RURAL ENERGY MATTERS

Report and recommendations for policymakers
Future of Rural Energy in Europe (FREE) initiative

2016

Table of Contents

About Future of Rural Energy in Europe (FREE) initiative

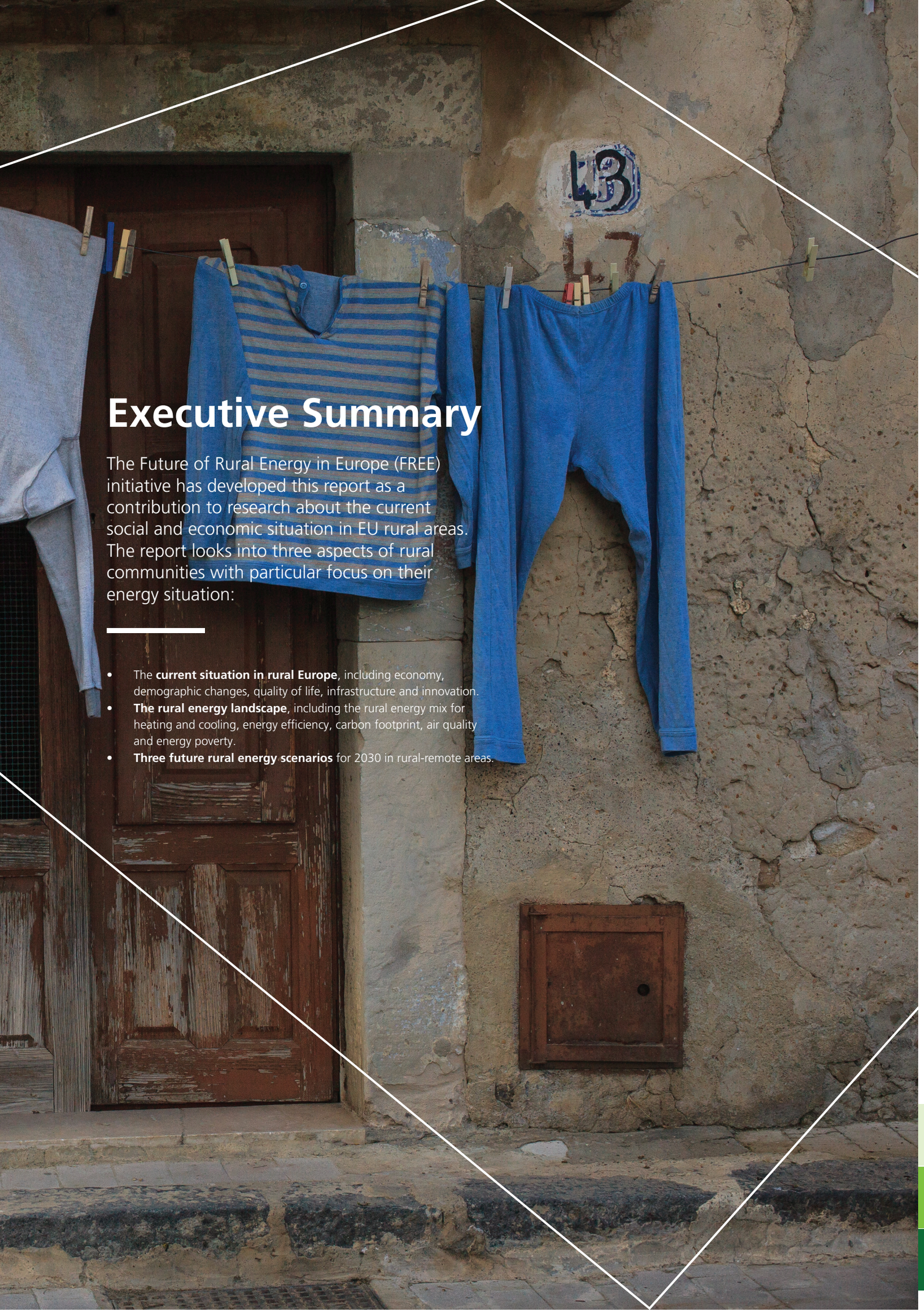
The FREE initiative was launched in 2010 and is funded by SHV Energy, a family-owned company that provides people and businesses with decentralised and personalised energy solutions and services. The FREE initiative is supported by a wide variety of groups and organisations, which are committed to improving the lot and realizing the potential of rural communities through greater energy choice. The aim of the initiative is to promote the use of sustainable energy in rural communities through research, to advise on rural energy solutions and to support rural community initiatives. We want to engage with EU policymakers and influencers to ensure that the specific sustainable energy needs of the EU's rural population are considered when legislation is proposed.

About the Rural Energy Matters Report

The report aims to provide up-to-date information and identify the key policy challenges that need to be addressed at EU level. Furthermore, it presents recommendations to policymakers in view of the upcoming revisions of key energy legislation.

There is little EU-wide data on rural energy use, but this report attempts to construct an overview based on a collection of different sources, including European Commission statistics and industry reports. The projections made herein should be seen as estimations and illustrative scenarios calling upon legislators, and influencers to make decisions that improve the current state of rural energy for the benefit of our environment, the economy and society as a whole.

List of Figures



Executive Summary

The Future of Rural Energy in Europe (FREE) initiative has developed this report as a contribution to research about the current social and economic situation in EU rural areas. The report looks into three aspects of rural communities with particular focus on their energy situation:

- The **current situation in rural Europe**, including economy, demographic changes, quality of life, infrastructure and innovation.
- **The rural energy landscape**, including the rural energy mix for heating and cooling, energy efficiency, carbon footprint, air quality and energy poverty.
- **Three future rural energy scenarios** for 2030 in rural-remote areas.

Rural Europe: Vital to Europe's Economy but Faced with Severe Economic, Demographic and Infrastructural Challenges

Rural, remote and mountainous communities are at the heart of the European Union.

Rural areas make up over 57% of the EU population and generate 46% of Gross Value Added (GVA). Furthermore, there are 40.7 million households located in rural off-grid Europe, which constitutes nearly 19% of all EU households. The rural economy is modern and service-oriented, with tourism playing an increasingly significant role. Yet, these regions face considerable challenges, such as a lower GDP per capita than urban areas, depopulation and difficulty attracting innovation. While the urban-rural divide does not show a significant difference in terms of quality of life, rural dwellers often suffer from a lack of infrastructure, clean energy sources and other amenities.

Rural Energy Landscape: Use of Inefficient High-Polluting Fuels in Rural Areas is Linked to Severe CO_2 Emissions, Air Quality Problems and Health Impacts

Overdependence on solid and liquid fuels is linked to 292 Million tonnes (Mt) of CO_2 emissions in 2016

72% of the heating and cooling demand of single-family homes in the EU is consumed in rural areas. This high demand for energy is combined with an overdependence on solid and liquid fuels, as well as old buildings and inefficient appliances. According to a study by Ecuity Consulting LLP (Ecuity), the most common form of heating in rural-remote (off-grid) areas is coal (39%) followed by biomass (28%) and heating oil (12%). **This overdependence on solid and liquid fuels means that rural-remote areas will contribute towards an estimated 292 million tonnes (Mt) of CO_2 emissions in 2016.**

Air quality in some rural regions of Italy and Poland is worse than in London

Poor air quality is a problem in many rural areas. People living in rural and mountainous areas are more likely to be exposed to high ozone levels caused largely by ozone precursor emissions from energy sources. Emissions of Particulate Matter (PM) and NOx and SOx gases can also be high in rural areas, because of the high use of coal, heating oil and biomass. For example, in the Italian mountainous region of Piedmont, the estimated exposure to small particulate matter (PM2.5) is as high as 21.1 µg/m³ (the highest accepted value in Europe is 25 µg/m³). Not even London - where air pollution is considered a big problem – reaches this level. Similar statistics are available for other rural European regions, for example the Polish Podlaskie region (15.1 µg/m³).

Energy efficiency financing is not reaching rural dwellers

The uptake of energy efficiency is more problematic in rural than in urban areas, despite the fact that on average rural house prices increase by 3.8% (compared to 1.7% in cities) after renovation and energy efficiency improvements. The reason behind the low uptake is that renovation of homes in rural areas is often more expensive and does not necessarily result in a sufficient increase of its energy efficiency rating. Financing seems to be a key issue, as only a small amount of funding goes to renovation of rural households. For example, 1.7 million British off-grid households have in the last few years paid over £40 each to national schemes to make households more energy efficient, but only 1,500 of them have seen any direct benefit for their own homes.

Some rural dwellers are twice as likely as urbanites to be fuel poor

Fuel poverty is often a problem for rural dwellers. For example, **British households located in off-grid areas are over twice as likely to be fuel poor as households who use mains gas.**

Future Rural Energy Scenarios: 80-100 Mt CO_2 Can be Saved by 2030 if Specific Measures are Introduced

According to three future scenarios examined by Ecuity, the potential for rural-remote energy consumption savings in heating and cooling lies between *10-21 million tonnes of oil equivalent (Mtoe) in 2020-2030.* If measures are taken to switch from high-polluting fuel sources and increase energy efficiency in rural-remote areas, rural carbon emissions could decrease by **80-100 Mt CO_2** (compared to business-as-usual by 2030. The three scenarios (Business-as-usual, Low-carbon and Low-Carbon /High Efficiency) demonstrate the CO_2 reduction potential if heating oil and coal are replaced and/or if additional energy efficiency measures are introduced.

