



# **GCSE GEOGRAPHY**

**8035/3/PM**

## **Resources for Paper 3 Geographical Applications**

**Pre-release resources booklet**

**To be issued to students on  
Wednesday 1 December 2021.**

**This booklet contains three resources  
as follows:**

- **FIGURE 1 – The changing pattern of energy production and use in the UK: pages 2–8**
- **FIGURE 2 – Energy futures – the development of renewable energy sources: pages 9–18**
- **FIGURE 3 – Views about the proposed Isle of Lewis wind farm development: pages 19–27**

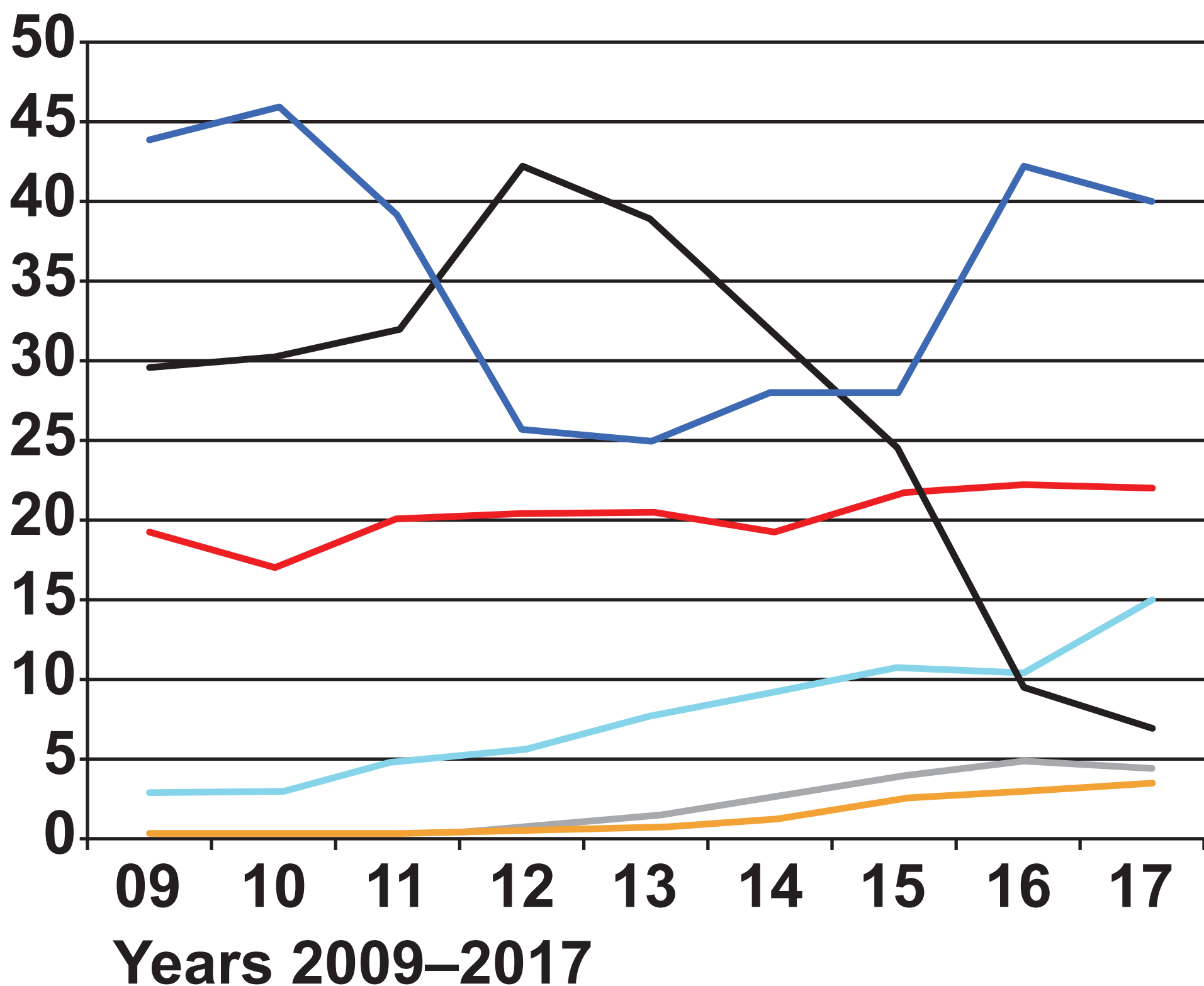
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## FIGURE 1

The changing pattern of energy production and use in the UK

The UK's annual electrical energy mix

Electrical energy by fuel source (%)

