THE GREEN BRITAIN FOUNDATION REPORT

# CAN THE NORTH WEST BE A GREEN ENERGY SUPERPOWER?

The North West Green Energy Task Force

THE GREEN BRITAIN FOUNDATION

CLIMATE outreach

CO-OPERATIVES UK

JULY 2023

# Foreword

**When I met with Andy Burham and Steve Rotheram last year, we wanted to see if the North West had the renewable energy potential to power itself, and what this would mean for the region.** We set up the North West Green Energy Taskforce alongside Co-operatives UK and Climate Outreach to answer these questions.

Now that we've done the work, we've got a clear answer. The North West has the potential to become a clean energy superpower and share the benefits across the region.

More than that, it shows how the North West can create a blueprint for the rest of the UK that brings lower bills, green economic growth, energy security and money for public services. It's also another nail in the coffin for fossil fuels. They're more expensive, unreliable and single-use. They make no sense and provide none of the benefits.

The North West is the perfect place to build the green economy. It has a strong history as an industrial and political powerhouse with leaders that have the vision to make it a reality. There's an opportunity for someone to lead the green industrial revolution and seize the benefits, so why not the North West?

The work of the Taskforce has found that:

- The North West can produce twice the clean energy supply it needs to meet future demand.
- The retail value of the North West's renewable energy potential would be £50bn at today's retail prices.

These profits can and should go to the people of the North West, but this will only happen through genuine public ownership. By collectively owning these resources, the profits can go back into the region, providing a dividend to invest in public services and communities.

The Labour Party's plans for Great British Energy provide a way for this to happen at the regional and local level. The chapter from Co-operatives UK in this report sets out how local communities benefit from collectively owned energy generation and the ways in which this can be done. It also shows that the desire for this isn't new. Across the UK there are examples of local communities

# Foreword

that have taken action into their own hands because the Conservative Government in Westminster has failed them. We need another way of doing things.

The scientific case is clear, the economic case is clear and the public want change. The chapter in this report from Climate Outreach shows that this isn't a partisan issue, with people from every background showing concern about climate change and nature.

How we talk about stuff matters – it's how we win the battle for a green Britain. We need to show that green energy is a forever fuel. That the North West has enough to power the region and it will never run out, which means that the jobs it creates will be forever jobs too. That the revenue generated can be put back into the community. That we can use it to break our dependence on foreign energy companies, dictators, petrostates and their price-fixing cartels. And that it gives us real energy security.

We know we can reach net zero and secure our energy by harnessing the wind, sun, waves and even grass. The work of the Taskforce shows that the North West can go beyond Net Zero and become a net exporter of energy. What's more, it provides a blueprint for the rest of the UK to follow.

The North West Net Zero Youth Network said it best when they told us that if "you build, they will come". It shouldn't need our kids to tell us we need to act, but they're right. We need to build. We need to build the infrastructure and we need to build a movement to bring people with us.

Dale Vince OBE, Founder of Ecotricity and leader of the Green Energy Taskforce.

# Table of Contents

# Taskforce report summary

**The Green Energy Task Force was created in Autumn 2022, bringing together The Green Britain Foundation, Climate Outreach and Co-operatives UK, to look at the potential for a just transition to renewable energy in the North West.** Backed by the Mayors of Greater Manchester and Liverpool City Region, Andy Burnham and Steve Rotheram, this report is the culmination of several months' research and dialogue to inform decision-makers about what is possible with renewable potential, models of ownership for energy and an engaged public.

The report has three parts. First, the Green Britain Foundation provides a detailed scoping and analysis of the region's green energy potential - in the context of current and future energy needs. The Foundation also examines the green energy mix and reveals some of the regional economic and livelihoods benefits of becoming a green energy superpower.

Climate Outreach, then, provides evidence-based recommendations for the region's metro mayors on how to catalyse and deepen wide public engagement around this transition, and climate action more broadly. It provides insight into communications and engagement strategies which resonate with key audience segments in the north west.

Finally, Co-operatives UK explores the feasibility for co-ownership of the region's renewable energy. With a twin focus on community engagement and wealth-building, the trade body examines the benefits of co-operative ownership; involving public, private and community stakeholders.

This report is ground-breaking and tells a clear story about the potential for and benefits of investing in the just, green, transition in the North West. Climate resilience - and so many co-benefits for our communities and economy - are within our reach and the North West region can show the rest of the UK how it is done.

# Taskforce report summary

**It finds that:**

- The North West has enough potential renewable energy to surpass forecasted demand and achieve a zero-carbon energy supply system. Through a combination of wind, solar, tidal, and green gas sources, the region has the potential to generate 92TWh of energy per year, more than double the projected demand of 46TWh per year.
- The North West also has freedom to choose its renewable energy mix to meet energy demand. This choice allows for economic considerations and public perception to be factored into the decision-making process.
- By becoming energy independent and a green energy superpower, the region can generate clean economic growth and create job opportunities for the future.
- The potential retail value of the North West's renewable energy generation could reach £50 billion per year at today's retail prices, providing significant profits that can be reinvested in public services and communities.
- Public engagement is a critical part of the process. The report stresses that involving local communities is the best way to mitigate fears and bring people into the transition story and process. Local leaders must also build narratives that resonate with a diverse range of values and everyday concerns.
- The mayors of Greater Manchester and the Liverpool City Region must lead by example when it comes to local engagement around climate action; to use their authority and platforms as a force for green good.
- Metro mayors must hold central government to account on climate commitments around public engagement.
- Co-operative ownership of renewable energy will ensure community-wealth building and community engagement.
- Mixed ownership co-operatives, including public, private and community stakeholders, address critical conclusions and recommendations on engagement while also unlocking micro-generation sites.

THE GREEN BRITAIN FOUNDATION

CLIMATE outreach

CO-OPERATIVES UK

Chapter 1

# Becoming a clean energy superpower - the renewable energy potential of the North West

When we set up the **North West Green Energy Task Force**, we wanted to establish the renewable energy potential of the region and compare it to current and future needs.

We've now crunched the numbers and the findings are clear. There is enough renewable energy capacity in the region to meet demand. In fact, there is more than enough.

The North West can produce twice the clean energy supply that it needs to meet its future demand targets. By doing this it can become a clean energy superpower and provide a blueprint that can be replicated across the country, by all regions - in pursuit of Net Zero and beyond.

The work of the Green Energy Task Force to date doesn't just validate this. It shows that there's a bigger opportunity than even we thought.

# METHODOLOGY & ASSUMPTIONS

The aim of this report is to establish the renewable energy potential of the North West region and compare it to current and future needs. This is a summary of the underlying assumptions and points to consider when reviewing these findings. More details on the approach and methodology can be found in the evidence base in Appendix i of the report.

## DEMAND ESTIMATES

On the demand side, this report uses the National Grid Future Energy Scenarios (FES) as the basis for future energy demand forecasts. Specifically, this relates to a regional estimate of National Grid's 'Consumer Transformation' scenario for the Liverpool City Region, Greater Manchester and Cheshire. This is therefore aligned to the assumptions and limitations of the FES scenarios, which can be viewed in more detail here.

## SUPPLY ESTIMATES

On the supply side, the research mapped the potential supply of renewable energy across green gas, ground based solar (both 'big solar' in areas larger than 5 hectares, and 'small solar' in areas between 3 and 5 hectares), rooftop solar, onshore wind, offshore wind and tidal range energy for the region. Specific input parameters, assumptions and a data catalogue can be found in appendix i across each of the renewable energy sources. For the purposes of this report, nuclear energy, geothermal energy and other biogases were excluded.

## FURTHER GUIDANCE FOR THE READER

**Geographic region** – this report covers the Liverpool City Region, Greater Manchester and Cheshire. This area is used as a pilot to show the viability of renewable energy supply.

**Energy mix in the supply scenarios** – the energy supply scenarios in this report are not fixed. They are illustrative examples to provide further information into the decision-making process. Further debate and analysis will be needed to determine the future energy mix.

**Demand exclusion** – the FES demand scenarios do not include aviation, maritime, and electrolysis for green hydrogen.

**Future research considerations** – the work of the Taskforce has not yet considered energy storage requirements, seasonal variation in supply and demand and grid upgrade requirements. These variables have therefore not been factored into these findings and will be considered as part of future research.

**Green gas** – green gas is a renewable form of energy that uses a process of anaerobic digestion to turn grass into energy. Green gas recycles atmospheric carbon and does not release any additional fossil carbon into the atmosphere as the carbon contained in biomethane is biogenic and part of the carbon cycle.

**Offshore wind** – the scenarios include energy supply from future offshore wind projects that have been confirmed and planned. There is further potential for offshore wind, but where it's not part of a planned project it has been excluded from the main scenarios. However, estimates for this can be found in appendix i.

# THE NORTH WEST HAS POTENTIAL

## THE NORTH WEST HAS THE POTENTIAL

The data shows that there's enough potential renewable energy to power the region and reach a Zero Carbon energy supply system.

## THE NORTH WEST HAS CHOICES

The region can choose what sources of renewable energy it uses to meet that demand.

## AND BIG BENEFITS

The region will become energy independent, a green energy superpower, generate clean economic growth and create the jobs of the future.

## KEEPING THE BENEFITS IN THE NORTH WEST

To maximise the benefits for the region, there should be genuine public ownership of future renewable energy generation. There are other options too. Co-operatives have a role to play and in reality, private ownership too.

# THE NORTH WEST HAS THE POTENTIAL

The data shows that there's enough potential renewable energy to power the region and reach a Zero Carbon energy supply system. Through a combination of wind, solar, tidal and green gas, the North West has a potential energy supply of 92TWh per year, which is more than double the forecasted demand of 46TWh per year.