Rural Europe – An overview

This section looks at the overall economic and social makeup of EU rural areas, and provides a background to FREE's analysis of the current situation with regards to the energy mix, energy efficiency, air quality and carbon footprint in rural communities. For the purpose of this report, FREE defines "rural areas" as regions classified as "predominantly rural" as well as "intermediate" by the European Commission. (1) This broad definition is used to ensure that the experiences of all non-urban dwellers are covered, not just those who live in the open countryside. When other common definitions of "rural" are used, such as "off-grid" or "rural-remote", this is explicitly stated.

Rural areas make up a significant part of the European landscape and population. More than 90% of European Union territory is rural and 52% is predominantly rural. (2) Over half of the EU population (57.4%) live in rural areas and around 22% in predominantly rural areas. (3) In addition, there are approximately 40.7 million homes with no access to the natural gas grid due to their remote rural location.

Rural communities remain at the heart of the European Union, but are undergoing significant demographic changes. Since 2007 the number of people who claim to live in the "open countryside" has fallen while the number of those living in medium/large towns has increased. Young people are leaving the countryside and fertility rates are declining, (4) which means that the average age is particularly high for rural areas; around 19% of rural dwellers are over 65. This compares to 17.6% in urban areas (5). Whilst migration is a real issue for rural Europe, it is a multifaceted trend; many people move away from rural to urban regions, but at the same time "counter-urbanisation" movements are increasingly inspiring people to move back into the countryside, thus bringing back economic activity to these regions (6). For example, in a recent British survey, 21% of respondents claimed they would like to move to the countryside, making rural areas the most popular location for potential movers (7).

For the people who stay in their rural communities, life is very different from that of their urban neighbours. Rural dwellers are less likely to live in single-person households, and their families tend to be larger (8). Working-age women often play a smaller role in the labour force of predominantly rural regions than in the EU economy as a whole, and there is often a burden on these women to take care of the household, especially as child care amenities are more scarce in these areas (9).

In addition, rural dwellers tend to have lower levels of formal education than the urban population; 68% of rural adults left school after finishing their secondary education and only 17% finished tertiary-level training (10). People living in rural Europe are also more exposed to the risk of poverty; their risk rate is at 27.1%, considerably higher than that of urbanites (24.3%) (11). Whilst unemployment is more prevalent in urban areas than rural, (12) employment rates (i.e. employment/population ratio) in predominantly rural areas are, at around 63%, slightly lower than the EU average of approximately 64% (13).

Despite these differences, the perceived quality of life for rural and urban dwellers is very similar. Of the eight indicators investigated by the European Foundation for the Improvement of Living and Working Conditions (social exclusion, risk of mental ill-health, dissatisfaction with accommodation, low trust in local government, dissatisfaction with life, deprivation of several items, bad health and difficulty making ends meet), only two show a significant difference between rural and urban dwellers, and they are to the detriment of urbanites: people experience lower trust in local government and are more dissatisfied with their accommodation in urban areas (14).

However, lack of infrastructure and services is a problem in the countryside. Problems accessing healthcare due to distance are more often found in rural than in urban areas, as are difficulties relating to lack of transport options (15). The share of households with broadband access (78%) is considerably lower in rural areas than in non-rural areas (100%) (16). A recent report shows that in Miserden, a village in rural Gloucestershire, United Kingdom, the broadband speed is worse than that on a Mount Everest base camp (below 2 megabits per second). Such bad internet connection can seriously impact the quality of life in the European countryside and the viability of rural economies (17).

Another key aspect that contributes to lowering rural quality of life is the lack or low quality of energy supply systems (18). Poor air quality (often due to polluting fuels) is also something that severely affects rural dwellers' wellbeing, as is the prevalence of fuel poverty (for more on this, see next section).

While sometimes lacking in infrastructure, European rural economies are nevertheless dynamic and modern. Though rural regions have the lowest level of GDP/capita in the EU (only 74.4% of the EU average of €26,039 for predominantly rural regions, and 95.6% for intermediate regions), (19) they generate 46% of the total EU GVA (Gross Value Added) and 55% of employment in the EU (20).

The rural economy primarily relies on the tertiary service sector, while the traditionally more rural sectors (i.e. agriculture, fisheries etc.) only represent 4.5% of value added in predominantly rural regions and 2.2% in intermediate (21). In the modern rural economy, small and medium-sized enterprises (SMEs) play an increasingly important role; (22) there are more than 7 million SMEs in predominantly rural Europe, and in most cases they are the biggest or sole employer in the area. These businesses are key contributors to rural development and socio-economic cohesion (23). Tourism has become a particularly important area for rural growth and development, (24) and is currently the second most important economic sector in rural Europe. It is particularly important for coastal and mountainous areas (25).

Yet, when it comes to innovation and entrepreneurship, rural areas face considerable challenges, such as low population density, a weak entrepreneurial culture and a lack of risk capital to help support new innovation (26). Many rural economies in Europe are also disadvantaged by the fact that the highly educated are often the first to leave, causing a "brain-drain". However, there are also rural regions who have taken advantage of the opportunities inherent in new economic developments like globalisation and digitalisation; (27) thanks to the opportunity to work from home with the use of digital technology there is now a new creative class of professionals (architects, engineers, artists etc.) who want to move to rural areas in search of a better quality of life (28).

The Rural Energy Landscape

With regards to energy, especially for heating and cooling, rural communities have different consumption patterns and face different challenges from their urban counterparts. Unfortunately, EU-level data on rural energy consumption is scarce, but a few key trends are clear.

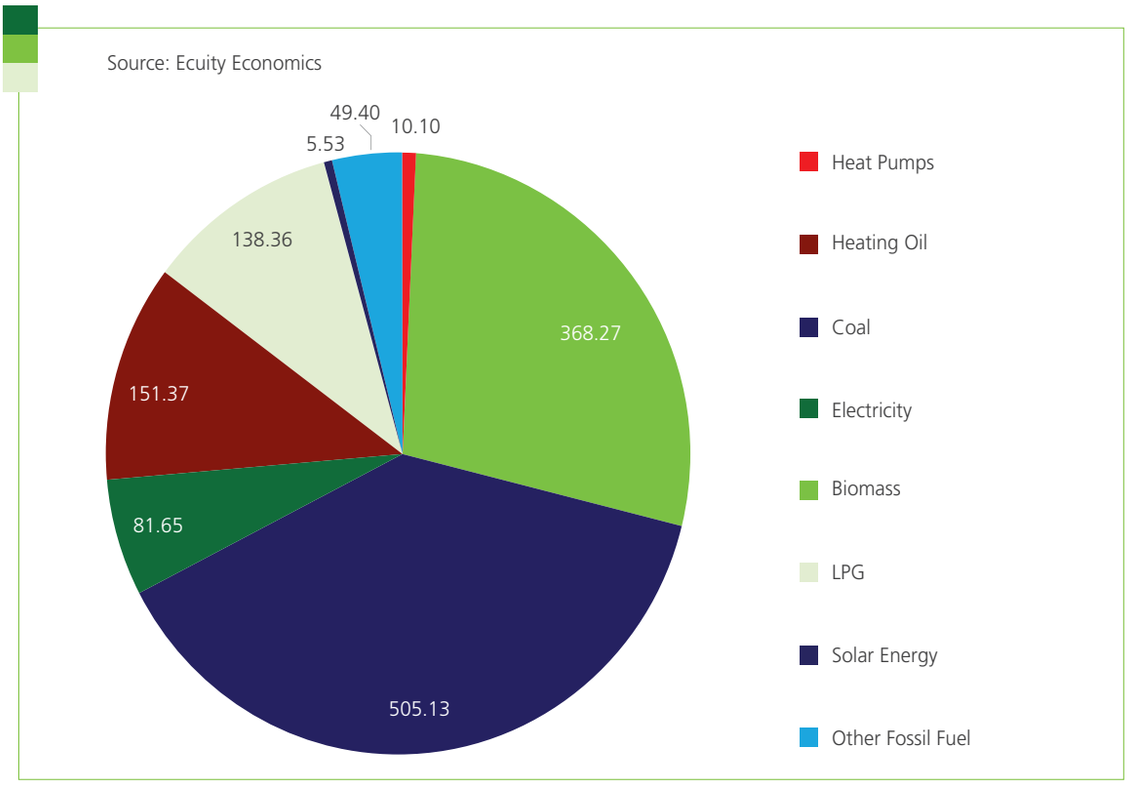
Rural Energy Mix

Rural communities consume a large proportion of EU energy; for example, 72% of the heating and cooling demand* of single-family houses in Europe is consumed in rural areas (29). When considering that heating and cooling overall represent more than half of final energy demand in the EU-28, (30) it is clear that rural communities are responsible for a substantial portion of the EU's energy demand.