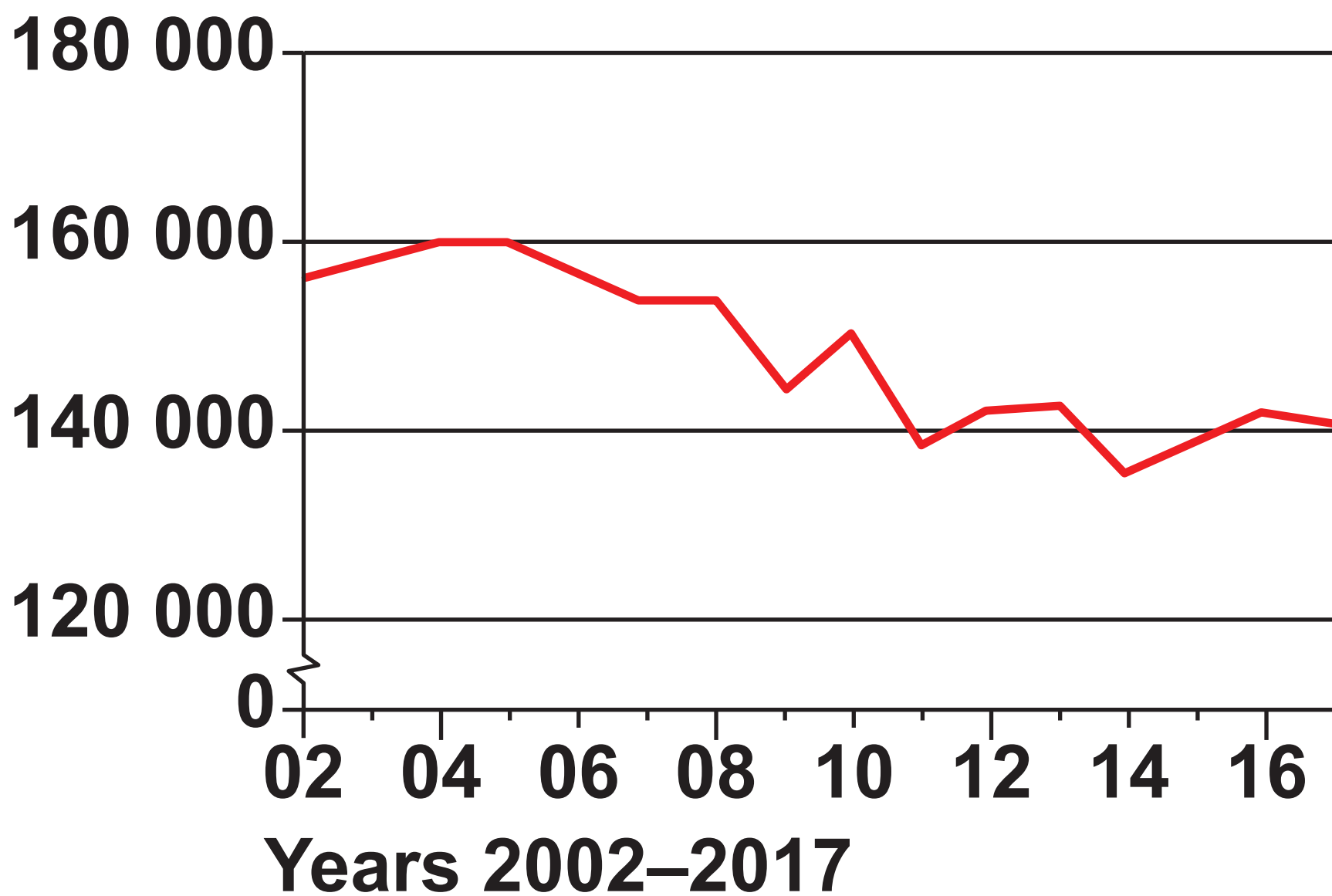


### KEY

— Natural gas    — Nuclear    — Biomass  
— Coal    — Wind    — Solar

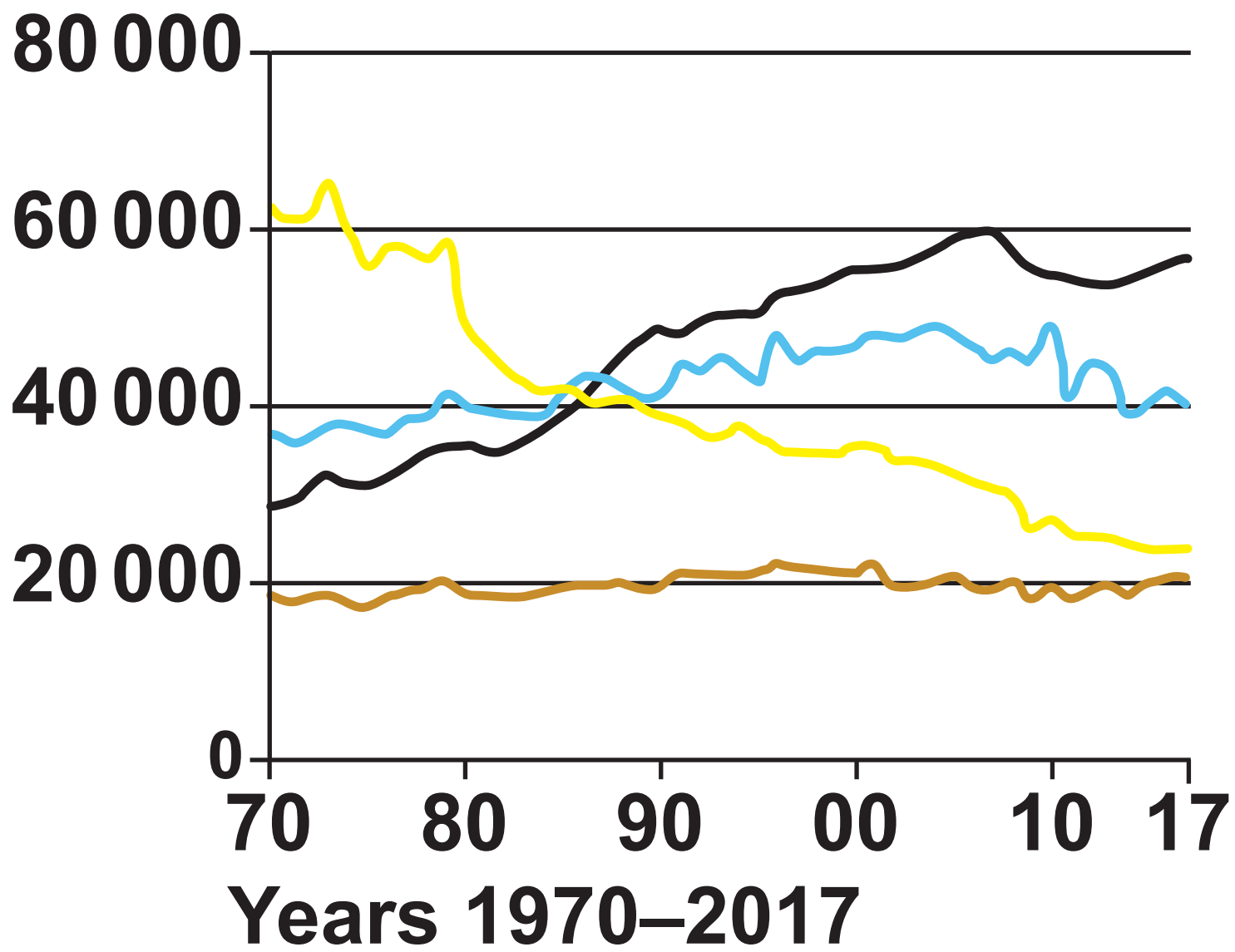
**The last thirty years have seen a steady growth in the use of renewable energy. However, there is no doubt that fossil fuels will continue to play a significant role in the UK's total energy mix in the future. Estimates suggest that the use of renewables for electricity generation will continue to grow but the move away from fossil fuels used to power transport will be slower. There is some concern that the continued use of fossil fuels to power vehicles will add to the problem of climate change. However, the continued shift towards renewable energy will help to manage climate change. In addition, conservation methods and more efficient use of energy will reduce energy demand in the future.**

**[Turn over]**

**FIGURE 1 continued****UK energy consumption****Consumption  
(ktoe)****KEY****— Energy consumption****Ktoe = Kilotonne of oil equivalent**

# UK energy consumption by sector

Consumption  
(ktoe)



## KEY

— Transport      — Industry  
— Domestic      — Services

[Turn over]

## **FIGURE 1 continued**

### **The changing pattern of energy production and use in the UK**

#### **UK electricity use falls – as rest of EU rises**

**The UK was the only country in the EU to reduce its energy consumption last year. In the UK, demand for energy has been falling in recent years as large scale industry has declined and households have used energy more efficiently. The UK's power consumption decreased by nearly 2%, while it increased by 0.7% across the EU as a whole. Overall, electricity demand in the UK has fallen by 9% in the last seven years, the biggest decline in the EU. The demand for electricity within the EU has increased as countries push for economic growth and populations grow.**

**The differences in the patterns of consumption cannot all be accounted for by the differences in economic and**

**population growth. Also, the weather did not appear to play a major part because it was equally mild throughout Europe. Carbon and power analysts suggest that the differences may be a result of the increasing use of electric vehicles and the growth in the use of air conditioning in some countries. Recent evidence also suggests that UK consumers are buying more energy efficient products.**