## DEMAND

### CURRENT DEMAND

**111TWh pa**

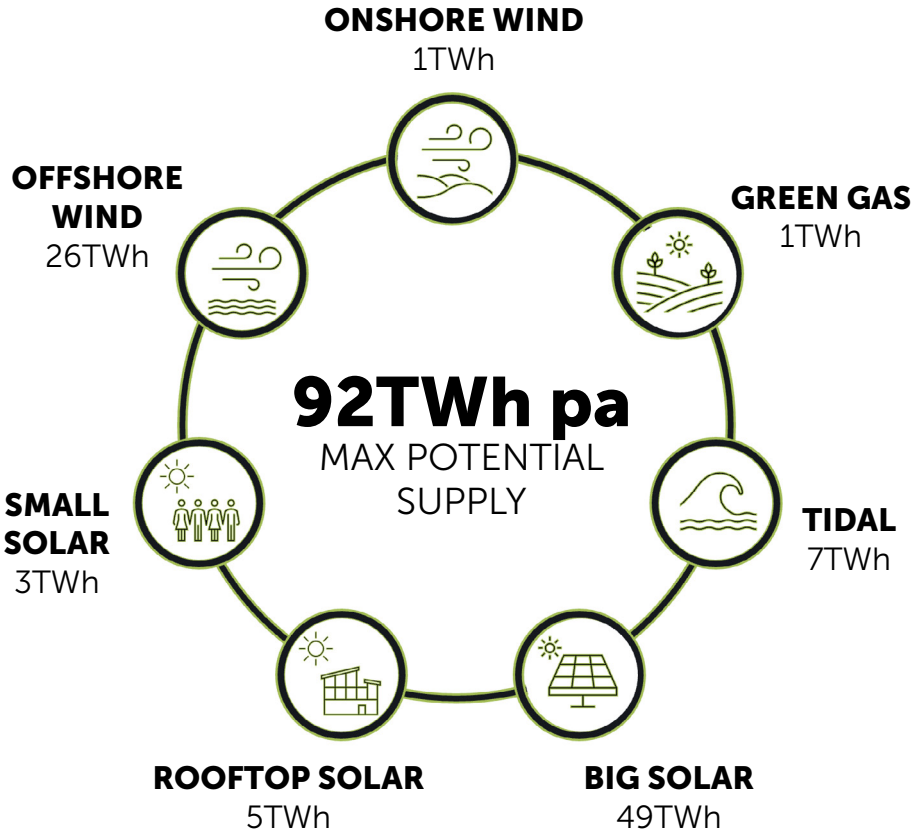
NW CURRENT DEMAND

### FUTURE DEMAND*

**46TWh pa**

NW FUTURE DEMAND

## FUTURE SUPPLY




*Based on National Grid Consumer Transformation Net Zero future energy demand scenario

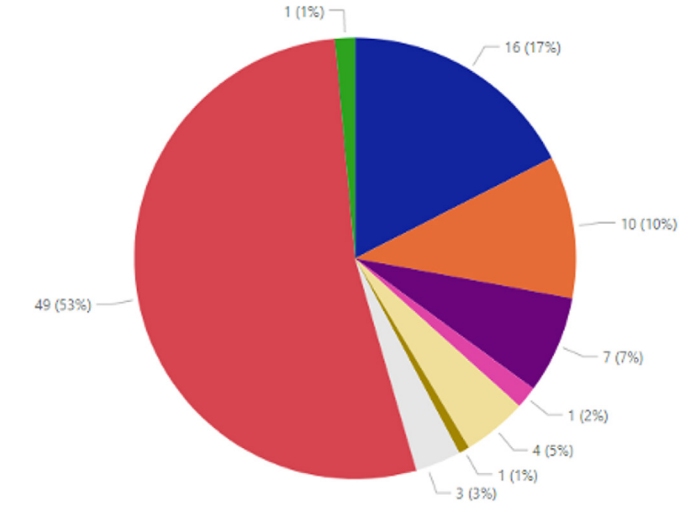
# THE NORTH WEST HAS THE CHOICE

The North West can choose the sources of renewable energy they use to meet demand. This choice means you can factor in economic considerations and public perception when deciding what to do.

## SCENARIO 1

Scenario 1 is an illustrative example of the renewable energy mix available to the North West. This scenario is based on the use of big solar where possible, green gas in the remaining suitable areas, and excludes unplanned future offshore wind, which has the potential to increase supply by 44TWh (installed capacity of 14GW). For more detail, please see the evidence base in Appendix i.

## RENEWABLES MIX

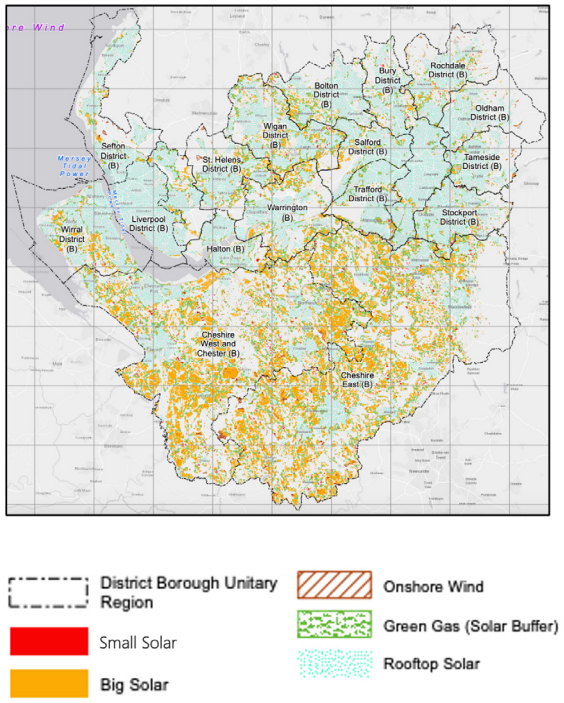



**92TWh pa**
POTENTIAL SUPPLY

**46TWh pa**
DEMAND TARGET*

*Current demand = 111TWh pa

## MAPPING



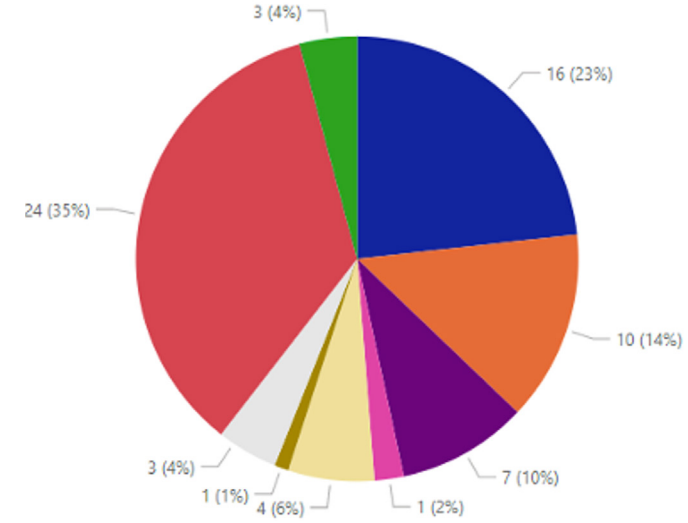
# THE NORTH WEST HAS THE CHOICE

The North West can choose the sources of renewable energy they use to meet demand. This choice means you can factor in economic considerations and public perception when deciding what to do.

## SCENARIO 2

Scenario 2 is another illustrative example of the potential renewable energy mix available to the North West. This scenario is based on even split of suitable land between big solar and green gas, with future unplanned offshore wind excluded. For more detail, please see the evidence base in Appendix i.

## RENEWABLES MIX

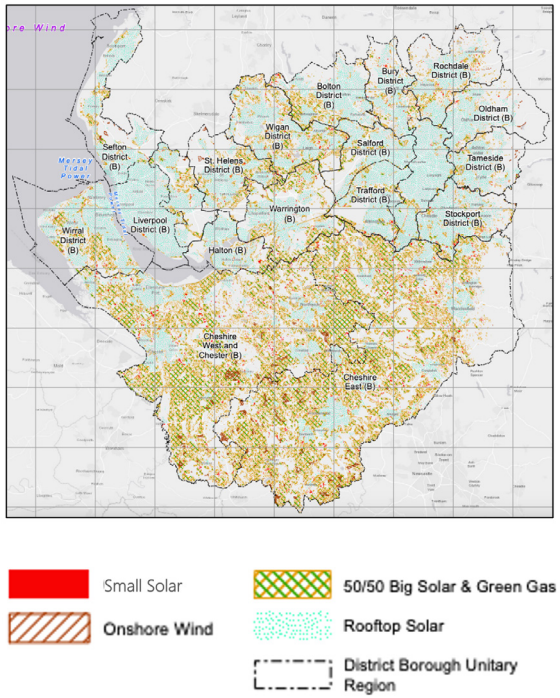



**69TWh pa**
POTENTIAL SUPPLY

**46TWh pa**
DEMAND TARGET*

*Current demand = 111TWh pa

## MAPPING



# THE NORTH WEST CAN GET THE BENEFITS

The benefits can accrue to the people of the North West. The region could become energy independent, a green energy superpower, generate clean economic growth and create the jobs of the future.

Green Britain Foundation research shows that investing in clean energy creates up to 2.5 times more jobs in the UK than the equivalent investment in fossil fuels. Clean energy investment also contributes up to 1.7 times more to the UK's Gross Domestic Product (GDP) than the equivalent investment in fossil fuels.

Using pre-energy crisis figures, the annual retail value of the North West's potential renewable energy generation would be £50bn a year (based on 92TWh pa), based at today's prices. The profits can go to the people off the region, providing a dividend to invest in public services and communities.

**£50BN**
RETAIL VALUE PA*

**ANNUAL ENERGY VALUE** based on current retail energy prices.

**GREEN JOBS**

**GREEN ECONOMIC GROWTH**

**ENERGY INDEPENDENCE**

*Based on 92TWh pa and current energy prices

# KEEPING THE BENEFITS IN THE NORTH WEST

The North West will get the greatest benefits through public ownership of future renewable energy generation. This wouldn't be nationalisation of current supply, but public ownership of the renewable energy and infrastructure that we need to build next. It's investment with clear returns, not spending without a plan.

It makes sense to keep the benefits of the energy made in the North West in the hands of the people of the North West.

There are other options too. Co-operatives have a role to play and in reality, private ownership too.

# THE FINDINGS AND POTENTIAL BENEFITS ARE PROFOUND

The work of the Task Force shows that by using the forever fuels of the wind, sun, waves and grass, the North West can reach net zero. In fact, the numbers show that there is an opportunity for the region to go beyond net zero and become a net exporter of energy.

This would bring about real economic growth, energy security and money for public services in the North West. In doing this, the North West would be creating a blueprint for how we can build a Green Britain across the rest of the country.