However, rural areas are often forced to rely on high-polluting energy sources due to lack of proper energy infrastructure. The choice of energy sources is often limited, because rural gas and electricity networks tend to be underdeveloped (31). Over 40 million households in rural Europe (19% of all EU households) are off-grid, which means they have to rely on decentralised energy solutions to ensure their energy needs. They therefore tend to use more high-polluting fossil fuels, such as coal and heating oil, which are more easily accessible.

Off-grid households were responsible for 50.8 million Toe of energy consumption in 2010, and the role of heating oil and solid fuels in these areas is more than twice as large as in the overall EU residential energy mix (32). The most common fuel for heating and cooling in residential, tertiary and industrial buildings in "rural-remote" (i.e. off the natural gas grid) areas is coal (39%), followed by biomass (28%) and heating oil (12%). The lower-carbon alternative liquefied petroleum gas (LPG) represents only 10.6% of energy consumption in rural remote areas, and heat pumps so far only deliver 0.8% of final energy demand in these regions (33).

Figure 1: Final energy demand for heating and cooling in EU-28 rural-remote areas TWh (2016, EU-28)



A closer look at the rural energy landscape in some of the biggest EU Member States confirms that high-polluting fuels dominate the rural energy mix. For example, French rural households use more unsustainable biomass and oil than urban ones, which primarily rely on natural gas. In Poland, the energy mix in urban and rural homes look quite alike, though some rural areas lack access to a centralised energy supply and therefore rely more on coal, LPG and wood. In the United Kingdom, rural homes tend to rely on heating oil and coal, whereas urban households use more natural gas (34).

**NB: 72% applies to "rural and intermediate" areas as defined by the European Commission. As previously mentioned, this report applies a broad definition of "rural", and thus counts "intermediate" areas as part of "rural" areas. The portion of heating and cooling consumed in only predominantly rural areas is naturally smaller.*

Energy Efficiency

Energy efficiency is more often a problem for rural households than urban ones, (35) and rural areas do not benefit as much from EU energy efficiency policies as urban regions. The potential for making energy savings in the building sector, especially through the refurbishment of existing buildings, is widely recognised. For rural Europe this potential should be particularly big, as the building stock tends to be old and the houses large (36). Lack of energy efficiency is often an issue, as insulation of rural homes lacks the benefits of scale achievable in the insulation of urban buildings with multiple tenants (37). The dominance of individual houses in rural areas and the scattered nature of dwellings also make it difficult to reach such economies of scale (38).

However, in some areas of the EU progress has been more difficult to achieve than anticipated. Energy Performance Certificates (EPCs), the role of which was strengthened by the 2010 European Performance of Buildings Directive, are meant to raise awareness of the better performance of buildings by requiring the publication of an energy performance indicator at the time of advertising a building for sale or rent. The certificates have been helpful overall in rolling out energy efficiency by improving the relation between energy efficiency and the price of the house in the EU, including in rural areas. In fact, according to the European Commission, the impact of energy efficiency improvements on rural markets caused an average rise in house price by 3.8% on average (compared to 1.7% in cities).

Yet, EU energy efficiency policy does not always favour rural areas. Location matters for the decision to obtain EPCs in the first place, and urban areas are more likely to use EPCs than rural ones. In the United Kingdom, combining the EPC band with the size and age variables and the urban/rural indicator variable (which scores each dwelling according to the extent to which it is located in an urbanised area), reveals that older, larger dwellings located in rural areas tend to have lower EPC ratings than smaller, modern dwellings in urban areas (39). For example, a study into energy efficiency in Scotland shows that rural homes are disproportionately placed in the lower classes for energy efficiency and that the cost of upgrading them (by improving insulation or upgrading boilers) would on average be higher for rural than urban dwellers. Depending on the choice of upgrade policy, the average difference spans from £1,656 to £4,092.

Further to the negative relationship between energy efficiency and rural households, it has been reported that 1.7 million British off-grid households have paid over £40 each to national schemes to make households more energy efficient, but only 1,500 of them have seen any results for their own homes. Collectively, these households have contributed £70 million, but only received £3.5 million worth of improvements. Consequently, they have contributed over 20 times more than they get back. This has led industry representatives to claim that energy companies spend their energy efficiency efforts on those households easiest to reach, i.e. in towns and cities connected to the gas grid. This leaves rural families at a disadvantage when it comes to energy efficiency measures (40).

Energy Poverty and Security

Energy poverty is a hot topic on the EU energy policy agenda, but rural areas are rarely taken into consideration in the discussions. Yet, energy poverty is often a big problem in rural Europe. Across the EU, 54 million citizens (10.8%) have problems heating their homes and in other ways consuming energy at a reasonable cost. A similar number of people have problems related to late payment of energy bills or poor living conditions. Some data suggests this may be more common in off-grid areas, such as some parts of rural Europe. (41) On a global level, energy costs in rural areas are disproportionately higher because rural grids are often less developed and service energy companies are incentivized to provide better and cheaper services in urban areas. (42) A 2013 European study revealed that: "location had the largest impact on whether households in the EU reported an inability to heat the home adequately, with residing in a rural area having the largest impact". The study concluded that high levels of rural energy poverty may be the result of overall economic poverty and problems relating to the availability of fuel sources (43).

For instance, 3.8 million households (8 million people) in France are estimated to suffer from fuel poverty. This represents 14.4% of the French population. (44) Fuel poverty is also a serious problem for millions of British households; those located in off-gas grid areas are more than twice as likely to be fuel poor as households who use mains gas. They are also more likely to be less energy efficient – around 43% of F and G homes (i.e. homes located in the two lowest classes of building efficiency) are off the gas grid (45). A 2012 study of fuel poverty in the United Kingdom shows that people living in the countryside, especially if they are off-grid, are the worst sufferers of fuel poverty, with a "fuel poverty gap" (i.e. "the amount by which the assessed energy needs of fuel poor households exceed the threshold for reasonable cost") of £800, compared to £332 in a fuel poor home connected to the gas mains. (46)

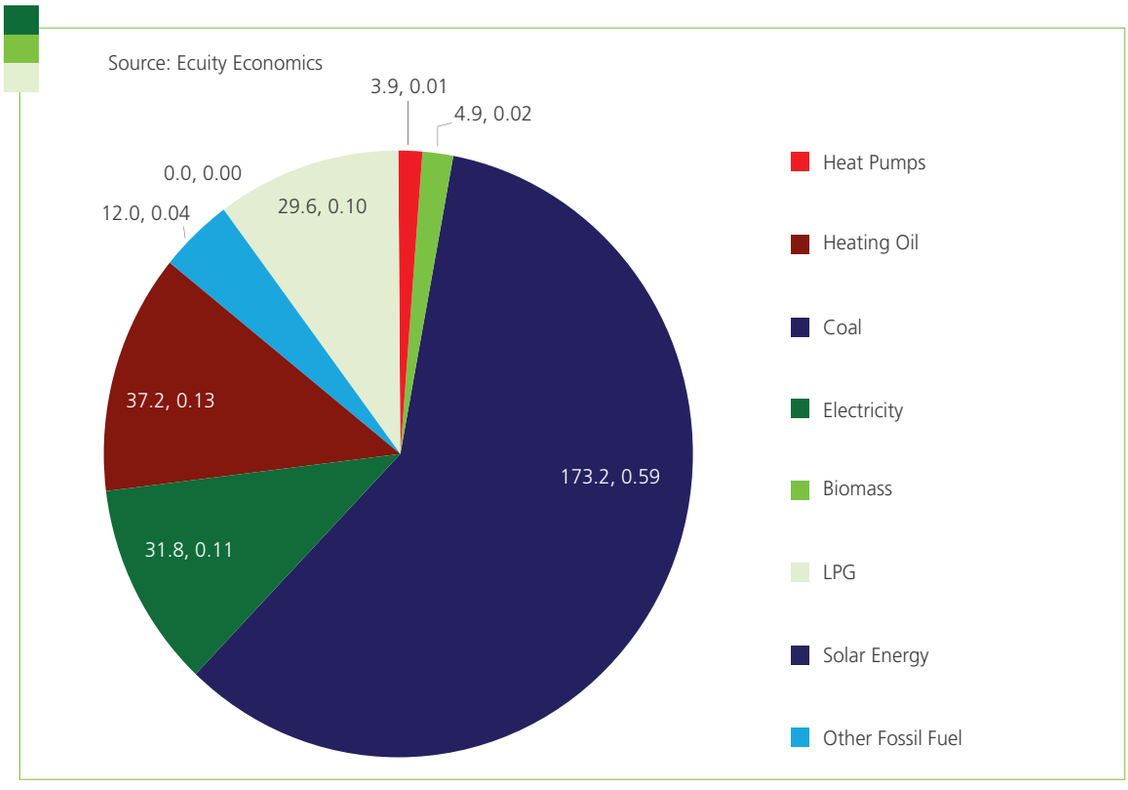
The energy security of rural households and businesses is further challenged by the prevalence of power outages. Although almost all European rural regions are covered by the electricity network, statistics by the Council of European Energy Regulators (CEER) suggest that blackouts in rural areas are two to four times more frequent than in urban areas and last 75% to 300% longer. According to CEER, because smaller transformers are typically used in rural networks, where the number of interruptions is higher, weighting based on the number of distribution transformers would likely result in somewhat higher values for frequency and duration of interruptions than weighting based on the number of network users (47).