**Adapted from 'The Guardian',  
30/01/2018**

**[Turn over]**

**FIGURE 1 continued**

**Renewables provide more than half UK electricity for the first time**

**Renewable sources of energy have generated more electricity than coal and gas in the UK for the first time.**

**The National Grid reported that at Wednesday lunchtime power from wind, solar, hydro and wood pellet burning supplied 50.7% of UK electricity. As the weather was both sunny and breezy, the conditions were perfect for generating energy from renewables and approximately 10% of the UK's power came from offshore wind farms.**

**(‘BBC News’ environment report, 08/06/18)**





## **FIGURE 2**

### **Energy futures – the development of renewable energy sources**

#### **How ‘green’ is renewable energy?**

**All types of energy generation can create environmental challenges. The exploitation and use of fossil fuels can lead to land and water pollution, and add to the threat of climate change. The use of renewable energy sources is considered ‘green’ because they do not have a significant negative effect on the carbon balance. However, they are not environmentally neutral.**

**[Turn over]**



## FIGURE 2 continued

### HYDRO-ELECTRICITY

- Large areas of land flooded
- People forced to leave towns and villages
- Natural flow of river blocked or diverted



### BIOMASS

- Large areas of land used
- Reduction in biodiversity
- Clearing land for fuel crops creates greenhouse gases
- Processing fuel crops uses energy





## WIND ENERGY

- **Negative visual impact**
- **Noise may disturb wildlife**
- **Trees removed**
- **Large amounts of concrete used in construction**



## SOLAR ENERGY

- **Large areas of land used**
- **Solar thermal plants use a lot of water for cooling**
- **Construction of solar panels creates highly toxic waste**




**[Turn over]**



# FIGURE 2 continued

## A leaflet about a planned renewable energy project in Cornwall



**Support your local Photo-Voltaic Community Renewable Energy project, which is cleaner and more affordable, retaining the social and economic benefits in the Falmouth & Penryn Area.**

**Clean Energy**

- Best wind location in Western Europe
- Best geothermal location in the UK
- Best solar location in mainland UK

**Let's generate our own Renewable Community Energy and keep profits within Cornwall**

**Wasted Energy**

- Poor housing standards
- Infrastructure is old and becoming unreliable
- Public spending decreasing

**We can**

- Generate and use our own clean energy
- Keep profits, reduce bills and create local jobs
- Make our homes, business and transport greener and more affordable

**98%**  
of our energy spend at present leaves the local economy

**32%**  
of our electricity demand met by renewables in 2016

**What are the benefits to local people?**

**Improved air quality**

**Year round jobs**

**Lower bills**

**Locally owned generation**

**Thriving communities**

**Warmer homes**

**Cleaner transport**

**We will re-invest profits back into new community renewable projects and support our community to reduce our impact on climate change.**

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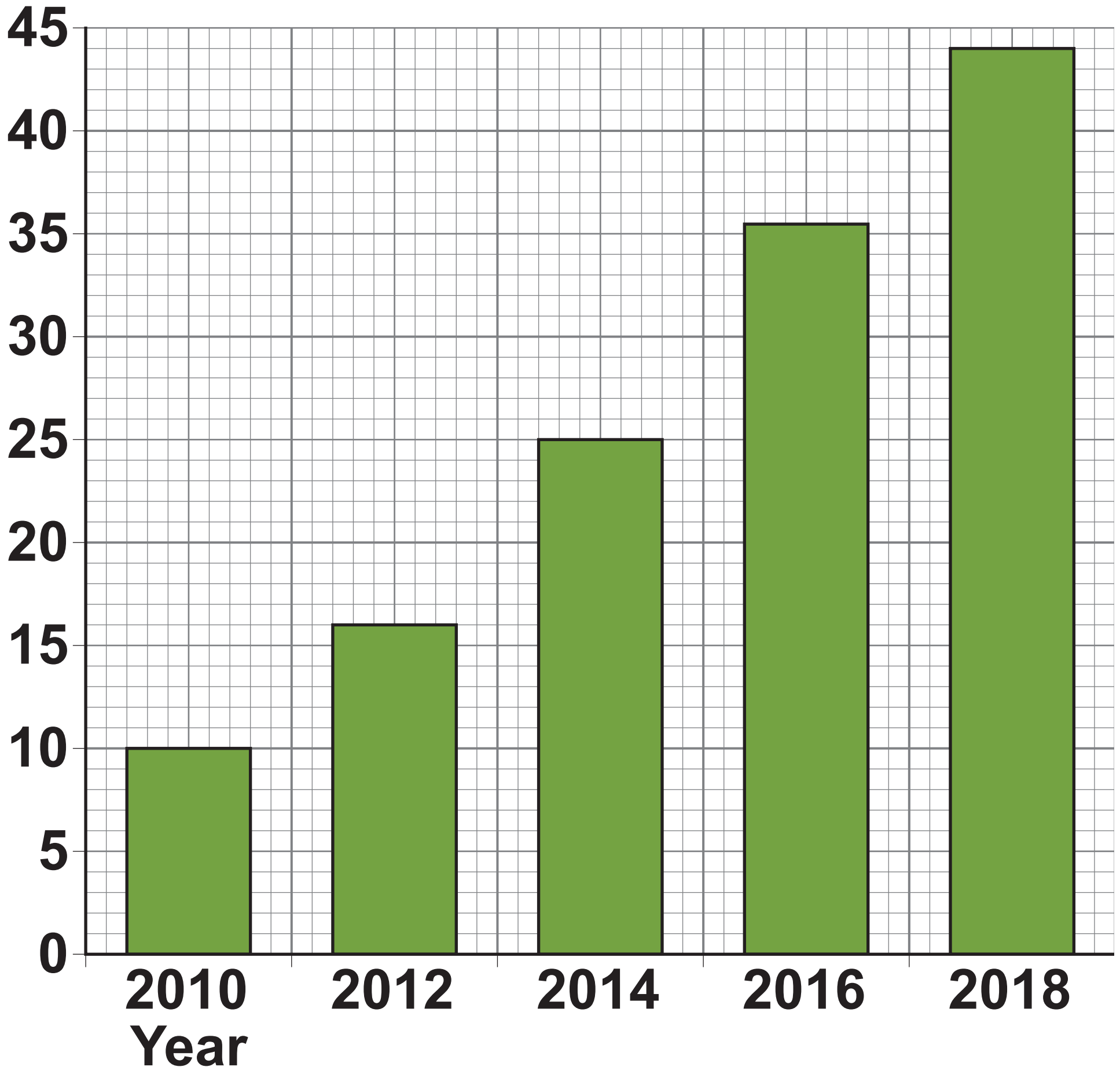
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**FIGURE 2 continued****Energy futures – the development of renewable energy sources****Renewable energy capacity (UK)**