Chapter 2

# Engaging residents of the North West of England on the net zero energy transition

Evidence-based recommendations to deepen engagement and mitigate polarisation through effective communications.

CLIMATE outreach

# CHAPTER SUMMARY

**There is no doubt the majority of the British public are concerned about climate change.** They want the government and businesses to do more. They want to do more themselves too, but don't always feel they have the framework or agency to act. According to the Climate Change Committee's latest Progress Report, the UK government has made no meaningful progress on implementing the net zero goal and targets are being missed on nearly every element. [1] Cross-societal action on net zero has never been more urgent.

The UK government - as a party to the UNFCCC - has also committed under the Glasgow-Sharm el Sheikh work programme to develop and deliver a National Plan for Public Engagement (under Article 12 of the Paris Agreement - 'Action for Climate Empowerment').[2] However, there is currently no evidence that this commitment is being meaningfully implemented. Since 62% of our net zero target requires some form of individual action, this risks our ability to reach net zero as a nation, let alone benefit from the transition socio-economically.[3]

The North West Green Energy Task Force was launched in October 2022 by Greater Manchester and Liverpool City region's Metro Mayors - Andy Burnham and Steve Rotheram. They asked the taskforce to scope out the potential for renewable energy in the region, in the context of current and future needs. Climate Outreach, as an organisation with expertise in public engagement on climate change and the net zero transition, has been asked to offer insights and recommendations into how residents might engage with it, including the opportunities and challenges of deep engagement to inspire and catalyse more people-led action.

Climate Outreach and partners' research and engagement work shows that **rapid social change towards a just transition depends on the informed consent and participation of the public.** Effective communication and public engagement - with people from a wide range of social and political values and identities - is essential. Political polarisation is on the rise, globally, so **meaningful engagement is also vital to mitigate backlash and unintended consequences** of implementing the ambitious policies we need to meet our net zero policies.

1. Climate Change Committee (2023) Progress in Reducing Emissions: 2023 report to parliament.
2. UNFCCC (2022) Decision 23/CP.27. Action plan under the Glasgow work programme on Action for Climate Empowerment.
3. Climate Change Committee (2019) The UK's Contribution to Stopping Global Warming

This report summarises key insights and considerations for engaging the public in projects in the region, drawing on learnings from the UK and globally. Key insights include:

- **Climate action and net zero are no longer a partisan agenda** - people from diverse political backgrounds express concern about climate change and environmental degradation.
- **There are ongoing attempts to draw climate action into the 'culture wars' space.** Backlash has been mobilised against the net zero transition in other countries. Bringing people in is the best way to mitigate their fears and help them to see themselves in the transition story.
- **Building narratives that resonate with a diverse range of values and everyday concerns** is not only possible, but critical, to preventing polarisation and deepening and sustaining public engagement on net zero.
- **The cost of living crisis has not usurped climate concern** - but communicating about how these crises are linked is important and needs to be done sensitively. We need to communicate clearly and honestly about the co-benefits, trade-offs and temporary costs of the transition to net zero.
- **Narratives like fairness, 'doing your bit', conserving nature and protecting future generations** are appealing to most people and encourage collaboration on net zero.
- **The trusted messengers for this agenda** are rarely politicians, environmental charities, campaigners, or media. Effective energy transition will be supported by messages disseminated by groups who are more likely to be trusted by wide segments of society.
- **Nature and healthcare are priorities for everyone**, so engagement efforts should seek to make the connections between climate and co-benefits for nature and health.

- **Two-thirds of the British public feel that the current system is 'rigged' against them.** Meaningful engagement in the energy transition is one helpful driver to a broader agenda of re-building the social contract.

# INTRODUCTION

**Three in four adults in the UK say they feel worried about climate change.**[4] Around 60% think the government should be doing more.[5] The British public are taking some actions to reduce their carbon footprint, but they would like a framework to support them to do more. More than half of us would be willing to pay more taxes to tackle climate change. People are worried about the financial impacts and trade-offs involved with climate action. This is exacerbated by the lack of meaningful engagement with people about the roles they could play, and about the net zero transition's co-benefits.[6] Additionally, confidence that the UK Government has a clear plan in place to tackle climate change has decreased in 2023, with only 28% of Britons agreeing the government has a clear plan.[7]

There is widespread recognition that **ambitious climate action - including the renewable energy transition - could unlock new economic opportunities and jobs.**[8] A new report by the UK's Sustainable Business Council emphasises that the UK could even go beyond net zero to become a net exporter of renewable energy to Europe, adding 70 billion GBP to the economy and creating an additional 279,000 jobs in the UK.[9] The report to the Green Energy Task Force by The Green Britain Foundation and Arup suggests this is possible for the North West region, with renewable energy potential to meet demand, and create sustainable jobs.[10] The report emphasises that the greatest benefits are likely to occur if there is a strong public role in this potential future, through public ownership.

Climate change is often misunderstood as a partisan issue, with the perception that left leaning voters are more supportive of the net zero agenda. However, research shows that the picture is much more nuanced. Among Conservative voters, those who are most likely to be at the knife edge of a just transition - working class voters - are more supportive than middle classes about the renewable energy transition.[11] The same study found that 51% of Conservative voters would vote for a different party if the net zero target was ditched. According to the Conservative Environment Network, **climate is not currently an issue that falls into the 'culture wars' and making this assumption could be fundamentally damaging** to politicians and policymakers who want to retain public support.[12]

However, the anxieties of policymakers and politicians is understandable, as political polarisation is on the rise globally.[13] **The UK public has made clear they believe that climate action should be fair for all** - although there are key differences in the attitudes and understanding of fairness and the types of policies supported.

4. Ipsos (2023) Earth day survey: public opinion on climate change, Great Britain and the world.; Office of National Statistics (2022) Worries about climate change, Great Britain: September to October 2022.
5. Qadri, M.J. (2022) Majority of Britons think government is failing to tackle climate crisis, new poll shows.
6. Ipsos and CAST (2022) net zero Living: policy update.
7. Ibid 4.
8. Climate Outreach (2020) Britain Talks Climate: a toolkit for engaging the British public on climate change.
9. UK Business Council for Sustainable Development (2023) New Industry Report Launch: Economic Opportunity For A Sustainable Economy.
10. Green Britain Foundation and Arup (2023) Report to the Green Task Force on renewable energy potential of the North West region.
11. UK Onward (2022) Taking the temperature: Has the political climate changed on net zero?
12. Conservative Environment Network (2023) "Dragging climate action into culture wars would fail with red wall voters", 23 May.
13. Edelman (2023) Edelman Trustbarometer: navigating a polarized world.

# BRITAIN TALKS CLIMATE

**In 2020, Climate Outreach and More in Common led a foundational, nationally representative study on how the British public engages with climate change.**[14] Britain Talks Climate found that British people can be categorised into seven distinct segments based on their values, attitudes, policy support beliefs, attitudes, and behaviour about climate change.

This illustrated that the UK is not polarised but rather, fragmented between:

- **Two ideological groups:** the Progressive Activists and the Backbone Conservatives
- **Two disengaged groups:** the Disengaged Battlers and the Disengaged Traditionalists - one left-leaning and one right-leaning
- **One group defined by attitudes towards immigration and a sense of victimhood:** Loyal Nationals
- **Two more groups (engaged but less ideological):** Civic Pragmatists and Established Liberals – whose politics are present, but softer

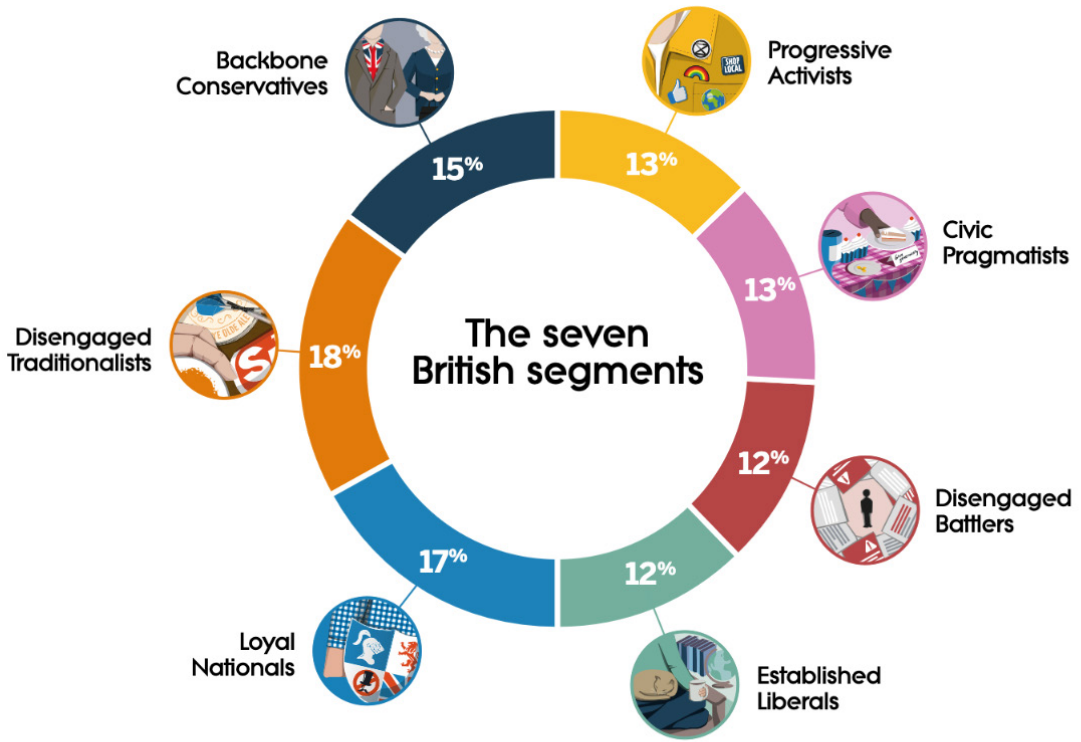



Figure 1: Britain Talks Climate - The seven segments[15]

14. See https://climateoutreach.org/britain-talks-climate
15. See climateoutreach.org/britain-talks-climate/seven-segments/ for more detail on each segment

Importantly, **it is often assumed that certain groups don't care about climate change.** These assumptions are detrimental to engaging the public in net zero and climate policies. The original Britain Talks Climate work and several follow up studies show that across all seven audience segments there is broad recognition that climate change is happening, that it is caused by human activity and that it concerns all of us.[16] Additionally, there is relatively high recognition that the UK is already feeling the effects of climate change.