Heavy heating and cooling loads attached to the electricity grid in rural-remote areas clearly compound this problem.

Carbon Footprint

Looking at the emissions generated by heating and cooling, EU rural-remote (i.e. off-grid rural) areas are estimated to be responsible for 292 Mt CO_2 in 2016, (48) much of which is due to high-polluting fuel sources. In rural-remote energy areas, 60% of CO_2 from heating and cooling comes from coal, 13% from heating oil, 11% from electricity and around 10% from LPG (49).

Figure 2: Carbon emissions from EU-28 rural-remote areas H/C (EU-28) Mt CO_2 (2016)



Air Quality

Low air quality and its effects on people's health is high up on the EU agenda and for good reason. Though improvements have been made, air pollution still causes ten times more premature deaths in the EU than traffic accidents, with a total economic cost of €1 trillion in the European UNECE region (50). Ambient (outdoor) air pollution from residential heating with wood and coal causes 61,000 premature deaths in Europe annually, many from cardiovascular diseases. Outdoor air pollution from household heating with solid fuels is also estimated to be responsible for 1 million DALYs (disability-adjusted life years) in Europe in 2010 (51).

However, little attention is paid to the particular challenges facing rural Europe in this regard. According to the European Environment Agency, people living in rural and mountainous areas are more likely to be exposed to high levels of ozone (O3) than urbanites (52). Ozone reacts chemically with biological molecules in the respiratory tract, leading to a number of adverse health effects (53). Emissions of particulate matter (PM) and NOx and SOx gases can also be higher in rural areas on a per capita basis because of the greater use of coal, oil and biomass in heating (as is the case for example in France) (54). The highest acceptable level of PM2.5 in Europe is 25 µg/m³ (55). When it comes to particulate matter of different sizes, the absolute concentration in rural areas varies across Europe, but daily levels have been exceeded in rural areas in, for example, the Czech Republic, Italy and Poland (56). In the Italian mountainous region Piedmont, the estimated average exposure to PM2.5 air pollution is as high as 21.1 µg/m³. Not even London, where air pollution is considered a big problem, reaches these levels, but stays at a relatively low 10.2 µg/m³. Similar statistics are available for other rural European regions (see for example the rural Podlaskie forest region of Poland with 15.1 µg/m³) (57).

Changing the pattern of energy use in heating and cooling can do a lot to help address the problem of rural air pollution. For example, an Irish study found that banning the "marketing, sale and distribution" of coal improved air quality and led to fewer deaths from respiratory and cardiovascular diseases (58). A comparable effort to decrease the wide use of coal and heating oil and other high-polluting fuels in rural Europe would surely yield similar positive results.

Future Rural Energy Scenarios

A study developed by Ecuity estimates that the potential for rural-remote emissions savings in the EU heating and cooling sector could be as much as 80-100 Mt CO_2 by 2030 compared to business as usual, depending on which future scenario is realised. Phasing out high-polluting fuels like coal and oil in favour of low-carbon fuels, such as renewable energy and LPG, as well as introducing heat pumps and energy efficiency improvements, could substantially reduce the carbon footprint of rural areas, not to mention emissions of other pollutants (59).

The scope of the report developed is to depict final energy demand for heating and cooling in EU-28 and how decarbonisation can be achieved by switching to low-carbon fuels and increasing energy efficiency in buildings. Ecuity developed three rural-remote energy scenarios to test the impact on carbon emissions levels of changes in the heating and cooling mix and the introduction of energy efficiency:[3]

1. Business-as-usual Scenario
2. Low-carbon Scenario
3. Low-Carbon / High Efficiency Scenario

The scenarios are based on interim heating and cooling final energy demand data published by the European Commission. The data is relevant to the year 2012 and the residential, tertiary and industrial sector are covered by the dataset. In the scenarios below we have chosen a legislative period of 2020-2030, however if the action is taken earlier, we could save even more CO_2 than indicated below.

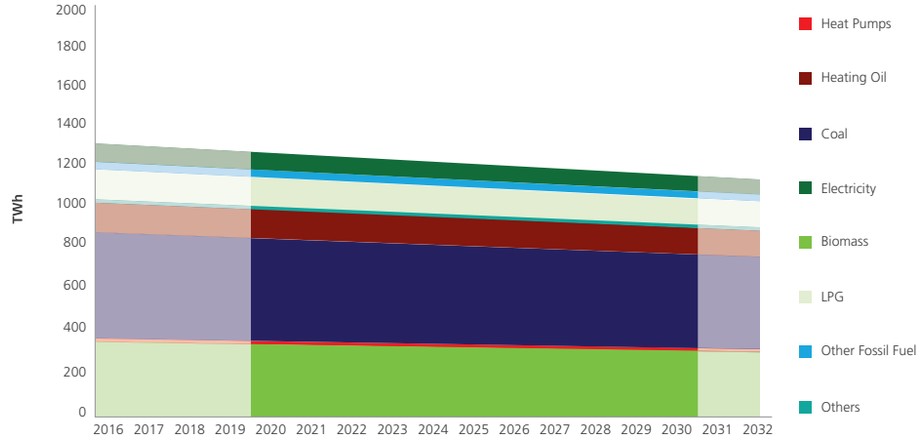
Business-as-usual Scenario

According to Ecuity's report, assuming no change in the energy mix or the energy efficiency profile of European rural communities, final energy demand for heating and cooling will decrease from **1261 to 1144 TWh** between 2020 and 2030 as a natural result of migration away from rural remote areas (this corresponds to **108 to 98 Mtoe** of energy consumption).

Total CO_2 emissions will, as a consequence, be reduced from **271 to 234 Mt** between 2020 and 2030 due to reduced energy demand and lower electricity grid intensity.

Figure 3: Final energy demand from EU-28 rural-remote areas H/C (EU-28) (Business-as-usual Scenario)

Source: Ecuity Economics



[3]*The illustrative scenarios do not cover all options and should be tested via feasibility studies.*

Figure 4: Carbon emissions from EU-28 rural-remote areas H/C (EU-28) (Business-as-usual Scenario)

Source: Ecuity Economics

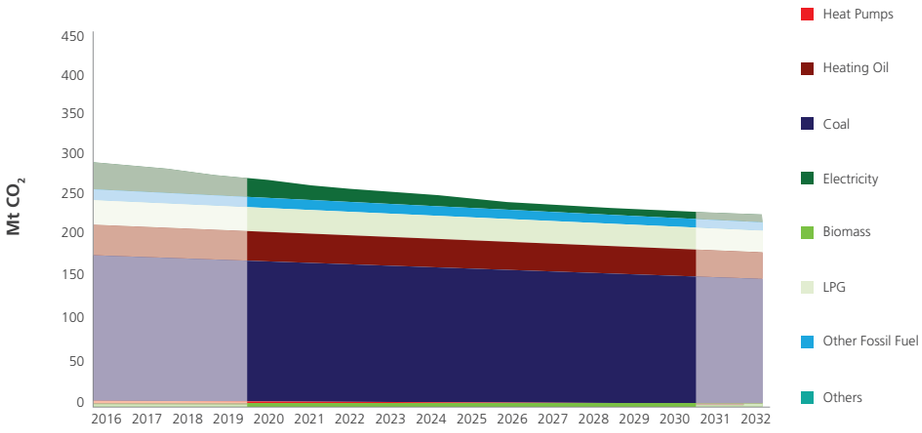
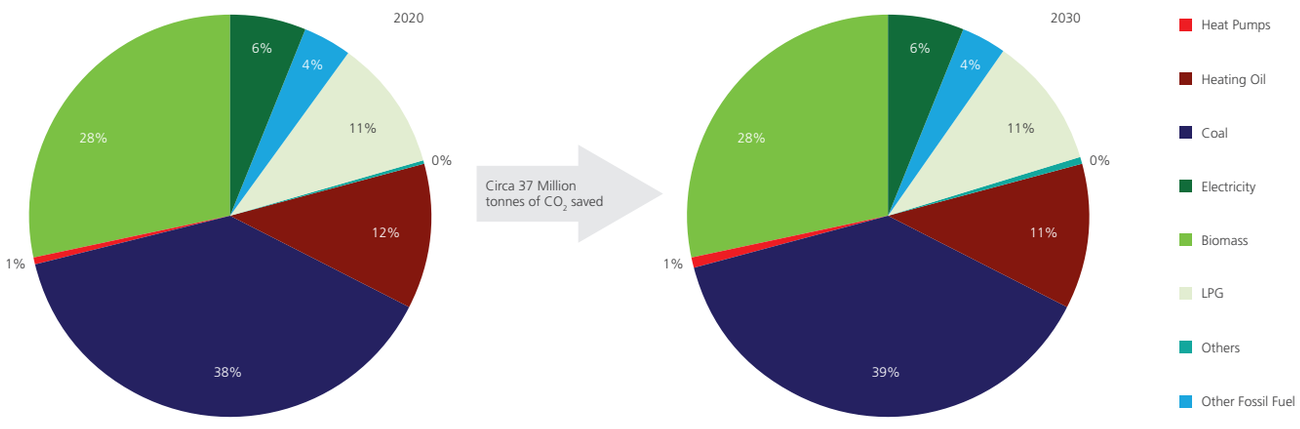


