also Balta-Ozkan et al. (2013).

processes to understand policy effects over time. Municipalities and social work, which are already involved in combating poverty in vulnerable households, also have an important role to play here. Debt management and financial support programmes can also contribute to monitoring the role that energy plays in the lives of vulnerable households. In this respect, municipalities could benefit from a national information point or knowledge centre that could provide support in setting up or improving energy poverty projects and programmes.

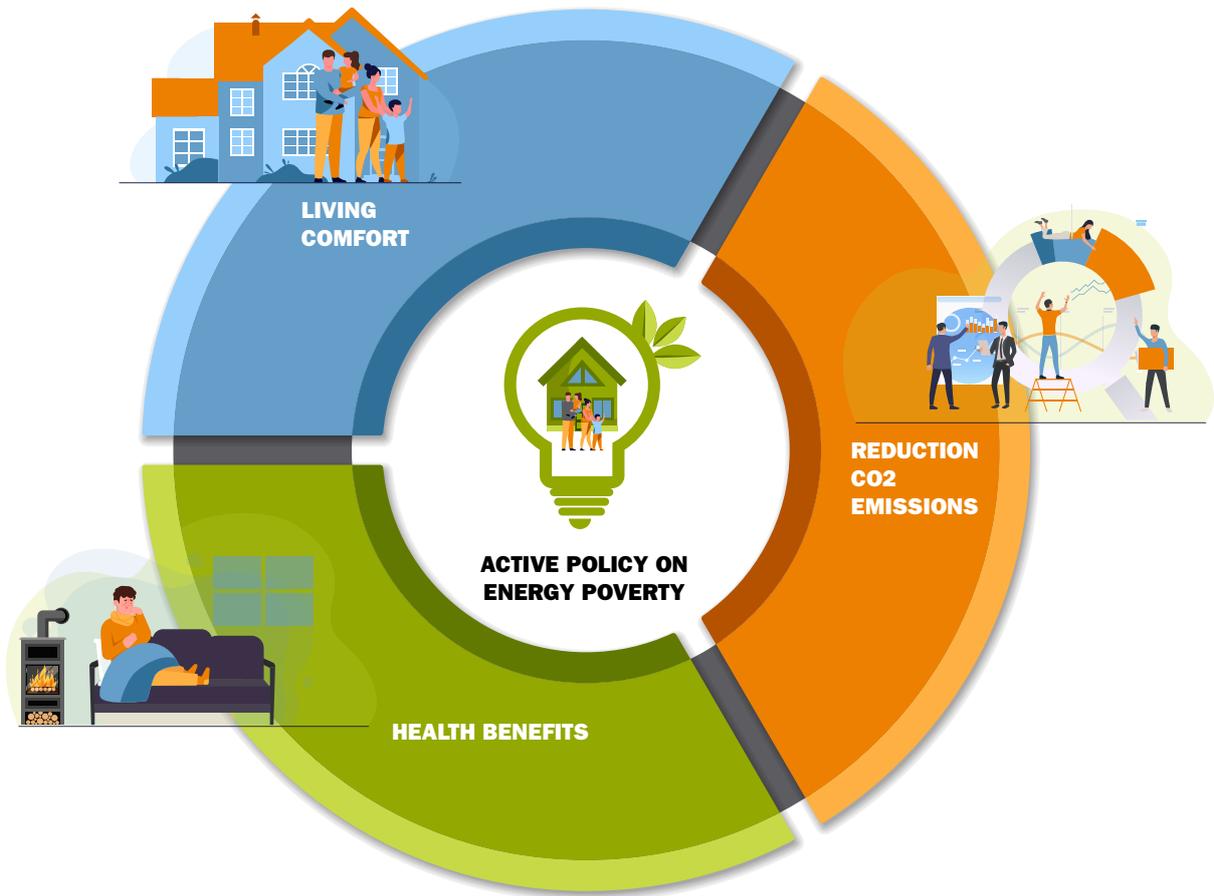
‘Different ministries each have a piece of the jigsaw to work on effectively tackling energy poverty. However, we still lack an integrated approach.’

3. INTEGRATING ENERGY POVERTY INTO SOCIAL, ENERGY AND BUILT ENVIRONMENT POLICIES

There is much to be gained in tackling energy poverty if social policy, energy policy and policy on housing and the built environment are better aligned. However, at a national level, the various ministries work on these policy areas from separate targets and responsibilities. They each have a piece of the jigsaw to work on effectively tackling energy poverty. For example, the Ministry of Economic Affairs and Climate Policy is responsible for achieving CO₂ reduction and the Ministry of the Interior and Kingdom Relations is responsible for the gradual phasing out of natural gas in the built environment. The Ministry of the Interior and Kingdom Relations deals with poverty and employment and the Ministry of Health, Welfare, and Sport is responsible for health.