The Loyal National segment is often taken for granted as not caring about climate change. Loyal Nationals are a politically critical segment, as a broad proxy for 'red wall' voters, with the majority stating they voted for Brexit. They tend to be working class, older, and proudly patriotic. And - against common assumptions - they have the third highest climate concern of the seven segments. But they are distrustful of elites. Many of their views on what should be done to tackle climate change track those of activist audiences - in particular that people on higher incomes should bear greater responsibility for emissions cuts. In practice however Loyal Nationals are poorly understood and rarely effectively reached by climate advocates and politicians, and there is a growing risk that they may be further alienated by messages designed for activists. This is a huge risk to net zero progress in the UK, as some attempt to drag climate change into the so-called 'culture wars', with a focus on audiences such as these.

We've seen that a failure to deliver transitions in a just and engaging way can risk backlash or resistance which staves off climate action (e.g. Switzerland, France, Australia, Berlin). [17] If we don't engage in respectful and meaningful dialogue with those who are most directly affected, we risk undermining the transition.

The framing of climate change narratives and messages therefore has the potential to drive polarisation and disengagement - and so using an evidence-based approach to prevent this really matters.

16. See https://climateoutreach.org/britain-talks-climate/latest-updates/ for the latest work and updates.
17. See: https://www.swissinfo.ch/eng/business/switzerland-votes-on-controversial-co2-law-/46695016 ; https://www.climatechangenews.com/2019/03/20/ecologists-capitalists-gilets-jaunes-climate-justice/ ; https://www.theguardian.com/environment/2014/jul/17/australia-kills-off-carbon-tax and; https://www.reuters.com/business/environment/berlin-votes-tighter-climate-goals-test-germans-commitment-change-2023-03-26/
18. IPPR North (2023) State of the North 2023 - Looking out to level up: How the North and the UK measure up.

*"If we communicate about controversial political subjects with language that balances competing core beliefs, then we will achieve broad reach and resonance across individuals of different political, psychographic, and demographic profiles"* - More in Common

This is particularly important for the North West region because of the legacy of regional inequalities, which affects people's confidence in institutions and their motivation and agency to engage with economic and political change (IPPR, 2023).[18] The North of England has also historically been home to carbon-intensive industries, which are - for some people - important cultural symbols. Systemic changes to those industries therefore require deep engagement so people do not feel change is driven by exogenous actors with less understanding of their regional cultural significance. The messages around decarbonisation in the North West region are emerging from multiple governmental and non-governmental sources and this can contribute to anxiety and frustrations if people who are likely to have lived experience of the changes are not given the opportunity to engage. Conversely, well-managed engagement around decentralisation, devolution, and strengthening of subnational actors can foster inclusion and a sense of agency in the transition. Our research also shows most people are open to discussions about climate action framed as a chance to build stronger social ties through collective action.

In order to succeed, **the outcomes of the Green Energy Task Force must include a strategy and messaging that take into consideration the cultural and political underpinnings of people's views on climate change.** This is the first step towards creating the frameworks and modes of public engagement that will promote inclusion and collaboration around sustainable public-private, cooperative and community owned energy.

# HOW TO ENGAGE THE PUBLIC IN NET ZERO AND A JUST TRANSITION

**The Fair Energy Transition for All (FETA) project worked in nine European countries on the issue of energy transitions and the impacts on, and engagement with, working class and marginalised communities.**[19] We learned that many participants were already taking steps to save energy. This was not driven by concern for climate change but rather a need to save money. People had a desire for greater agency to participate in the energy transition, but this was made difficult by their lack of capacity and lack of networks. For example, people in rented accommodation often had little control over when and how to improve energy efficiency through steps such as improving insulation. In the face of limited agency, participants believed the responsibility should lie with those who hold the power – governments and wealthier individuals. There was also a generalised deep distrust of politics and scepticism in the ability of politicians to deliver a fair or successful energy transition. Participants in Denmark, France, Germany and the Netherlands were however more likely to suggest the need for a collaborative approach between governments, housing associations and citizens to allow for more inclusive decision-making. We identified a tendency to discuss the energy transition in terms of the relationships between people, rather than in technical or economic terms.

This resonated strongly with the Britain Talks Climate work - the concept of fairness was often linked to the need for the energy transition to minimise existing inequalities, and to help build greater social cohesion. Many participants also wanted to see governments balance taking more action themselves with enabling people to have more autonomy over their energy system - suggesting a desire for new modes of engagement in energy management. In some countries, there were thousands of vacant jobs related to the energy transition which could be filled through better efforts to engage people.

19. Fair Energy Transition for All Project is focussed on what the energy transition means for marginalised groups across Europe. Climate Outreach has been involved as a partner, developing and delivering research with 900 people most vulnerable to socioeconomic risks of the energy transition in nine countries. A brief summary of key insights can be found here: https://climateoutreach.org/amplifying-voices-energy-transition-europe/

The FETA project concluded with several recommendations for engaging individuals in fair energy transition efforts, based on dialogues with experts and vulnerable citizens and residents in nine European countries. These included:

- **Communicate clearly and honestly about the benefits, trade-offs and temporary costs of the transition.** Getting through these exceptional times requires exceptional measures but these are vital to avoid devastating consequences for the most vulnerable people.
- **If public consultations are used, they should be binding**, so that people see their influence in the decision-making process even if not all proposals are implemented.
- **Focus messaging on local and community cohesion and fairness** - messages should centre on broader issues such as inequality and also highlight opportunities from the transition while recognising risks.
- **Take proactive steps to communicate about how to train for and access energy transition roles.**

Britain Talks Climate highlighted that **frames such as fairness, 'doing your bit', and protecting future generations and nature are appealing to all audience segments.** Therefore, clear narratives can be built out of those frames to build support for the transition among all groups. Building trust is essential here - most individuals struggle to identify institutions, organisations or groups in society that they feel truly represent their interests and concerns. This is especially true for Disengaged Battlers, Established Liberals, Loyal Nationals, Disengaged Traditionalists, and Backbone Conservatives.

# HOW TO COMMUNICATE WITH AUDIENCE SEGMENTS IN THE NORTH WEST REGION

**In the North of England, the Loyal Nationals and Disengaged Traditionalists segments represent almost 40% of the population (Figure 2).** This is important because these segments feel alienated and frustrated by big institutions and by society in general. When similar segments in other countries were not effectively engaged around net zero and the energy transition, they eventually spoke out about their frustration - leading to the rollback of net zero in Switzerland, the mass Gilets Jaunes protests in France, and the failure of the net zero referendum in Berlin. The other major segments - Civic Pragmatists and Backbone Conservatives - are more optimistic and, rather, need support to turn their concern about climate change into action.

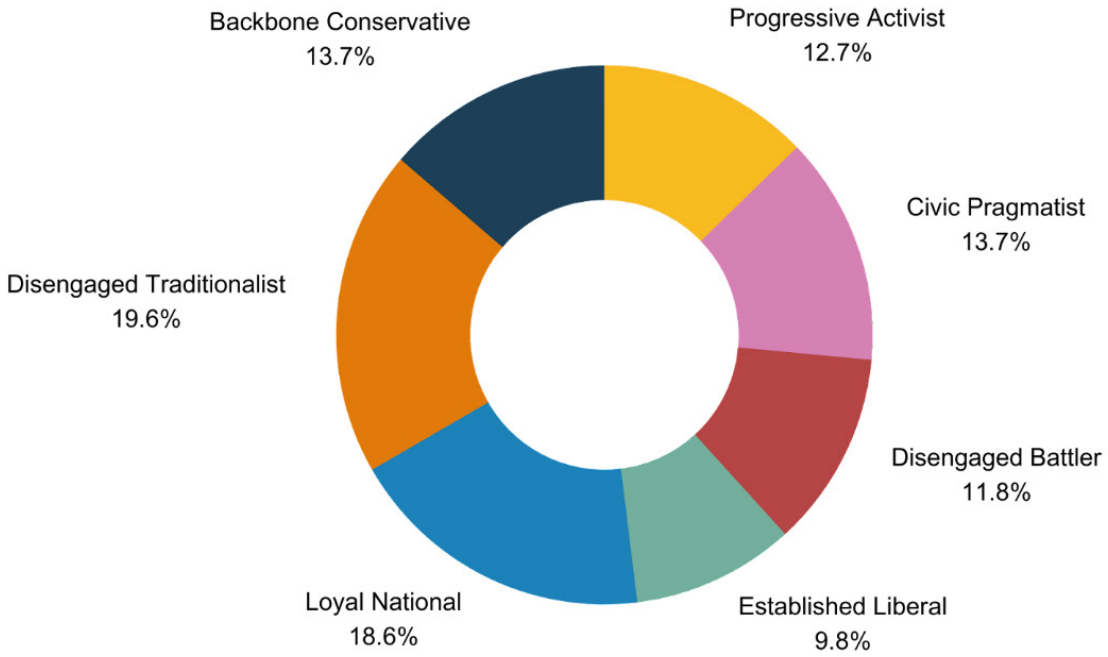



Figure 2: Distribution of the BTC segments in the North of England

Here are some key insights for developing strategies when engaging Loyal Nationals and Disengaged Traditionalists. It is important to acknowledge and channel their feelings of unfairness toward shared concerns. Loyal Nationals express feelings of personal victimisation (that they are being taken advantage of or singled out) and we need to hear this when building successful communications strategies with them.