Figure 5: Final energy demand per fuel 2020-2030 from EU-28 rural-remote areas (Business-as-usual Scenario)

Source: Ecuity Economics



Low-carbon Scenario

CO_2 emissions can be decreased much further if steps are taken to actively change the status quo. For example, the Low-carbon Scenario assumes a switch in the rural energy mix from high-polluting fuels such as coal, fuel oil and other fossil fuels to a mix of lower-carbon fuels, including LPG, BioLPG (introduced from 2020), LNG and heat pumps. With LPG and BioLPG providing around 20% and heat pumps 6% of total energy consumption, rural-remote coal consumption could hypothetically be reduced to 15% and heating oil and other fossil fuel consumption to 12% by 2030. In this scenario, the final energy demand for heating and cooling would decrease from **1192 to 1044 TWh** between 2020 and 2030 (this corresponds to approximately **103 to 90 Mtoe** in energy consumption). This would in turn result in a total CO_2 reduction from **237 Mt to 150 Mt** between 2020 and 2030. As a direct comparison to the Business as Usual Scenario in 2030, this represents approximately **80 Mt** further CO_2 savings.

Figure 6: Final energy demand from EU-28 rural-remote areas (Low-Carbon Scenario)

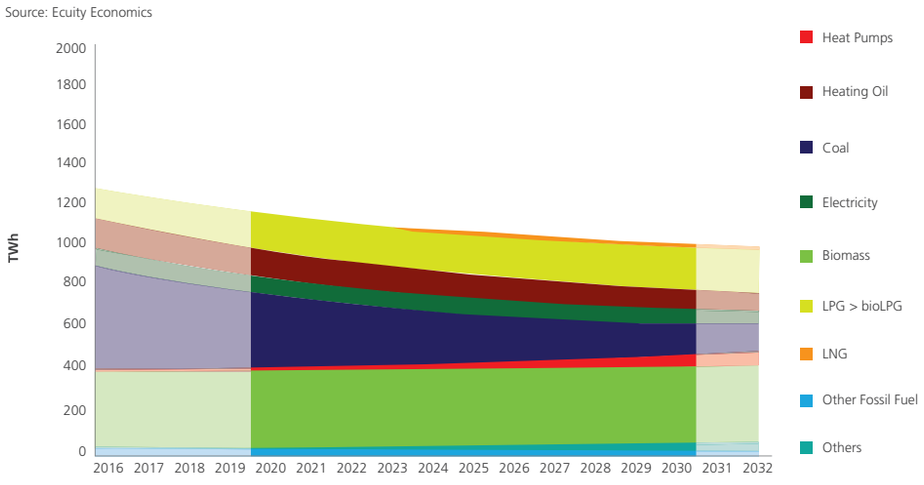


Figure 7: Carbon emissions from EU-28 rural-remote areas (Low-Carbon Scenario)

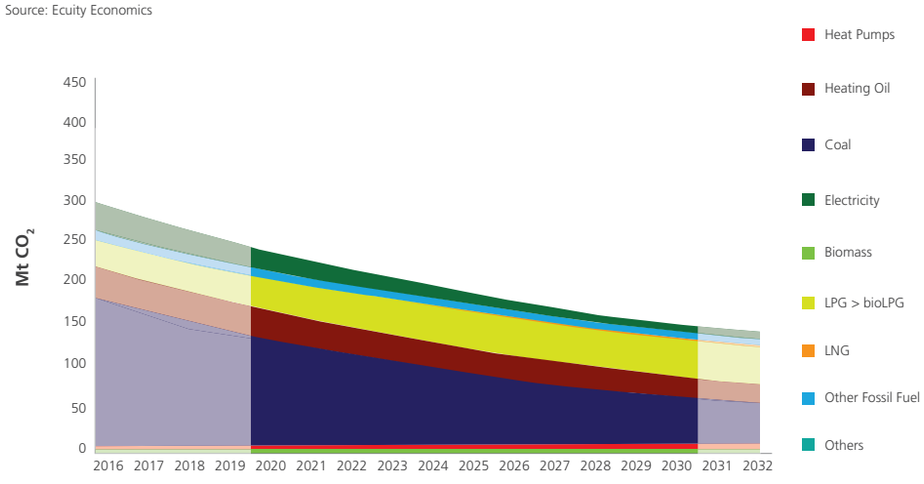
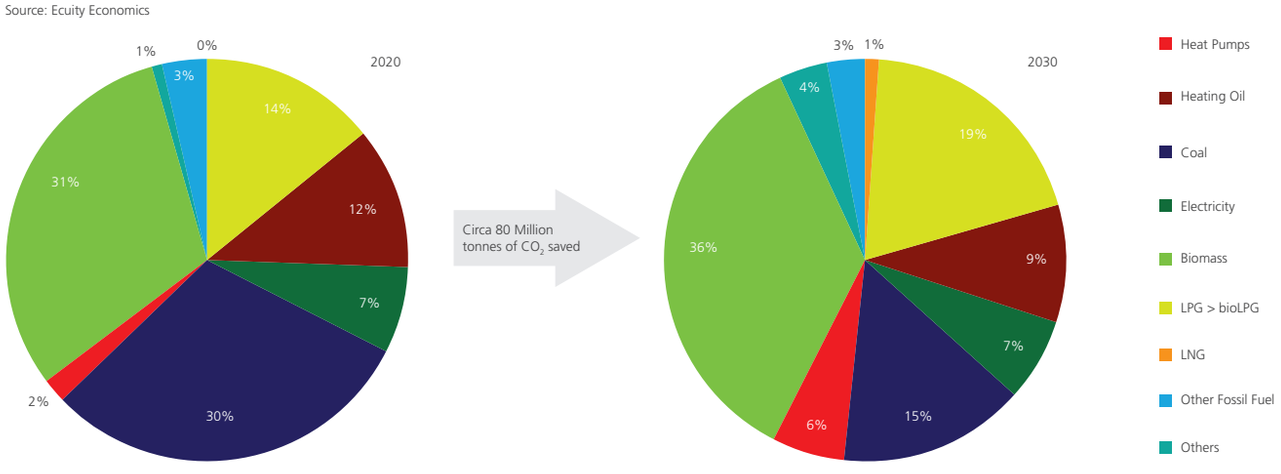


Figure 8: Final energy demand per fuel 2020-2030 from EU-28 rural-remote areas (Low-Carbon Scenario)



Low-Carbon / High Efficiency Scenario

If additional energy efficiency improvements were to be made, the carbon footprint of rural-remote heating and cooling could be reduced significantly more. Based on evidence reported by the European Commission that energy demand decreased by 7% between 2005 and 2013, it is not unreasonable to expect that energy efficiency improvements could decrease final rural energy demand by an additional 15% by 2030 compared to the Low-carbon Scenario. Energy efficiency improvements in buildings would mean that the final energy demand in rural-remote areas could decrease from **1134 to 887 TWh** by 2030 (this corresponds to a decrease in energy consumption of **97 to 76 Mtoe**). This means a total CO_2 reduction from **226 to 129 Mt** between 2020 and 2030. Compared to the Business-as-usual Scenario, **100 Mt of CO_2 further** savings by 2030 could be realised in rural-remote areas even after anticipating a population decrease.