Effectively addressing energy poverty in the Netherlands requires a better inter-departmental approach. An approach whereby targets, responsibilities and budgets are in optimum harmonisation. This could include the housing market, public health and social welfare. This approach would also benefit local authorities. Even though municipalities have taken the lead in combating energy poverty, there is still much to be gained at municipal level from better coordination between different policy areas. Conversely, an effective energy poverty policy makes it easier for the different policy domains to cooperate in achieving distinct responsibilities and goals (Clancy et al., 2017).

In order to achieve this, we recommend setting up a national task force to design and implement national policy to better measure, monitor and combat energy poverty in the Netherlands. The task force should in any case consist of representatives of four ministries (the Ministries of Economic Affairs and Climate Policy, Social Affairs and Employment, Interior and Kingdom Relations and Health, Welfare and Sport), energy suppliers, network operators, homeowners' association, AEDES, VNG, RVO, PBL, NIBUD, various municipalities, practitioners and international experts involved in energy poverty. After all, there is common interest in doing this. Less energy poverty will improve the lives of vulnerable households at several levels, will ensure a fairer and quicker energy transition and will increase prosperity for society as a whole.



ADVANTAGES OF ENERGY POVERTY POLICIES

› ENERGY POVERTY PROFILE: **JOHN**

JOHN is a single man in his early forties. Despite the fact that he has been living in his small three room apartment for a couple of years, there is hardly any furniture. The only personal touch to the apartment are some posters. The dwelling itself is in poor condition, being single glazed, poorly insulated and with many cracks in the walls. His landlord has promised many times to improve his situation, but so far nothing has been done. The energy coach that visited his house tried to give him advice, but there was a lack of understanding because of a lack of Dutch language skills. These events left him feeling frustration towards the authorities.

He lives in a neighbourhood with a high percentage of elderly people where he feels socially isolated. He has no emotional connection to the apartment, and if it was up to him he would leave the place. Because of the language barrier, he does not sufficiently understand his energy bill. He does invite a lot of family and friends over to cook traditional meals. Preparing these meals takes several days, with multiple pans on a low fire. He is aware that this increases his energy bill and thus his debt with the energy company. But since this is one of the few things that gives him pleasure, he does not want to stop doing this.

LEARNING FROM OTHER COUNTRIES

Spain

In Spain, the institutional recognition of energy poverty through specific indicators has gone hand-in-hand with the development of a specific policy framework (the Spanish National Energy Poverty Strategy) aimed at reducing the incidence of energy poverty by 25% in 2024.

The introduction of the indicators recommended by the European Energy Poverty Observatory (EPOV) has contributed significantly to the recognition of energy poverty in Spain. However, important aspects of the lived experience of energy poverty are still missing in the measuring and monitoring framework. These include underspending on essential energy services, debts to service providers, forced and self-imposed household disconnections, issues around pre-purchased forms of household energy (e.g. bottled gas), informal or irregular connections, and fire hazards and accidents resulting from risky energy practices.

Because data on these aspects is not available, the sometimes dramatic consequences of severe energy poverty are still disregarded in policy frameworks. Incomplete statistics result in inadequate policy responses. The lack of recognition of severe energy poverty conditions speaks of a under-recognised energy precariat unable to participate in society on an equal footing.

United Kingdom/England

In 2001, the aim was to eradicate fuel poverty by 2016. The United Kingdom used the 10% definition: if a household spends more than 10% of its income on fuel, it is categorised as a household experiencing fuel poverty. More recently the UK has adopted the low income high cost definition.

However, in both cases, only a single indicator was used. This narrows the scope of what can and cannot be done about energy poverty. A multi-layered approach, with core objectives and better defined plans to achieve them, would be more effective.

France

In 2010, a new law called ‘Grenelle 2’ was introduced. This shifted the policy for reducing energy poverty from the social welfare domain to the responsibility of energy policymakers. This shift was crucial for tackling energy poverty as an environmental problem. France combines two concepts of energy poverty; ‘précarité énergétique’ (energy insecurity) with ‘pauvreté énergétique’ (energy poverty), whereby the latter refers to households that cannot afford energy services. Additionally, France uses several indicators for measuring energy poverty: the 10% income indicator, the high-income indicator (LIHC) 5, the subjective experience of a cold house, mobility indicators and inadequate lighting at home. France’s definition of energy poverty is: “Anyone experiencing particular difficulties in their housing due to the inadequacy of its resources or its housing conditions. Or to have the necessary energy available to meet basic energy needs”.