## Loyal Nationals

**Angry and threatened**

| | |
|---|---|
| ***Age Group*** | One of the oldest segments |
| **Socioeconomic** | Low to medium levels of education, lowest earning, working class, lowest social grade (after Disengaged Battlers) |
| **Climate Attitudes** | Third highest level of worry about climate change with 60% being extremely or very worried. More progressive position on key measures than Disengaged Battlers and Established Liberals. |
| **Most important issues** | • Healthcare and the NHS<br>• Brexit<br>• Crime |
| **Media sources** | BBC, ITV, Facebook |
| **Trusted Messengers** | 1. David Attenborough<br>2. Climate Scientists<br>3. Ordinary people affected |
| **Ideal UK** | Hard working, honest, compassionate |

Messaging Takeaways

- **Avoid climate migration messages**, LN are highly focused on perceived immigration threats. Their perceived disadvantage and lack of inclusion are barriers for engagement. Instead connect their lived experiences of extreme weather (heat waves and floods) and climate using trusted messengers (farmers, family, friends, and ordinary people affected).
- **Make it local**, prioritise the local and tangible 'environment' focusing on cleaning 'neglected' areas rather than abstract notion of sustainability
- **Call out big polluters**, LNs are sensitive to injustice and actors not 'playing by the rules' (including greenwashing). The polluters pay principle is a good narrative for this segment
- **Invoke national pride**, focus on success stories that suggest British global leadership


## Disengaged Traditionalists

**Alienated, disillusioned, and skeptical**

| | |
|---|---|
| ***Age Group*** | Millennials and baby boomers |
| ***Gender*** | More likely to be male |
| **Socioeconomic** | working class, lower social grades, and low to medium levels of education |
| **Climate Attitudes** | Recognize tangible environmental risks, but this is the segment that is closest to being sceptical about climate change. |
| **Most important issues** | • Healthcare and the NHS<br>• The economy<br>• Brexit |
| **Media sources** | BBC, ITV, Daily Mail |
| **Trusted Messengers** | 1. Climate Scientists<br>2. David Attenborough<br>3. Farmers |
| **Ideal UK** | Hard working, honest, educated |

Messaging Takeaways

- **Avoid climate-led messages**, instead focus on manufacturing being fit for the 21st century, health co-benefits, and Green Industrial Revolution building on national pride to engage in green jobs and just transition,
- **Tax the rich argument**, using the 'Robin Hood' approach with arguments that big corporations should pay their fair share instead of expecting the little people to pick up the tab
- **Avoid messaging that refers to them as 'victims of injustice'**, instead focus on cooperative model and their role in leading the Green Industrial Revolution

# DOS AND DON'TS FOR COMMUNICATING NET ZERO AND FAIRNESS

**In 2022, Climate Outreach conducted a study with the four segments who tended to vote Conservative in the 2019 General Election on their perceptions of fairness and the net zero transition (Loyal Nationals, Disengaged Traditionalists, Backbone Conservatives and Established Liberals).[20]**

The following recommendations are highly relevant to effective communications and engagement of people in the North West region on the renewable energy transition. They are key to mitigating polarisation and backlash from the segments who are most at risk. They do not ignore the needs of other segments - in fact, these recommendations are evidenced to drive more engagement overall, encouraging more collaboration on net zero than fragmentation and polarisation. This is essential to moving net zero forward.

## DO TALK ABOUT "DOING YOUR BIT"

"Doing your bit" has universal power. Majorities in all segments say that "doing their bit to protect the environment" makes them feel proud. All segments show some openness to changing their behaviour in an effort to cut carbon emissions (i.e reducing meat consumption, being willing to pay flight tax on their 2nd or 3rd flight in a year).

Communicators can build on this sense of pride by framing net zero policies and behaviour change as an extension and enabler of people "doing their bit". Messages should prioritise recognition and positive reinforcement of what people are already doing to reduce their environmental impact.

## DON'T IGNORE DIFFERENCES IN MEANS AND MOTIVATIONS

"Doing your bit" looks different depending on your means and motivations. Low-income households (most likely Loyal Nationals, Disengaged Traditionalists, and Disengaged Battlers) may not be able to afford climate-friendly technologies but are likely to have smaller carbon footprints anyway.

Recognising inequalities, messages should focus on energy efficiency and waste reduction co-benefits. Segments that are less motivated to take personal steps for the sake of the climate (Disengaged Traditionalists and Backbone Conservatives) may nonetheless want to live a low-carbon lifestyle for non-environmental reasons.

20. See https://climateoutreach.org/britain-talks-climate/latest-updates/ for the latest work and updates.

# DOS AND DON'TS FOR COMMUNICATING NET ZERO AND FAIRNESS

## DO FRAME NET ZERO AS AN OPPORTUNITY FOR FINANCIAL WELL-BEING

Britain Talks Climate shows widespread concern about climate change causing a rise in bills over the next 10 years. A third of respondents think net zero could deepen inequality between rich and poor. At the same time, most segments are undecided about whether net zero will be good or bad for the economy.

This uncertainty about net zero's economic impact is coupled with deep mistrust. It is important to address these worries head on, by pointing to ways net zero could tangibly reduce the cost of living– i.e, cutting energy bills – and give British people a sense of greater control over their lives.

## DON'T PIT ECONOMIC GROWTH AGAINST ENVIRONMENTAL PROTECTION

Despite uncertainty about costs and the economic role of net zero, most segments believe that it is possible to protect the economy and the environment at the same time. The UK public holds the highest belief in Europe that the country should invest in green industries.[21]

Communicators should avoid framing environmental and economic outcomes as mutually exclusive or in competition. Instead, messages should show how they are mutually beneficial.

21. See https://www.moreincommon.com/navigatinguncertainty/

# DOS AND DON'TS FOR COMMUNICATING NET ZERO AND FAIRNESS

## DO BUILD ON THE CO-BENEFITS OF NET ZERO

Communicators should frame the path to net zero as an opportunity to tackle problems such as widening inequality or rising costs of living, rather than as an additional burden on households and the country.

Britons' primary concerns about climate change ("harm to nature and wildlife" and "negative impact on our children's futures") reinforce the need to communicate the shared values of protecting nature and future generations. In addition, most people believe that reaching net zero will improve our "health and well-being", providing an opportunity to connect across political and social divides, given that healthcare and the NHS are high priorities for all segments.

## DON'T GET TECHNICAL AT THE EXPENSE OF VALUES OR COMMON SENSE

Segments are not yet engaging deeply with the details of climate policy. Although there is evidence of growing knowledge of net zero and of key technologies, for some segments these conversations are far removed from their daily lives, and trying to engage them about specific policies or products risks sounding out of touch at best.

Instead of only trying to engage people about specific policies or products, practitioners can bring to life the softer elements of a "good life" that all people share – health, community, family, and connection with nature.

# DOS AND DON'TS FOR COMMUNICATING NET ZERO AND FAIRNESS

## DO TALK ABOUT RENEWABLES AS A WAY TO INCREASE ENERGY INDEPENDENCE AND SELF-RELIANCE FOR BRITAIN AND THE NORTH WEST

Britain Talks Climate reports little support for additional UK fossil fuel extraction in response to the Russia-Ukraine war. This is an opportunity to connect climate solutions with energy security and independence.

Messages about how a fair transition to renewables can build independence and self-reliance would resonate with all segments. Renewables that are fairly sourced, secure, and accessible to all appeal to segments both concerned about the UK's economic and energy independence (Backbone Conservatives and Established Liberals) and concerned about rising energy costs (Loyal Nationals, Disengaged Traditionalists and Disengaged Battlers).

## DON'T ASSUME THAT PEOPLE CONNECT THE DOTS BETWEEN CLIMATE CHANGE, NET ZERO, AND ENERGY

Widespread high concern about climate change is often met with cynicism about political climate action. While people are broadly supportive of net zero aims, some are sceptical that new technologies will work, that the process will be properly and fairly regulated, and that dates such as 2050 are close enough to spur action.

Low awareness and political distrust means that net zero is not yet seen as a climate solution. Most segments link climate change to tangible changes (i.e plastic waste and extreme weather events). They do not readily connect it with fossil fuel extraction and use, or with net zero policies and energy.

# RECOMMENDATIONS

**Meeting the UK's net zero target through a just and equitable transition is going to require meaningful public engagement.** People want to have a say over their futures in the energy transition, and they want future generations to be resilient against shocks and stressors like climate change. But there is also a general lack of public trust in government and business institutions that needs to be addressed and rebuilt. The energy transition is one of the most prescient opportunities to do this.

Our recommendations to the Mayors are designed with that in mind:

## 1. LEAD BY EXAMPLE: CHAMPION AND MAKE EVIDENCE-BASED, TESTED AND ITERATED PUBLIC ENGAGEMENT THE FOUNDATION OF THE ENERGY TRANSITION IN THE NORTH WEST

The Mayors and regional authorities should demonstrate to national government how public engagement can be done and how it can be a positive force for reaching net zero. The evidence shows that rooting engagement in a sense of locality - and pride of place and community - sets it up for success.  We don't have time to develop perfect approaches - we urgently need to test and iterate. We have to engage people, using the evidence we have, and pilot and try things, learn from them, improve and scale up. Doing public engagement well in the North West of England can be a model and evidence base to support other nations and regions facing the same transition challenges.

## 2. HARNESS YOUR TRUST AND CONVENING POWER - AND BRING OTHER REGIONAL LEADERS IN

As some of the most trusted metro Mayors in the country, you are in a really good position to engage the public effectively, by showing them that they matter and have agency in their futures. Connect with other leaders across the North West in order to ensure people from outside the metro regions feel valued and part of the picture. As Mayors you have proven your convening power though different initiatives such as the Greater Manchester Housing Partnership and the Digital Inclusion Network. We recommend you bring in learnings from those initiatives and marry those learnings with the evidence on public engagement and cooperative models.

## 3. HOLD THE NATIONAL GOVERNMENT ACCOUNTABLE ON ITS COMMITMENTS TO 'ACTION FOR CLIMATE EMPOWERMENT' (ACE)

Leading by example, the Mayors and regional authorities can bring credible accountability and challenge to national government on its public engagement commitments under the Paris Agreement. ACE includes six areas: climate change education and public awareness, training, public participation, public access to information, and international cooperation.

At COP27, parties adopted a four-year ACE action plan under the Glasgow-Sharm el Shaikh work programme (Decisions 23/CP.27 and 22/CMA.4), which sets out short-term, clear and time-bound activities - including the development of a national plan for public engagement which has yet to materialise in the UK.

Climate Outreach and the global law firm DLA Piper have determined that this is a legally enforceable commitment.[22] In fact two of the six ACE elements are easily enforceable by human rights bodies and in many domestic courts: i) public access to (climate) information, and ii) public participation in climate decision-making.