Figure 9: Final energy demand from EU-28 rural-remote areas (Low-Carbon / High Efficiency Scenario)

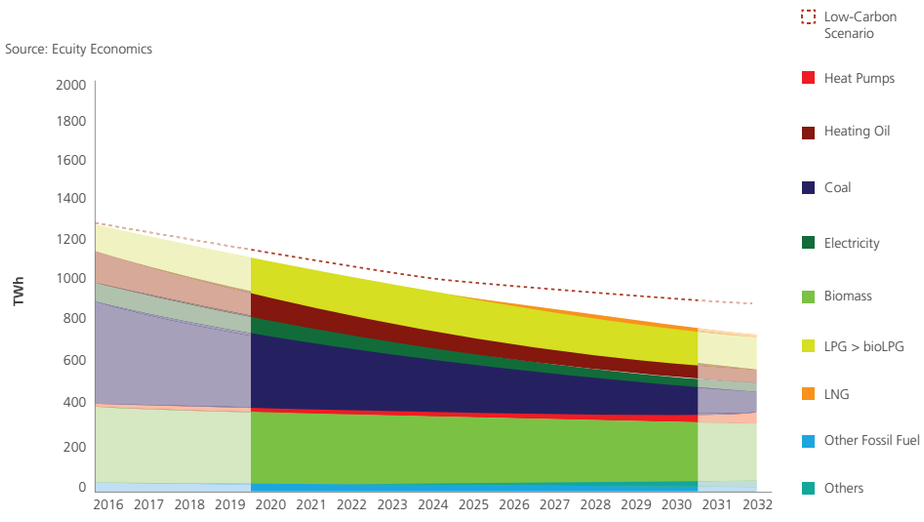


Figure 10: Carbon emissions from EU-28 rural-remote areas (Low-Carbon / High Efficiency Scenario)

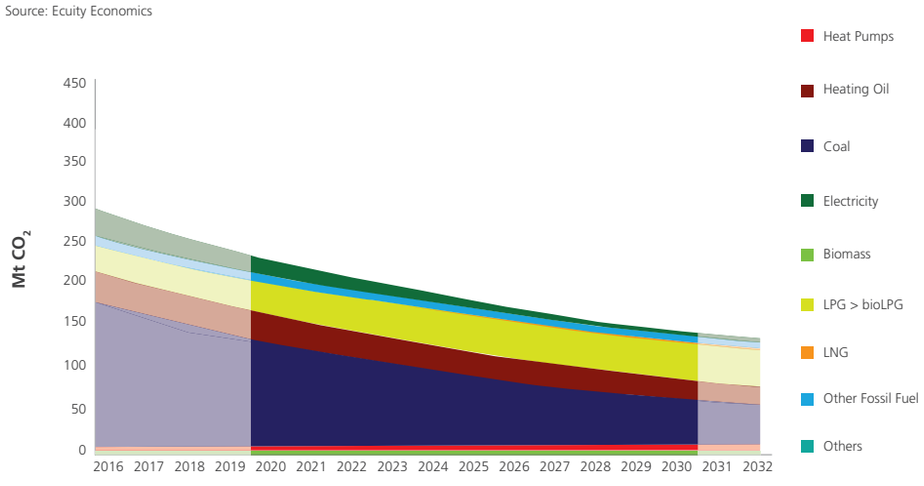


Figure 11: Final energy demand per fuel 2020-2030 from EU-28 rural-remote areas (Low-Carbon / High Efficiency Scenario)

Source: Ecuity Economics

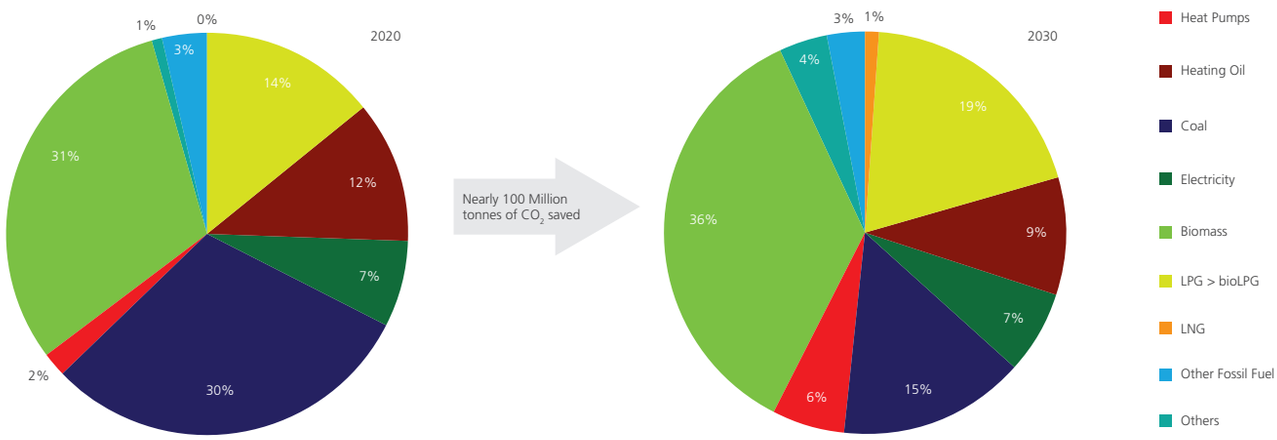
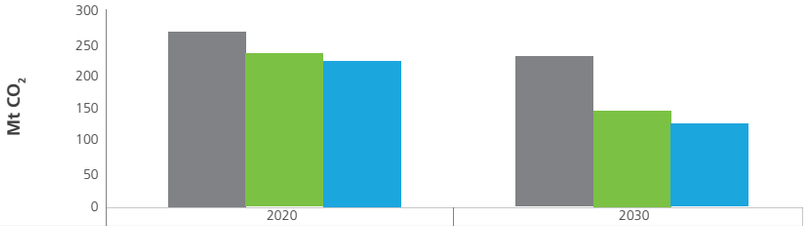


Figure 12: Carbon emissions from EU-28 rural-remote areas H/C (Business-as-usual vs. Low-Carbon and Low-Carbon / High Efficiency Scenario)

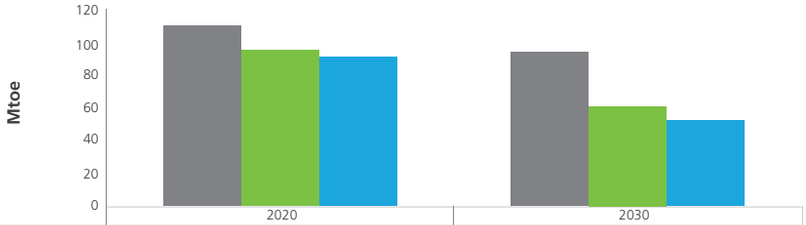
Source: Ecuity Economics



	2020	2030
Business As Usual	271	234
Low-Carbon Scenario	237	151
Low-Carbon / High Efficiency Scenario	226	129

Figure 13: Energy consumption from rural remote areas (H/C, EU-28) (Business-as-usual vs. Low-Carbon and Low-Carbon / High Efficiency Scenario)

Source: Ecuity Economics



	2020	2030
Business As Usual	108	98
Low-Carbon Scenario	103	90
Low-Carbon / High Efficiency Scenario	97	76

In summary, switching from high-polluting fuels and increasing energy efficiency has a lot to offer rural communities in terms of CO_2 emission reductions, not to mention improvements in air quality and energy security. Though these illustrative scenarios are hypotheses and should be tested via further feasibility studies, they clearly show the potential for improvement in rural-remote areas if the right incentives were put in place. It is now up to EU policymakers to ensure that this potential is translated into reality with the help of energy policies that are properly attuned to the needs of rural communities.

Policy Recommendations

Rural, remote and mountainous communities are at the heart of the European Union, making up a considerable proportion of its population, economy and landscape. Yet, the unique challenges and great potential of the European countryside are too often overlooked by EU policymakers, not least in the area of energy. For the objectives of the Energy Union to be fully realised, the specific future energy needs of rural, mountainous and remote communities must be addressed.

What is needed is an appreciation of the rural aspect of policy areas relating to energy efficiency, consumers, air quality issues and CO_2 emissions. In rural-remote areas, the use of high-polluting fuels is widespread. Given the right policy incentives, lower-carbon fuels such as LPG, LNG and renewables could represent affordable and cleaner solutions. Using highly efficient technology already available, cleaner fuels could resolve air quality problems and high CO_2 emissions caused by the current old-fashioned energy mix in rural areas.

The FREE initiative has developed the following list of proposals on how to put rural areas back on the EU energy map. In addition, we ask the European Commission to develop a White Paper to address issues affecting rural areas which clearly prioritizes the provision of secure and environmentally sensitive energy and encourages homes and businesses to switch from high-polluting to low-polluting fuels.

Enabling improvements to energy efficiency by giving the countryside the right tools.

Existing legislation fails to adequately support the improvements needed if rural areas are to effectively tackle energy losses. Policymakers should support the renovation of building stock through local energy advice and audit programmes, advanced finance schemes and financial incentives.

Empowering rural consumers through the rollout of smart energy technologies.

Decentralised energy generation technologies are becoming increasingly important for rural consumers without access to reliable energy supplies from the Grid. Incentives should be introduced for localised clean electricity generation, Micro-CHP and smart grids deployment.

Streamlining EU and national funds to support energy projects in rural areas.

This must be coupled with political support for the development of cleaner and more energy efficient technologies in rural areas.