Scotland

Scottish ministers are required to publish a fuel poverty strategy to reduce the number of households living in energy poverty. The goal is that by 2040 no more than 5% of households in Scotland will be living in fuel poverty. Every five years the Scottish Government reports on progress in reducing energy poverty. This report provides information on the progress and plans for the next five years. Scotland's energy poverty policy pays explicit attention to the health benefits of reducing energy poverty, such as improving indoor air quality, improving mental well-being and reducing respiratory complaints due to poor ventilation and mould (Scottish Government, 2018).

EXAMPLE OF THE LIVED-EXPERIENCE FROM THE UNITED KINGDOM

By talking to people about their experiences of energy poverty, we get a better understanding of how these situations come about. For example, through their relationships with family and friends, how they are treated by their landlord, specific failures with insulation or energy efficiency and the challenges they face when switching suppliers. These interactions often change the perception of how and why people act as they do and also offer policy solutions to energy poverty problems.

Many policy initiatives around the energy market focus on providing information to people about how to switch suppliers. The assumption is that people do not understand or lack information about what they need to do or that people are not interested in acting in their own interest. However, when British researchers talked to people about this in more detail, they found that the energy poor are more than well aware of how much energy costs. For instance, they will be able to tell you how much it costs to do a load of washing. Their resistance to switching is not always rational. For those with IT skills, it is more often than not a relational decision: it is based on their previous experiences with the energy supplier, the level of trust they have in the supplier, experiences of friends and family with switching and the perceived risk this entails. As soon as we understand this, we can also understand why it is unlikely that informing people of their switching options will have any substantial impact. An alternative approach would be to approach people through intermediaries to give them the confidence to change suppliers. Or, even more radical, to create markets in which people are not required to switch in order to get the best price.

For researchers working in this field, the lived experience is an important way of monitoring this problem. It is the only way in which the full effects of the various policies affecting energy poverty can be seen (Middlemiss et al., 2019). It also offers unique opportunities for policy makers: gaining insight into the unintended consequences of (energy) policy and other forms of intervening actions, such as a divorce or redundancy.

THE BENEFITS OF A MULTI-INDICATOR, MULTI-LAYERED FRAMEWORK

In order to see whether the living situation of households is improving, it is important to monitor progress. To do this, we can use indicators, such as the different types of households, income, type of housing and geographical areas. Progress can be tracked for each indicator. This multi-indicator framework provides insight into how and which households have upgraded from, for example, Label F to Label B homes. It also shows whether these households have lower energy payment debts and which households can reduce their energy expenditure. A comparison of these indicators shows which households are 'lagging behind' in energy policy making. These cross-references – a multi-layered system – are necessary to create a gradual transition to better housing situations. A binary indicator – which only focuses on measuring layer 0 or 1 – is not able to properly record this transition and the mechanisms behind it. A multi-indicator, multi-layered policy framework offers many advantages. We can easily measure which households are able to participate in the energy transition and which are lagging behind. It is important that a multi-layered framework combines the setting of energy poverty targets with indicators and the adoption of an energy poverty policy.

The basis for a new policy

In order to understand energy poverty in the Netherlands, it is important to realise that we need to look at a combination of indicators. These are: 10% energy expenditure, low income vs. high cost indicator, overdue energy bills, household energy debt in euros, energy label of homes, ability to access energy services, type of energy source, average number of rooms that can be heated in winter and presence of leaks, damp and rot in the home. These indicators to help demonstrate different aspects of energy poverty are known from various studies and are explained in the index section of this document. In addition to measuring energy poverty through multiple indicators, it is also important to know the vulnerability of a household. This will allow municipalities to develop specific programmes, which have as their aim to provide insight into who is vulnerable and whether certain indicators of vulnerability should be articulated more extensively. Indicators known from the literature on energy poverty are: gender, disability, social isolation, employment status, housing situation, mental health and migration background. The basic starting-point must be the data collection, the monitoring and setting of targets based on indicators and vulnerability indicators. This is the basis on which a new and innovative energy poverty policy can be created or adapted in the Netherlands.