## 4. SEEK, LEVERAGE AND RESOURCE TRUSTED MESSENGERS FOR THE NORTH WEST'S TRANSITION

Research is clear: messages about climate are only as effective as their messengers. The British public lack trust in many of the traditional messengers on climate change. Leveraging trusted messengers is important in the North West region, given its unique history in the industrial revolution, and broader legacies of inequalities that impact trust in government.

The right messengers can range from public figures to community groups and leaders, small business owners, health workers and young people. But they need to be supported - in terms of resourcing and platforms - to be able to engage the people that trust them about why this transition matters for their futures, and how they can get involved and benefit. Climate policy leaders, NGOs and scientists have so far failed to do this in an authentic way. This is an opportunity to do things differently.

## 5. DON'T PUT THE WEIGHT OF THE NORTH WEST'S CLIMATE FUTURE ON YOUNG PEOPLE

Young people are being expected to fix the climate future that they are due to inherit. They tend to care about climate change and climate justice but don't feel they have any meaningful control over decision making and implementation. Communicating that this is not fair to young people and future generations is important, and effective.

Bring young people into this process in ways that overcome their sense of lack of agency and confidence. Young people are experiencing high levels of 'climate anxiety' which is affecting their mental health at alarming rates across the world, including in the UK. Doctors are calling this a future public health crisis. So find ways to resource bringing them in - so they can engage meaningfully and start to feel they have inputs that are respected and taken on board by adults and decision makers.

22. Magniez-Pouget, S., Straathof, T. and Bonomini, G. (2022) Is ACE a legal obligation? A review of States' obligations under international, regional and national legal frameworks. Oxford: Climate Outreach.

Chapter 3

# An ambitious vision for renewable energy – collectively owned and democratically controlled

The potential to power the devolved regions by the local natural resources also has the potential to be co-owned by the people in the locality.

CO-OPERATIVES UK

# COMMUNITY POWER

**There is huge appetite and potential in communities to invest in renewable energy on cooperative terms.** Millions of pounds of community investment have been pumped into renewable energy generation in the UK over the past decade. Community Energy England's 2022 State of the Sector Report confirmed that £21.5 million was raised across the UK for new projects in 2021, with £15 million in community energy income spent locally, boosting local economies. In the same year, 90 new co-operatively owned organisations installed 7.5MW of renewable electricity capacity, adding to the circa 500 existing co-operatives already making a difference in their communities. Success in community-owned energy arrives despite a challenging policy environment.

Why is a combination of people, private investment, and community so powerful? Ensuring communities are active partners – as investors, volunteers, and decision-makers – mobilises social capital alongside financial capital, inspiring climate action in communities beyond just power generation. It can unlock sites for the generation of green power, not least the roofs of houses, schools and other public, municipal and community buildings. Community investment using co-operative models also unlocks cheap, flexible, and patient capital.

Extensive private investment in renewables is important in reaching net zero. Community investment can be used as part of a blended funding model. Partnerships with local government – who can borrow and invest at a lower cost over a longer term – can unlock sites and enable a unique convening power that includes being a bridge to communities. Local authorities can directly own and operate renewable energy installations, ensuring community involvement in decision-making processes through, but not limited to, consultations and share offers in publicly owned projects.

# HOW DOES COMMUNITY POWER CREATE COMMUNITY WEALTH?

**Community involvement through co-operative ownership and control works.** It ensures an equitable distribution of power and wealth back to communities and local people. Community-owned energy projects generate community wealth in several ways. Community-owned energy contributes to community wealth in numerous ways:

1. **Financial Returns:** Community ownership empowers residents and businesses to invest in renewable energy projects and share in financial benefits. As projects generate revenue through the sale of electricity or other energy services, profits can be distributed to community members in the form of interest on investment, dividends and reduced energy costs. This income stimulates the local economy, increases personal income, and contributes to community wealth.

2. **Job Creation:** The development, construction, operation, and maintenance of renewable energy installations require skilled workers, which can lead to job creation within the community. These jobs provide stable employment and contribute to the local economic well-being.

3. **Local Investment and Retention of Revenue:** Community-owned energy projects encourage local investment, by allowing residents to directly invest in renewable energy infrastructure. This keeps financial resources within the community and reduces dependence on external sources of funding. As projects generate revenue, a significant portion of the income remains within the community, leading to the circulation of wealth and increased economic activity locally.

4. **Community Development and Resilience:** Reinvesting profits back into the community supports local development initiatives, such as funding community facilities, improving infrastructure, and supporting social and environmental projects. These investments contribute to the overall wealth and well-being of the community. The ability to reinvest proceeds back into communities themselves – through a process in which those communities have a real say – brings significant additional value. It reverses the draining of economic value away from where energy is created, as often occurs with a centralised, large-scale delivery model.

5. **Energy Affordability and Security:** Community-owned energy projects help address fuel poverty by providing affordable and sustainable energy solutions to community members. This helps alleviate the financial burden of energy costs on vulnerable households, promoting greater financial stability and wealth within the community.

6. **Education and Awareness:** Members of the community gain knowledge and skills related to renewable energy technologies, energy efficiency, and sustainable practices. Increased awareness leads to the adoption of sustainable behaviors, energy savings.

# WHAT ARE THE OPTIONS FOR CO-OPERATIVELY OWNED VENTURES?

**There's no limit to who – co-operatively – can own our renewables.** All stakeholders could have the opportunity to be involved. Stakeholders include people (residents and communities), local authorities; government and private business.

There is already a vibrant and growing community energy sector in both the UK and globally made up of community-led renewable energy, energy demand reduction and energy supply projects. A wide range of ownership structures place ownership and control in the hands of the community, either fully, or as part of a partnership approach with commercial or public sector partners, operating on a hyper local, regional and/or national basis.

There are range of potential ownership options

- Co-operative and community ownership – where members collectively own and manage renewable energy installations, run along democratic principles, participatory decision making is usually one member one vote. A focus on reinvesting profits back into the community, supporting local initiatives or tackling fuel poverty.

- Municipal/local authority ownership - they may directly own and operate renewable energy installations, often ensuring community involvement in decision-making processes.

- Energy Service Companies (ESCOs) - entities that develop and operate renewable energy projects on behalf of a community. In this model, the community may have a stake in the project through shareholding or a revenue-sharing agreement although community engagement is not assured.

- A combination of the options above.

- A co-op of a thousand co-ops, harnessing solar energy for example see Grimsby Community Energy Co-op case study below

# RECOMMENDATION FOR OWNERSHIP

**Co-operatives UK would recommend the consideration of a multi stake holder Co-operative.**

Multi-stakeholder co-operatives comprised of public, private and community stakeholders already exist in the UK. There is nothing new or untried in multi-stakeholder models; in co-operatives comprised of other corporate entities; or of co-operatives in which some corporate members are public bodies.

Multi-stakeholder co-operatives are versatile and can register using a variety of legal forms. For example, a co-operative society, a community benefit society, a limited company, or potentially a group of various corporate structures. Provided ownership and control is in the hands of members, including the public bodies and whoever else may be, any structure is available.

In a multi-stakeholder co-operative, the influence of different stakeholders can be distributed and balanced in a way that helps achieve the agreed common purpose. Public authorities could have a significant voice and could share power with communities, on democratic terms including placement of for example turbines.

There are already great examples of local authorities partnering with communities to generate renewable energy and reinvest proceeds back into those communities. Plymouth City Council convened community and private sector partners to help set up Plymouth Energy Co-operative, an umbrella multi-stakeholder co-operative that is active in renewable energy deployment and low carbon housing.

These case studies demonstrate that community ownership in renewable energy can be financially viable, promote local resilience, and foster community engagement. They highlight the importance of co-operative and community owned models, where meaningful ownership and control ensures widespread participation and local buy in. The case studies show a virtuous circle, whereby the reinvestment of profits from one project to another increases the beneficial effect.

# UK EXAMPLES

**There are some UK businesses with a track record in facilitating large-scale community investment in renewables, such as ShareEnergy, Energy4 All and most recently, Ripple Energy.**

There are many tried and tested different options for co-operative and community ownership in the UK. Many of the existing community-owned renewable energy projects are established as co-operative or community benefit societies. These legal forms ensure that communities can come together in the spirit of collective action, operating democratically to run projects they directly own and control.

Baywind Energy Cooperative in Cumbria, UK, is one of the oldest and largest community-owned wind projects. The co-operative was formed in 1996 and owns and operates multiple wind turbines. The project has been financially successful, providing returns to its members and contributing to the local economy, while supporting renewable energy generation.

More recently, Grimsby Community Energy's 70+ members have developed six solar panel installations on local properties totaling 200kW; reducing CO2 emissions and saving energy consumers money. The co-operative sells its cheaper, clearer energy to the building hosting the solar panels and offers a return to its community investors.

Both Baywind and Grimsby Community Energy have raised funds for their installations through community share offers, attracting investment from local people and organisations. Grimsby Community Energy has also worked in partnership with North East Lincolnshire Council on the Smarter Energy NEL Public, designed to help small and medium sized businesses reduce their carbon footprint and positively reduce energy costs.

There is constant innovation in this area. Ripple Energy designed an ownership structure which enables individuals to buy shares in a co-operatively owned wind farm, making them co-owners. Ripple Energy manages the windfarms on behalf of the co-owners. It then partners with an energy supplier to get the power generated from the wind farms into homes, via the grid, with up to 25% savings on energy consumption. The low and steady operating costs of the windfarm or solar park, rather than the wholesale market price, will be reflected in owners' bills.

**A co-operative run by its members, Grimsby Community Energy (GCE) has been dedicated to bringing community energy projects to the local area since its inception in 2016.**


With 73 members and six solar panel installations on local properties totalling 200kW, GCE's work is reducing CO2 emissions while saving energy consumers money.

Amongst the buildings GCE has fitted with solar

panels are the YMCA Humber and a fundraising charity shop for the Rock Foundation, which supports children and adults with learning disabilities.

The co-op raises funds for solar panel installations via community share offers, attracting investment from local people and organisations. It then sells the cheaper, cleaner energy to the building and offers a return to investors.

*"Since January of this year, we've also been working with North East Lincolnshire Council and local social enterprise E-Factor on the Smarter Energy NEL project," she continues. "The aims are to help small and medium sized enterprises make a real difference to their carbon footprint and positively reduce energy costs."*

The project offers comprehensive energy audits, which evaluate the business premises and report back on how best to reduce carbon footprint and save money.