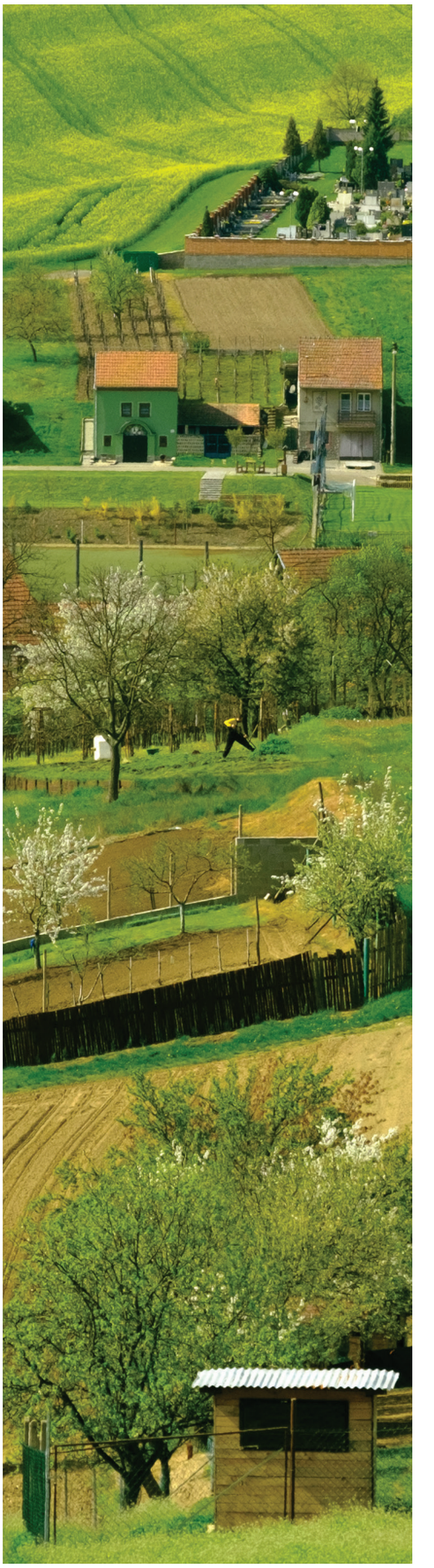
Acknowledging the unique characteristics of rural areas as they transition to sustainable energy use.

Given the overreliance on heating oil and coal, policymakers should introduce a portfolio of political and financial incentives to transition towards cleaner energy technologies. A priority of the EU must be the reduction of CO_2, mono-nitrogen oxides (NOx), Sulphur Oxide (SOx) and fine particulates considering their impact on climate change and public health.

Formulating a comprehensive strategy to address the challenges facing the European countryside.

As rural citizens face a range of challenges, including related to climate and energy, a Rural Agenda for Europe should set a roadmap for improving the conditions of our countryside.

The FREE initiative and its supporters will constantly review energy and environmental legislation and will promote policy solutions and proposals aimed at ensuring a positive change in the energy landscape in the EU's countryside.



Footnotes

1. Eurostat (Eurostat (2015), Urban-Rural Typology
2. European Commission (2015), CAP Context Indicators 2014-2020 – 3.Territory
3. European Commission (2015), CAP Context Indicators 2014-2020 – 1. Population
4. Eurofound (2014), Foundation Findings - Quality of Life in Urban and Rural Europe.
5. European Commission (2015), CAP Context Indicators 2014-2020 – 2. Age Structure
6. Copus, Andrew et al. European Development Opportunities for Rural Areas – Applied Research 2013/1/2, Final Report; Eurofound (2014)
7. Property Wire, Rural locations becoming more attractive to home movers in the UK
8. Eurofound (2014)
9. European Commission (2012), Women in EU Agriculture And Rural Areas: Hard Work, Low Profile
10. Eurofound (2014)
11. European Commission (2015), CAP Context Indicators 2014-2020 – 9. Poverty Rate
12. European Commission (2015), CAP Context Indicators 2014-2020 –7. Unemployment rate
13. European Commission (2015), CAP Context Indicators 2014-2020 – 5. Employment Rate
14. Eurofound (2014)
15. European Commission (2008), Poverty and social exclusion in rural areas. Final study report
16. European Commission (2012), Rural Development in the EU - Statistical and Economic Information Report 2012
17. Farming UK (2016), Rural villagers have internet slower than an Everest base camp
18. European Commission (2012), Commission Staff Working Document – A view on employment, growth and innovation in rural areas
19. European Commission (2015), CAP Context Indicators 2014-2020 – 8. GDP per Capita
20. European Commission (2014). Rural Development in the EU Statistical and Economic Information – Report 2013
21. European Commission (2015), CAP Context Indicators 2014-2020 –10. Structure of the Economy
22. European Network for Rural Development (2011), Draft Context Analysis: Rural Entrepreneurship in Selected EU Member States
23. UEAPME (2013). Letter to the European Commission regarding EAFRD
24. Eurostat (2015). Tourism statistics
25. European Commission (2012), Commission Staff Working Document – A view on employment, growth and innovation in rural areas
26. European Network for Rural Development (2011)
27. Schnaut, Gitta et al. (2012), LEADER- an approach to innovative and suitable solutions in rural areas?
28. Eurofound (2014)
29. European Commission (2016), Mapping and analyses of the current and future (2020 - 2030) heating/ cooling fuel deployment (fossil/renewables).
30. European Commission, Heating and Cooling
31. Ecofys (2011), Rural Energy in the EU Country: Studies for France, Germany, Italy, Poland and the UK
32. AEGPL (2011)
33. Ecuity Consulting (2016), EU-28 Rural Remote Energy Scenarios
34. Ecofys (2011)
35. Eurofound (2014)
36. AEGPL (2011)
37. Ecofys (2011)
38. BPIE for European Climate Foundation (2011)
39. DECC (2013), An investigation of the effect of EPC ratings on house prices
40. Gosden, Emily (08-11-2014), Rural homes pay £70m into energy scheme for city dwellers, The Daily Telegraph
41. Insight_E (2015), Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures
42. Energypedia (2012), "Electrification Challenge in Rural Areas"
43. Thomson, Harriet & Snell, Carolyn (2013), Quantifying the prevalence of fuel poverty across the European Union, Energy Policy (52), p. 570
44. Rappel (2012), Focus précarité énergétique. La lettre du réseau Rappel, n° 12, June 2012
45. HM Government (2014) , Cutting the cost of keeping warm: A new fuel poverty strategy for England
46. Hills, John (2012), Getting the Measure of Fuel Poverty – Final Report of the Fuel Poverty Review
47. CEER (2011), 5th CEER Benchmarking Report on the Quality of Electricity Supply
48. Ecuity Consultancy (2016)
49. Ecuity Consultancy (2016)
50. UNECE (2016), Towards Cleaner Air: Scientific Assessment Report 2016
51. WHO (2015), Residential heating with wood and coal: health impacts and policy options in Europe and North America
52. European Environment Agency (2015), Air quality in Europe – 2015 Report
53. U.S. environmental Protection Agency (2016), What Is Ozone?
54. Ecofys (2011)
55. European Commission (2016), Air Quality Standards
56. European Environment Agency (2015)
57. OECD, Regional well-being
58. WHO (2015)
59. Ecuity Consultancy (2016)
60. European Commission (2013), Vulnerable Consumers Working Group Guidance Document

References

AEGPL (2011). Beyond the Gas Grid. Retrieved from: http://www.aegpl.be/media/63958/beyond%20the%20gas%20grid_aegpl_2011.pdf [06-05-2016]

BPIE for European Climate Foundation (2011), Europe's buildings under the microscope - A country-by-country review of the energy performance of buildings

CEER (2011). 5th CEER Benchmarking Report on the Quality of Electricity Supply. Retrieved from: http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/Tab/CEER_Benchmarking_Report.pdf [06-05-2016]

Copus, Andrew et al. European Development Opportunities for Rural Areas – Applied Research 2013/1/2, Final Report. Retrieved from: http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/EDORA/EDORA_Final_Report_Parts_A_and_B-maps_corrected_06-02-2012.pdf [26-02-2016]

DECC (2013). An investigation of the effect of EPC ratings on house prices Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207196/20130613_-_Hedonic_Pricing_study_-_DECC_template__2_.pdf [24-03-2016]

Ecofys (2011). Rural Energy in the EU- Country studies for France, Germany, Italy, Poland and the UK. Retrieved from: http://www.ecofys.com/files/files/ecofysreportruralenergyintheeu09_2011.pdf [26-02-2016]

Ecuity Consultancy (2016), EU-28 Rural-Remote Energy Scenarios

Energypedia (2012), Electrification Challenge in Rural Areas. Retrieved from: https://energypedia.info/wiki/Electrification_Challenge_in_Rural_Areas [21-03-2016]

Eurofound (2014). Foundation Findings - Quality of Life in Urban and Rural Europe. Retrieved from: http://www.eurofound.europa.eu/publications/foundation-finding/2014/quality-of-life-social-policies/foundation-findings-quality-of-life-in-urban-and-rural-europe [26-02-2016]

European Commission, Heating and Cooling, Retrieved from: https://ec.europa.eu/energy/en/topics/energy-efficiency/heating-and-cooling [06-05-2016]

European Commission (2011). Rural Development in the EU Statistical and Economic Information – Report 2011. Retrieved from: http://bookshop.europa.eu/en/rural-development-in-the-european-union-pbKFAH12001/downloads/KF-AH-12-001-EN-C/KFAH12001ENC_002.pdf?FileName=KFAH12001ENC_002.pdf&SKU=KFAH12001ENC_PDF&CatalogueNumber=KF-AH-12-001-EN-C [26-02-2016]