› ENERGY POVERTY PROFILE: FAMILY DE WIT



THIS FAMILY lives in a large rental house, built around 2000. One of the parents (Michiel) is unemployed, but Tara still has a job that pays the bills. Their income is therefore just above the limit for subsidies on their rent. One of their children just turned 18, so several subsidies that they received for Douwe stopped (kinderbijslag en kindgebonden budget). Their son is starting a new course, and he needs books and a laptop, things that the household is trying to save money for. There is a chance they have to stop their subscription to their local football

club, as the contributions they have to pay might be too high.

Tensions are rising at home, the parents worry a lot about getting by. If things don't improve, and Michiel doesn't find a new job, they probably won't go on holiday this year, again. They will tell relatives and friends they'll just stay home this year 'relaxing', because they don't want to tell the truth; they can't afford it. Their energy bill is around 130 euros a month, but it seems hard to change that.

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INDEX

Energy poverty is a multidimensional concept that cannot easily be captured by a single indicator. In measuring energy poverty, we use a set of indicators, which must be looked at and used in combination. Each indicator captures a slightly different aspect of the phenomenon. For more information about the indicators, how they are calculated and interpreted and the database that is used, please read our methodology guide. It shows the availability of data for a range of different indicators, such as Eurostat data explorer, building stock observatory, EU SILC micro-data, micro-data of the household budget survey issued by Eurostat [ESTAT] (and supplemented by AT and NL national statistical offices).

It is our intention that the following indicators are used to provide a snapshot of energy poverty issues, which can then be further explored in research and action projects. These indicators are known from research showing the different aspects of energy poverty (Theme, J., & Vondung, F., 2020). As a starting point, we propose that important benchmarks for understanding energy poverty of households in the Netherlands are a combination of the following indicators. These indicators are known from research to help demonstrate various aspects of energy poverty (REF):

Energy expenditure, (Is your energy bill too high compared to your expenditure?).

Possible answers from worst to best case scenario: >20%, >15%, >10%, 5%, <5%

Payment arrears on energy bills, (Are you having trouble paying your bills?).

Possible answers from worst to best case scenario: >90 days, >60 days, >30 days, >10 days, no arrears

Household energy debt in euros (What is your household's energy debt to energy suppliers?). Possible answers from worst to best case scenario: >500 €, >200 €, <200 €, < 100 €, no energy debt

Energy efficiency label of your home, (Is your home energy efficient?). Possible answers from worst to best case scenario: F, E, D, C, B, A

Possibility to access energy services (Are you able to maintain the minimum standards of living?). Possible answers from worst to best case scenario: choice between eating or heating, minimum use of heating, heating and eating and lighting, all possible use against minimum standards, full use of all services

Type of energy source (Is your energy sustainable or future-proof?), Possible answers from worst to best case scenario: 100% fossil fuel (energy mix of natural gas and electricity) to 100% renewable energy sources

Average number of rooms that you are able to heat in winter (Are you experiencing spatial shrink?). Possible answers from worst to best possible scenario: no rooms heated, one room heated, several rooms heated, all rooms heated

Presence of leaks, damp, rot/mould in your home (Are there any health and energy efficiency problems?). Possible answers from worst to best case scenario: there are leaks, rot/mould and damp, rot and damp, leaks, no problems.

In addition to measuring energy poverty through multiple indicators, it is also important to know the vulnerability of a household and to have specific targeted programmes. This will provide an insight into who is vulnerable and whether certain vulnerability indicators should be listed more extensively.

Indicators known from scientific literature (Clancy et al., 2017; Snell et al., 2015) regarding the social intersectional component of energy poverty are:

- Gender income gap - the socio-cultural distribution of care responsibilities between women and men, biological demography: life expectancy of men and women
- Disability and chronic illness - need for extra warmth
- Social isolation, - finding information/receiving advice
- Employment status - unemployed, low-income work
- Literacy and educational background: functional illiteracy limits access to information
- Housing status - homeowner or tenant
- Occupancy rate - living alone or with others, multi-generational households, single-parent households, large families, single parent, single dwelling
- Mental health - unable to cope with energy consumption/stressed by energy bills
- Migrant background - difficulty with information/language issues, different cultural habits and heating/cooling/cooking patterns.

Data collection, monitoring and the setting of targets resulting from indicators and vulnerability indicators together form the policy framework. It is essential to be aware of this correlation when collecting, monitoring and evaluating indicators. Energy consumers have different energy needs and behavioural patterns related to their gender, family situation, age, health, cultural background, migrant background, employment status, health, housing situation, etc.

Extracted from the European Energy Observatory: <https://www.energypoverty.eu/indicators-data>

CONTACT

Koen Straver

✉ koen.straver@tno.nl

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