*"Smarter Energy NEL has now provided free energy audits to more than 40 businesses of all kinds, from a coffee shop to a foundry. In many cases, the audits have been followed by grants for energy saving measures, which will save more than 70 tonnes of CO2,"* says Vicky.

Another way GCE benefits the local community – and raises awareness of renewable energy – is by offering work experience placements to college and sixth form students, as Vicky explains: *"They get to do lots of practical work as part of the NEL project, looking at environmental policies, creating social media posts and taking testimonials from the businesses we've supported."*

*"The feedback from the students has been good and they've come away feeling much more motivated about renewable and community energy than before. This is an area of community benefit we are going to deliver more of, so we're developing our work experience as day release."*

Whilst GCE is doing its bit to reduce emissions, in Vicky's opinion, there's still plenty more work to do at all levels. *"We've a lot to learn from other countries,"* she says. *"We've got the leakiest houses in Europe, and in Germany they've stopped lighting up certain things at night.*

*"The war in Ukraine may have focused our minds on the energy crisis, but it's certainly not the cause. There are other root causes that go way back, such as when the government stopped insulating homes. And the boom and boost for businesses in the energy industry because government schemes have proved to be too complicated."*

For Vicky, tackling the energy and climate crises must be addressed in a number of ways: "We need to reduce energy use by efficiency and insulation – and that's what our NEL project is working towards.

*"There's also a need for storage technologies for renewable energy, of which there are all kinds. I've been to conferences and industry shows and are plenty of ways energy can be stored. And there's an awful lot of jobs in that too.*

*"With electricity and gas, there should be a minimum amount that people can use, with adjustment for age and disability. If people use more than that for by running hot tubs or powering lots of electricals for example, then they pay more. But at least people's basic requirements are met.*

*"There should also be reform with the way energy is charged. Currently, renewable energy and fossil fuels are all put into the grid with one standard charge regardless of source. Why does all electricity have to be put in together when we have much cheaper sources?*

*"The cost of electricity from solar panels looks ridiculous compared to the grid. We installed solar panels at E-Factor in 2016 and they've recently posted on social media saying they're glad they did it because their electric costs are half current standard prices.*

*"The same goes for the other organisations we've worked with. I couldn't write a personal cheque like that for the YMCA Humber. But it's great knowing we've supported them in reducing their energy costs which frees up funds they can put into supporting young people who are vulnerable."*

Grimsby Community Energy is currently working with local businesses and charities to launch its fourth community share offer in the near future.

It was awarded £5,000 through the Co-operatives UK Booster Fund in August 2022 to get ready to launch a share offer to fund the development of six new solar PV sites.

*"A typical business could be a manufacturer experiencing high energy bills, with a suitable roof, not wanting to invest in solar themselves, but happy for us to provide the solar panels and sell them discount clean electricity.*
*"The share offer will fund the panels. Putting a package of sites together means we can work with some charity projects which wouldn't stand up on their own financially.*

*"Other businesses with large electricity bills might be suitable too, for instance hotels and offices," Vicky explains. "This will be a great step of business growth – and it's all part our ongoing mission to help more businesses cut their electricity bills and their carbon emissions."*

# EUROPEAN EXAMPLES

**Alongside the UK, several other European countries have pioneered the use of community-owned renewable energy.** According to the European Union Commission, by 2030, 20%+ of all solar in the EU will be community owned. European countries have encouraged a move away from centralised energy production to sustainable local and regional ownership:

**Denmark** - Samso Island in Denmark is cited as one of the most successful examples of community-owned renewable energy. The island's residents formed a co-operative and invested in wind turbines and other renewable energy projects. Today, Samso produces more energy than it consumes, with excess electricity sold to the grid. The co-operative model has allowed the community to benefit financially and socially from renewable energy production. Over 50% of onshore wind in Denmark is community owned.

**Germany** - The Schönau Energy Co-operative in Germany aimed to shift the local energy supply to renewables and successfully acquired the local distribution grid. The co-operative has expanded its portfolio with solar and wind projects, providing clean energy to the community and generating revenue that is reinvested in further renewable projects. Over 50% of onshore wind production in Germany is owned by its citizens.

**Austria** - EWS Schönau is an energy co-operative in Austria that focuses on renewable energy and energy efficiency projects. It has invested in a diverse range of technologies, including wind, solar, hydro, and biomass. Through the co-operative model, EWS Schönau has achieved significant community involvement and fostered a sense of energy autonomy.

**Spain** - Som Energia is a co-operative that enables individuals and communities to participate in the renewable energy transition. It offers green energy services and has developed various renewable projects, including solar installations and wind farms, attracting thousands of members and promoting clean energy production.

# THE OPPORTUNITY

**In 2022, when considering strategies for gaining energy independence, the UK government recognised the importance of ensuring community buy-in and support of onshore wind.** Government officials said: "There is potential for more onshore wind but it has to be done with community consent." The narrative suggests those residents supporting local wind projects would receive a share of any financial rewards. An Octopus Energy scheme (partners to Mid-Counties Co-operative Society), piloted in Yorkshire and Wales, saw those supporting local windfarms receive up to 50% off their bills.

Kier Starmer's plans to "harness the wealth that is in our air, in our seas, in our skies and use it to serve the interests of your community" by establishing GB Energy. This publicly owned organisation would recognise the importance of joining together local government, the private sector, and communities. GB Energy would be designed to create jobs, bring down energy bills, and encourage communities to establish renewable energy projects alongside the use of public land and municipal buildings. Labour aims to create up to a million owners of renewable power by 2030, with a commitment to give back profits to communities involved and directly to those most in need.

Co-operatives UK recommendations to the taskforce and commitment to working through the models will help pave the way for a greener, sustainable, renewable future that the next generation will be proud to inherit.

# Appendix A
# **Chapter one evidence pack**

# Appendix 1
# **Demand Figures**

# Energy demand

## Summary

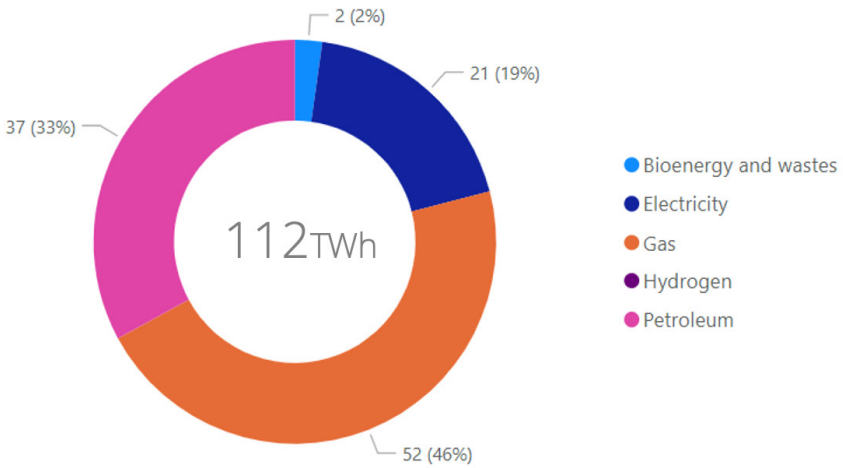
The following energy demand breakdowns for the study region has been determined by using BEIS 2020 energy data to estimate the proportion of energy used by each local authority compared to Great Britain as a whole. We assume this proportion stays the same, and then can map National Grid FES Great Britain wide forecasts onto the North-West.

Further information about the FES scenarios can be found here.

Some of the key inclusions and exclusions of our study are highlighted below:

- Does not include demand for aviation and maritime
- Does not include the energy demand for electrolysis of hydrogen
- Includes industrial direct connects
- Includes customer demand for homes, road transport, rail industry and commerce

# Current demand

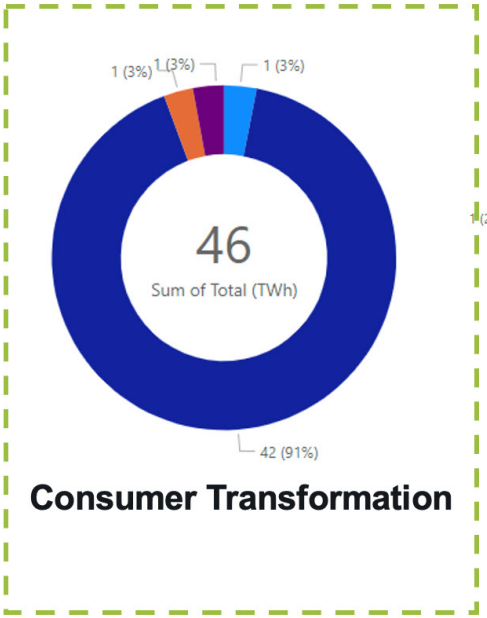



| Local authority | Gas | Electricity | Hydrogen | Petroleum | Bioenergy and wastes | Sum of Total (TWh) |
|---|---|---|---|---|---|---|
| Bolton | 2 | 1 | 0 | 2 | 0 | 5 |
| Bury | 2 | 1 | 0 | 1 | 0 | 4 |
| Cheshire East | 5 | 2 | 0 | 4 | 0 | 10 |
| Cheshire West and Chester | 4 | 2 | 0 | 8 | 0 | 14 |
| Halton | 1 | 1 | 0 | 1 | 0 | 3 |
| Knowsley | 1 | 1 | 0 | 1 | 0 | 3 |
| Liverpool | 4 | 2 | 0 | 2 | 0 | 8 |
| Manchester | 4 | 2 | 0 | 2 | 0 | 9 |
| Oldham | 2 | 1 | 0 | 1 | 0 | 4 |
| Rochdale | 2 | 1 | 0 | 1 | 0 | 4 |
| Salford | 2 | 1 | 0 | 2 | 0 | 5 |
| Sefton | 3 | 1 | 0 | 1 | 0 | 5 |
| St. Helens | 3 | 1 | 0 | 1 | 0 | 4 |
| Stockport | 3 | 1 | 0 | 2 | 0 | 5 |
| Tameside | 2 | 1 | 0 | 1 | 0 | 4 |
| Trafford | 3 | 1 | 0 | 1 | 0 | 6 |
| Warrington | 2 | 1 | 0 | 2 | 0 | 6 |
| Wigan | 3 | 1 | 0 | 2 | 0 | 6 |
| Wirral | 3 | 1 | 0 | 1 | 0 | 6 |
| **Total** | **52** | **21** | **0** | **37** | **2** | **112** |