European Commission (2012). Commission Staff Working Document – A view on employment, growth and innovation in rural areas. Retrieved from: http://ec.europa.eu/agriculture/publi/reports/ruralemployment/swd-2012-44_en.pdf [21-03-2016]

European Commission (2012). Rural Development in the EU - Statistical and Economic Information Report 2012. Retrieved from: http://ec.europa.eu/agriculture/statistics/rural-development/2012/full-text_en.pdf [21-03-2016]

European Commission (2012). Women in EU Agriculture and Rural Areas: Hard Work, Low Profile Retrieved from: http://ec.europa.eu/agriculture/rural-area-economics/briefs/pdf/07_en.pdf [24 -03-2016]

European Commission (2013), Vulnerable Consumers Working Group Guidance Document. Retrieved from: http://ec.europa.eu/energy/en/content/vulnerable-consumers-working-group-guidance-document [15 -06-2016]

European Commission (2014). Rural Development in the EU Statistical and Economic Information – Report 2013. Retrieved from: http://ec.europa.eu/agriculture/statistics/rural-development/2013/full-text_en.pdf [26-02-2016]

European Environment Agency (2015). Air quality in Europe – 2015 Report. Retrieved from: http://www.eea.europa.eu/publications/air-quality-in-europe-2015 [26-02-2016]

European Commission (2015). CAP Context Indicators 2014-2020 – 1. Population. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c1_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –2. Age Structure. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c2_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –5. Employment Rate. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c5_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –8. GDP per Capita. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c8_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –9. Poverty Rate. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c9_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –10. Structure of the Economy. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c10_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –11. Structure of Employment. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c11_en.pdf [06-05-2016]

European Commission (2015). CAP Context Indicators 2014-2020 –45. Emissions from Agriculture. Retrieved from: http://ec.europa.eu/agriculture/cap-indicators/context/2015/c45_en.pdf [06-05-2016]

European Commission (2015). Energy performance certificates in buildings and their impact on transaction prices and rents in selected EU countries Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/20130619-energy_performance_certificates_in_buildings.pdf [23-03-2016]

European Commission (2016), Air Quality Standards. Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/Report%20WP1.pdf [15-06-2016]

European Commission (2016). Mapping and analyses of the current and future (2020 - 2030) heating/cooling fuel deployment (fossil/renewables). Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/Report%20WP1.pdf [06-05-2016]

European Network for Rural Development (2011). Draft Context Analysis: Rural Entrepreneurship in Selected EU Member States. Retrieved from: https://enrd.ec.europa.eu/sites/enrd/files/fms/TWG/Context_Analysis_-_Rural_Entrepreneurship_-_FINAL_March_2011.pdf [21-03-2016]

Eurostat (2013). Rural Development Statistics by Urban-Rural Typology. Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Rural_development_statistics_by_urban-rural_typology [26-02-2016]

Eurostat (2015). Labour markets at Regional Level. Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Labour_markets_at_regional_level [26-02-2016]

Eurostat (2015), Tourism statistics. Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics [21-03-2016]

Eurostat (2015), Urban-Rural Typology. Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology#cite_note-2 [26-02-2016]

Equal Climate (n.d.). Energy. Retrieved from: http://www.equalclimate.org/en/energy/Energy.9UFRnQXn.ips [21-03-2016]

Farming UK (2016), Rural villagers have internet 'slower than an Everest base camp. Retrieved from: http://www.farminguk.com/News/Rural-villagers-have-internet-slower-than-an-Everest-base-camp-_38931.html [21-03-2016]

Gosden, Emily (08-11-2014). Rural homes pay £70m into energy scheme for city dwellers, The Daily Telegraph

Hills, John (2012). Getting the measure of fuel poverty – Final Report of the Fuel Poverty Review. Retrieved from: http://sticerd.lse.ac.uk/dps/case/cr/CASEreport72.pdf [26-02-2016]

Insight_E (2015). Energy poverty and vulnerable consumers in the energy sector across the EU: analysis of policies and measures. Retrieved from: https://ec.europa.eu/energy/sites/ener/files/documents/INSIGHT_E_Energy%20Poverty%20-%20Main%20Report_FINAL.pdf [06-05-2016]

OECD. Regional well-being. Retrieved from: http://www.oecdregionalwellbeing.org/ [06-05-2016]

Property Wire. Rural locations becoming more attractive to home movers in the UK. Retrieved from:http://www.propertywire.com/news/europe/uk-buyers-rural-locations-2016042611839.html [06-05-2016]

Rappel (2012). Focus précarité énergétique. La lettre du réseau Rappel, n° 12, June 2012. Retrieved from: http://www.precarite-energie.org/IMG/pdf/Focus_9-web.pdf [06-05-2016]

Schnaut, Gitta et al. (2012). LEADER- an approach to innovative and suitable solutions in rural areas? Retrieved from: http://ageconsearch.umn.edu/bitstream/135779/2/Schnaut.pdf [26-02-2016]

Thomson, Harriet & Snell, Carolyn (2013). Quantifying the prevalence of fuel poverty across the European Union, Energy Policy (52), pp. 563–572. Retrieved from: http://ac.els-cdn.com/S0301421512008671/1-s2.0-S0301421512008671-main.pdf?_tid=b679fa6a-dafd-11e5-ad2a-00000aab0f6c&acdnat=1456322072_50557f51a166d5fca7a2c5908b19ec29 [26-02-2016]

UEAPME (2013). Letter to the European Commission regarding EAFRD. Retrieved from: http://www.ueapme.com/IMG/pdf/UEAPME_comments_EAFRD_letter_20130228_Commissaires.pdf [21-03-2016]

UNECE (2016), Towards Cleaner Air: Scientific Assessment Report 2016. Retrieved from: http://www.unece.org/fileadmin/DAM/env/documents/2016/AIR/Publications/CLRTAP_Scientific_Assessment_Report_-_Final_20-5-2016.pdf [01-06-2016]

U.S. Environmental protection Agency (2016), What Is Ozone?. Retrieved from: https://www3.epa.gov/apti/ozonehealth/what.html [23-06-2016]

World Health Organization (2015). Residential heating with wood and coal: health impacts and policy options in Europe and North America. Retrieved from: http://www.euro.who.int/__data/assets/pdf_file/0009/271836/ResidentialHeatingWoodCoalHealthImpacts.pdf?ua=1 [25-02-2016

Annex

ENERGY & CLIMATE CHANGE IN RURAL, MOUNTAINOUS & REMOTE AREAS

Summary of responses to the public consultation organised as part of RUMRA Intergroup

This consultation overview collects the findings of the public consultation launched by the RUMRA Working Group on Climate Change and Energy in May 2015. Twenty stakeholders, including associations, contributed to the consultation, with the aim of examining the current energy situation in rural, mountainous and remote (r.m.r.) areas, and to identify potential solutions to the existing challenges. The results of this consultation will feed into the RUMRA call for a White Paper, which will be developed by the end of 2015. Below follows a short summary of the current energy situation, main challenges and solutions, and policy action recommended by the respondents.

Current Situation

The view of the current energy situation in r.m.r. areas expressed by the stakeholders varied, not least depending on the region they represented. On the topic of energy sources, the stakeholders noted the lack of gas grid, but also the dominance of heating oil, gas and renewable energy in particular. Regarding energy efficiency, while most of the respondents, especially those representing mountainous areas, stated that energy efficiency is very important for their area, and highlighted some successful projects, they also noted that there is an insufficient level of support in rural areas for rolling out energy efficiency projects.

Challenges and Solutions

The main challenges identified by the stakeholders varied somewhat depending on the region, but overall challenges included:

- The lack of a diversified energy mix, with an over-reliance on sub-optimal electricity grids or polluting fuels like heating oil, and a lack of connection to main gas supplies.
- Threats to security of supply, for example in the form of frequent blackouts (this led some respondents to question the EC's call for full electric coverage of heating systems in rural areas, in favour of more decentralised technologies).
- Air pollution.
- Lack of adequate benefits for rural/remote areas, and lack of financial support for increased energy efficiency or for switching to cleaner fuels.
- Lack of innovative investments in rural energy infrastructures.
- Lack of energy efficiency and the spread of fuel poverty.
- The increasing impact of global warming on rural agricultural production and on business.

Policy Actions

All respondents unanimously agreed that the policies currently in place fail to address rural areas in a sufficient way. Stakeholders recommended a series of changes to current EU energy policy, for example, including:

- Increased promotion of small-scale community solutions in the area of heating and cooling, and consideration of the scale of projects in rural areas when designing policy and EU grants.
- Creation of stronger links between air quality, climate change, environmental protection and sustainable rural development, and rural area, which will require tailor-made approaches to cut GHG emissions, based on realistic and cost-efficient measures, for example by promoting cleaner fuels like LPG.
- Promotion of investment in low-carbon space heating to provide consumers with lower-carbon alternatives to the current range of heating oil technologies.

RURAL ENERGY MATTERS

www.rural-energy.eu - www.freechoices.eu

Future of Rural Energy in Europe (FREE)

@RuralEnergyEU

Future of Rural Energy in Europe (FREE)