**“The issue with renewable energy may be a question of scale. Large scale projects can generate a large amount of energy and bring significant economic advantages to both local and regional areas. However, they also have the potential to create significant environmental problems, especially if they are not managed effectively. Smaller scale projects may only generate a limited amount of energy but are often seen as more environmentally sustainable.”**

**(Energy consultant)**

**UK energy capacity for renewables  
GW (gigawatts)**



**[Turn over]**



**FIGURE 2 continued****Tallest onshore wind turbines in Scotland planned for the Isle of Lewis**

**An energy company has published plans to build over 80 huge wind turbines, 45 at the Uisenis site and 36 on grazing land on the outskirts of Stornoway, the main town on the Isle of Lewis. The turbines would be up to 200 metres tall, higher than any existing onshore wind turbines in Scotland. The company says that the scale of the turbines will mean that fewer turbines will be required in order to generate the required power and that the excess generated power will be transported to the Scottish mainland via a new cable system. There are mixed feelings about the proposed development. Many local people feel that it will bring much needed jobs and create business opportunities in an area that has suffered from declining population in recent years as younger people move away in order to seek employment. This is shown by the way that existing wind energy schemes have created**

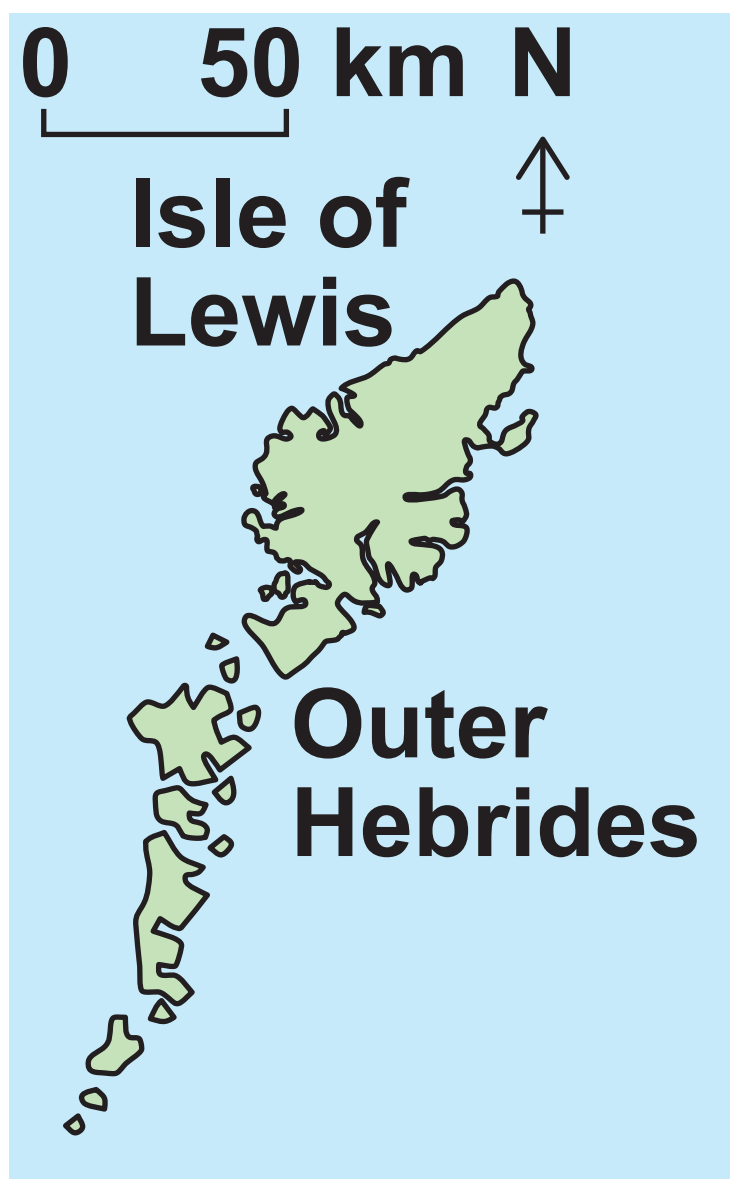
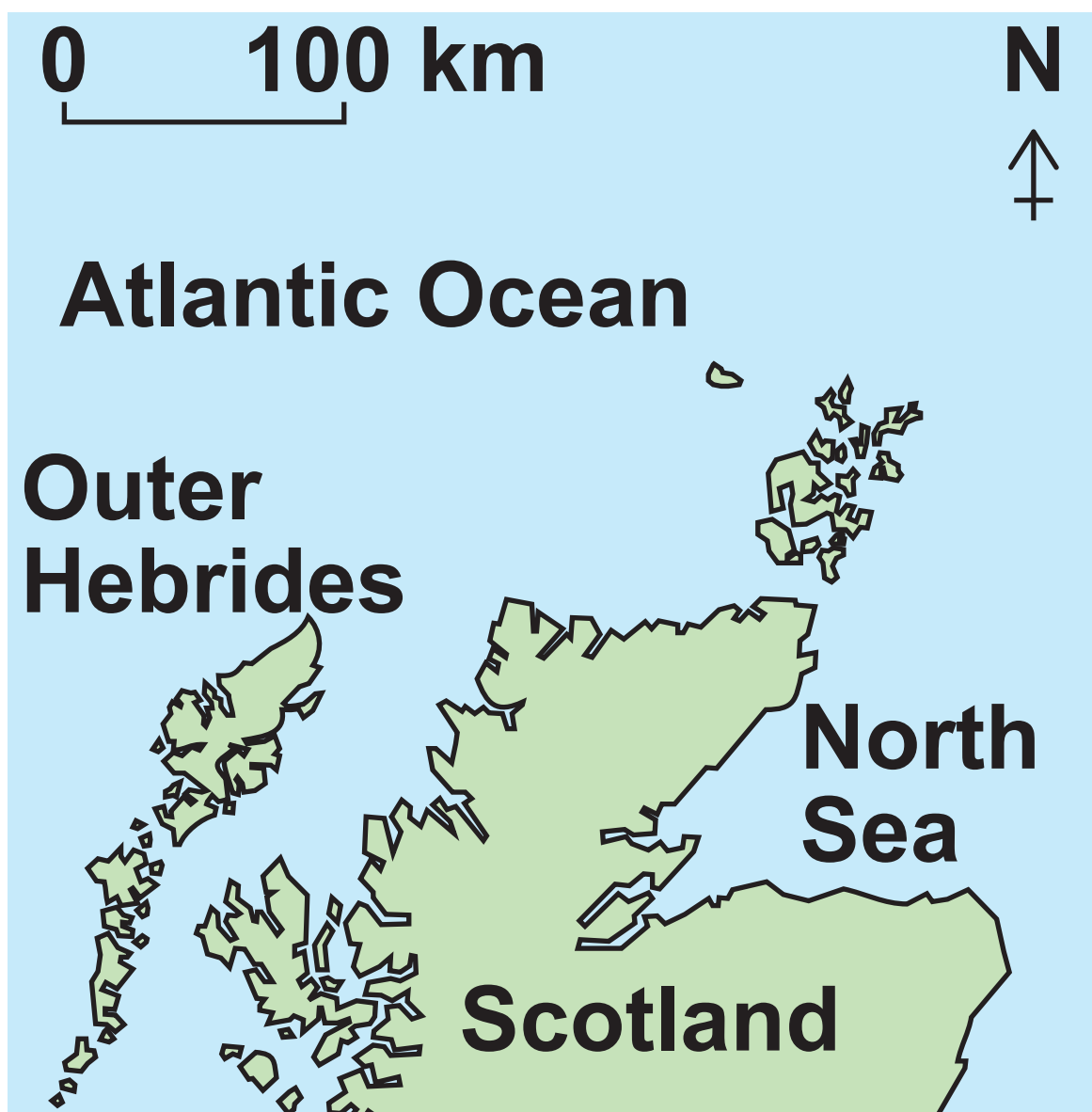


**opportunities for local people with some of the money generated being put into local community schemes. Other people feel that the wind turbines are too big and will be very intrusive, possibly putting off visitors and damaging the tourist industry. As one local writer/ blogger said, “These super turbines are the same size as the giant turbines being built in the North Sea and they are built offshore for a good reason, because their enormous size is thought to make them unacceptable anywhere onshore, especially in pristine environments like the Isle of Lewis.”**

**(Adapted from ‘Stornoway Gazette’, 01/05/2018 and ‘The Scotsman’, 01/05/2018)**

**[Turn over]**

FIGURE 2 continued



**KEY**

- Town
- Wind farm

## **FIGURE 3**

### **Views about the proposed Isle of Lewis wind farm development**

#### **Lewis Wind Power**

**Lewis Wind Power has proposed two wind farm projects at Stornoway and Uisenis. These projects would make the most of the wind resources on the Isle of Lewis in the Outer Hebrides. The two wind farms would produce low-cost power for consumers across Great Britain while also creating local economic opportunities. The projects, along with the proposed mainland interconnector, could generate hundreds of local jobs and add up to £33 million annually to the local economy. The company has been working with the local community for many years to ensure that there is a community stake in any current and future projects.**

**[Turn over]**

**FIGURE 3 continued****Benefits of the proposed project:**

- **Community Ownership – Lewis Wind Power is working closely with local community groups to allow them to invest in the project.**
- **Community Benefit Payments – The wind farms would pay significant sums into local trusts which could be distributed to local projects and organisations.**
- **Rental Payments – Stornoway Wind Farm would pay an annual rent to the local authority and make payments for each area of grazing land used.**
- **Building of the Mainland Interconnector – No further onshore wind farm development can take place unless a mainland connector is built because the current network is at full capacity.**
- **Employment and Wider Economic Development – It is estimated that 600 jobs will be created during construction.**

**(Adapted from 'lwp.scot/edfenergy', 2018)**

**Coach of local athletics club**

**“The athletics club has had financial support from Lewis Wind Power, enabling it to develop successfully and allowing local athletes to travel to the mainland for competitions.”**

**Hotel manager**

**“We have to allow this development because it will create jobs and opportunities for local business as well as boosting the hospitality industry.”**

**Business manager**

**“These projects are vital for local business and the community. They will bring jobs to the area and the opportunity for skills-based training.”**

**Local crofter**

**“We have used the communal land to graze animals for generations and building wind turbines there will change our way of life.”**

**[Turn over]**

**FIGURE 3 continued****Scotland has more than half of the UK's wind turbines**

**It has been claimed that the desire to build more wind turbines in Scotland is completely out of control, after official figures showed that Scotland now has more than half of the UK's onshore turbines. It has been suggested that Scotland's countryside is in danger of being 'swamped' by wind farms, and areas that are already 'saturated' with turbines are being put under pressure to accept more. A Scottish energy spokesperson said, "It is foolish to put such emphasis on unreliable energy sources which can damage the landscape for residents and tourists". A recent poll found that two thirds of walkers and climbers said that turbines were making Scotland a less appealing place to visit. It has been claimed that more than five million trees have been chopped down to make way for turbines. ('The Telegraph', 11/04/14)**



## **Views about the proposed Isle of Lewis wind farm development**

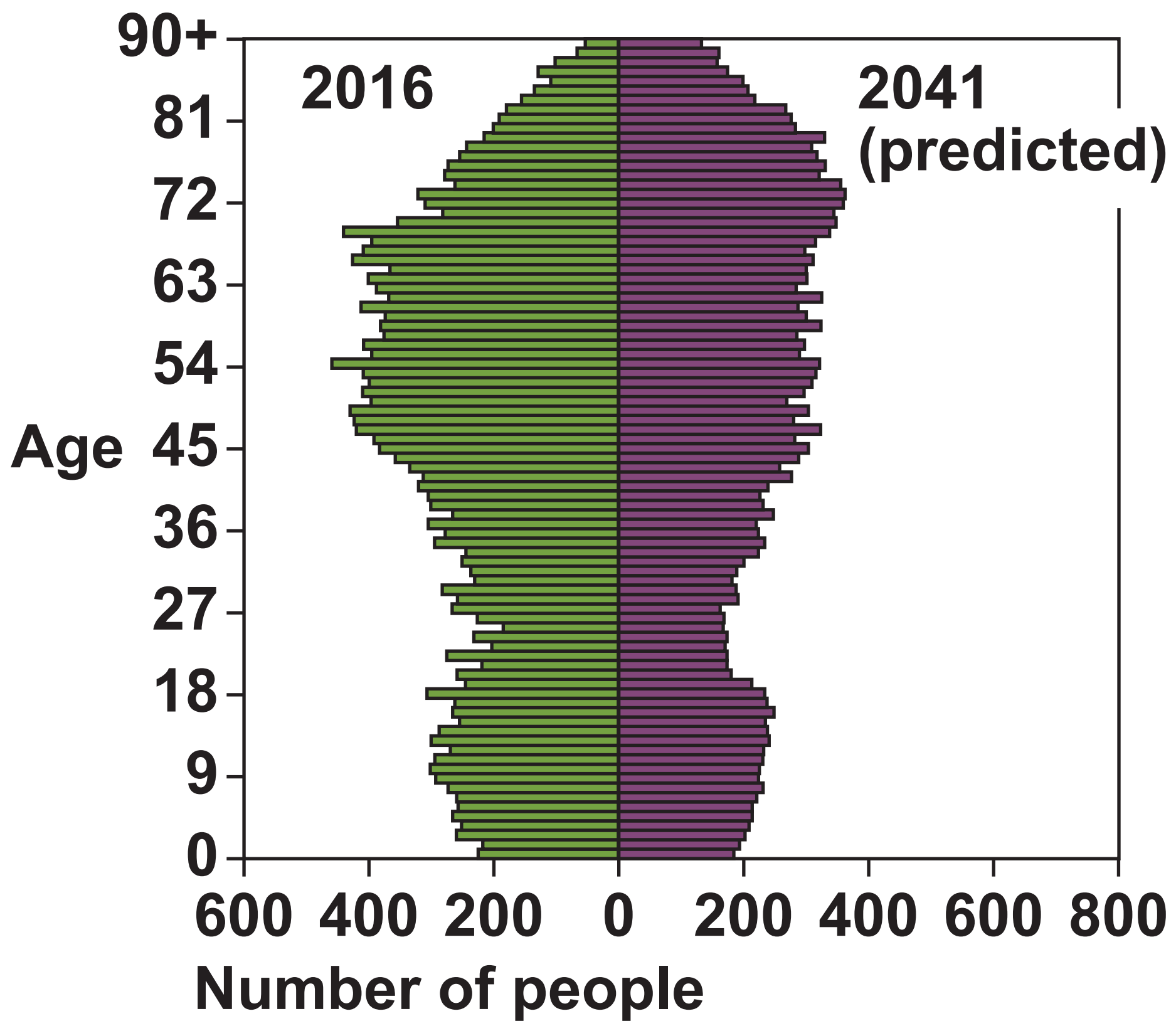
### **Outer Hebrides battle to reverse steep population decline**

**The population of the Outer Hebrides is predicted to decline by 13.7% by 2039 – the steepest fall of any Scottish region. The number of Islanders of working age is predicted to decline by 21%, and the number of children aged 15 or below will fall by 28%. Council leader Angus Campbell said, “Population decline is the biggest threat facing our islands and action must be taken to reverse this. This is why we need to do everything we can to make the area an attractive place to live and work. Realising our renewable energy and tourism potential will help, otherwise younger people will be forced to leave the islands to seek work elsewhere.”**

**[Turn over]**

## FIGURE 3 continued

## Age distribution – Outer Hebrides





**FIGURE 3 continued**

**RSPB claim that Lewis wind farm plans threaten eagles**

**RSPB Scotland has claimed that the proposed wind turbines may harm golden eagles and sea eagles. The RSPB does not oppose wind power developments as a way of reducing carbon emissions where turbines do not pose serious threats to wildlife or habitats, but they feel that planning applications must take into account the importance of sites to eagle populations.**

**Plans for tallest UK onshore wind farms create conflict**

**Plans to build some of the tallest wind turbines on the Isle of Lewis have caused an angry response from some local residents. Local crofters have objected to the proposals to build on communal land near Stornoway, the largest town in the Outer Hebrides.**

**[Turn over]**

**FIGURE 3 continued**

**Local community groups want to build their own smaller turbines, with profits going directly to local causes. This has already been done in the Point and Sandwich area, where three turbines have been built; the profits are being used to support local health services and an arts project. There is also concern about the effect on the tourist industry and a fear that the scale of the proposed turbines will make the area less attractive. The company proposing the development has said that the number and size of the turbines is required in order to justify building a new mainland connector, which will transfer electricity to the mainland, and that without it the area will not be able to fully realise its energy potential and create the job opportunities and income that it needs.**



**END OF SOURCES**

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