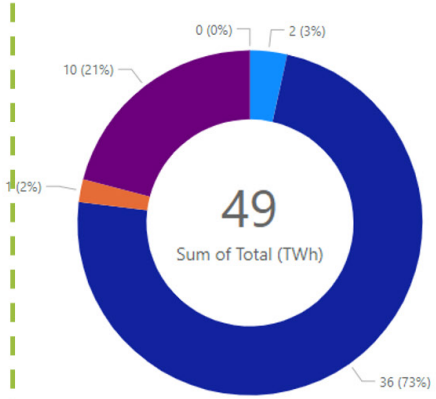
NB: Figures rounded

# Future energy scenarios

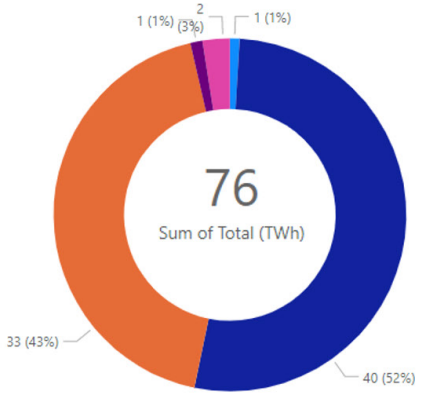
## FES DEMAND SCENARIOS



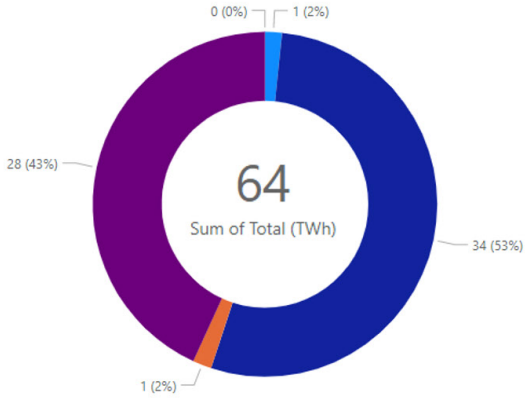

**Consumer Transformation**




**Leading the Way**




**Falling Short**




**System Transformation**

# Appendix 2

Methodology and assumptions: Demand analysis

# Input Parameters and Assumptions

For the demand analysis, the National Grid Future Energy Scenarios have been used as the basis of the forecast energy demand for the study regions. It therefore align with the assumptions and limitations of their study, which can be found at this link. Some of the key inclusions and exclusions of our study are highlighted below:

- Does not include demand for aviation and maritime
- Does not include the energy demand for electrolysis of hydrogen
- Includes industrial direct connects
- Includes customer demand for homes, road transport, rail industry and commerce

The breakdown of energy demand by region has been completed using BEIS subnational energy consumption data from 2020 available here. The proportion of consumption by fuel type of each local authority in the study area of the UK total has been calculated and applied to the FES forecasts to inform our demand estimates.

# Appendix 3

Methodology and assumptions - Supply: green gas, onshore wind & ground based solar

# Input Parameters and Assumptions

The following assumptions relate to processing the onshore wind, green gas and ground based solar; they are based on Green Britain Foundation methodology. Results are not suitable for site selection for further development.

Table A1: Key Input Assumptions and Decision Points Agreed with the Client Team

| Decision Point / Input Assumption | Agreed Action |
|---|---|
| Designated sites not to be included in available sites | Assumption that there are no energy types acceptable to be built in designated sites (Ramsar, SPA, SSSI, SAC, National Nature Reserve, National Park, Local Nature Reserve, Ancient Woodland, Priority habitats).<br><br>Green belt has not been considered as a constraint at this stage. |
| Agricultural Land Classification (ALC) 1 & 2 | ALC 1&2 land is excluded from ground solar and Green gas estimates. However, it is assumed that the footprint of onshore wind turbines is small enough that the impact on agricultural use is minimal; ALC1&2 is not excluded from assessment for onshore wind potential. |
| Slopes and Aspect | Green Britain Foundation assessed slope and aspect assigning 4 classes: 0 - too steep to develop; 0 to 1 - Technically developable but less favourable gradient / aspect; 1 to 2 - Technically developable very low or zero gradient; 4 - Technically developable with favourable aspect to south. Classes 0 to 1 were excluded. |
| Area scaling | The suitable sites for ground based solar are reduced by 25% to account for footpaths, hedgerows etc, and green gas by 10% as less room for paths and field boundaries will be required. |
| Road and rail widths | Main roads and multi track rail have been assumed as 20m width, and width of other roads assumed as 15m. A further 150m buffer has been applied within in which no onshore wind has been sited. |
| Airports | A 15km circumferential buffer has been applied to airports in the region inside which no onshore wind has been sited. |
| Small land parcels | Small land parcels are removed at stage 4 in the processing (Onshore wind, ground based solar and green gas) before other buffers and clips, therefore there are some parcels included in the final areas that are smaller than 5Ha (or 3Ha in the case of community solar) |
| Community Solar | Rules have been set that land parcels between 3 and 5 Ha are suitable for community solar – if this was extended to include smaller land parcels then further community solar capacity would be included. |
| Cultural heritage sites (where available) | Cultural Heritage sites were excluded where the data was available in open source data sets. For some Local Authorities in the study area there were no records available |

Table A2: Data catalogue

| Incoming Dataset Name | Date Obtained | Data Type | Description | Data Structure | Copyright information | Contain personal data? |
|---|---|---|---|---|---|---|
| Sites of Special Scientific Interest England | 12/12/2022 | Open | | Structure | Open Government Licence | No |
| Special Protection Areas_(England)__Natural England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| Agricultural Land Classification Provisional England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| Special Areas of Conservation_(England)__Natural England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| Ramsar__England___Natural_England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| Ancient_Woodland__Natural England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| National Parks_(England)__Natural England | 13/12/2022 | Open | | Structure | Open Government Licence | No |
| district borough unitary region | 15/12/2022 | Open | Clipped the data saved in the SDE to the study area | Structure | Open Government Licence | No |
| National_Nature_Reserves_England | 15/12/2022 | Open | | Structure | Open Government Licence | No |
| Local_Nature_Reserves_England | 15/12/2022 | Open | | Structure | Open Government Licence | No |
| England_Green_Belt_2021-22_WGS84 | 15/12/2022 | Open | | Structure | Open Government Licence | No |
| Data-workbook2022_V005 | 21/12/2022 | Open | National Grid Future Energy Scenarios data workbook | Semi-structured | | No |
| dfes-2021-workbook | 21/12/2022 | Open | ENWL Distribution Future Energy Scenarios workbook | Semi-structured | | No |
| SPM DFES data workbook | 21/12/2022 | Open | SPEN Distribution Future Energy Scenarios workbook | Semi-structured | | No |
| subnational_gas_consumption_statistics_2005-2020 | 21/12/2022 | Open | BEIS Gas Consumption 2005-2020 Local Authority Level | Semi-structured | Open Government Licence | No |
| subnational_electricity_consumption_statistics_2005-2020 | 21/12/2022 | Open | BEIS Gas Consumption 2005-2020 Local Authority Level | Semi-structured | Open Government Licence | No |
| sub-national-road-transport-fuel-consumption-statistics-2005-2020 | 21/12/2022 | Open | BEIS Electricity Consumption 2005-2020 Local Authority Level | Semi-structured | Open Government Licence | No |
| residual_fuels_2005-2020 | 21/12/2022 | Open | BEIS Residual Fuel Consumption 2005-2020 Local Authority Level | Semi-structured | Open Government Licence | No |
| subnational_total_final_energy_consumption_2020 | 21/12/2022 | Open | BEIS Total Energy Consumption 2005-2020 Local Authority Level (summation of gas, elec, road and residual fuels) | Semi-structured | Open Government Licence | No |

# Input Parameters and Assumptions

## Green Britain Foundation capacity factors

Table A3: Capacity and generation assumptions

| | Capacity [MW/ha] | Generation [MWh/ha/vr] | Comments |
|---|---|---|---|
| Wind | 0.25 | 740 | Average value cover 2MW to 6MW wind turbines. 33% capacity factor and 3 x 5 rotor spacing |
| Solar | 1 | 1,000 | Assumes ~66% ground cover ratio with 22% efficient N type bifacial modules. Yielding 1,000kWh / kWp (this will be slightly higher than existing solar) |
| Green Gas | 0.008 | 80 | Assumed 20T/ ha yield of feedstock and 4MWh / Ton conversion. The MW / ha figure is then back calculated from an equivalent plant fed from an annual volume. |

The capacity factors provided are slightly higher than published industry figures, but it is understood that we are using an assumption that due to advancements in future technologies greater efficiency will be reached.

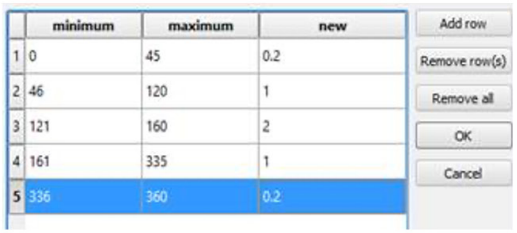
# Slope and Aspect

The assumptions on slope and aspect are summarised below.

GIS layer with a score of 0 to 4 in each land parcel.

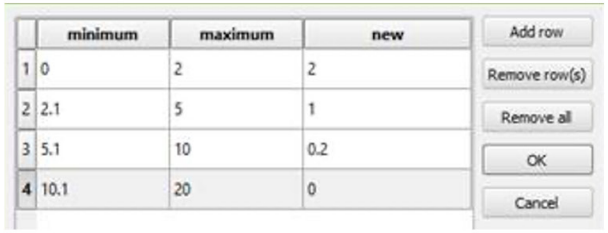
Topographic data input: OS Terrain 50 DTM – Gov source

Aspect and slope were classified using the table values below:



| | minimum | maximum | new |
|---|---|---|---|
| 1 | 0 | 45 | 0.2 |
| 2 | 46 | 120 | 1 |
| 3 | 121 | 160 | 2 |
| 4 | 161 | 335 | 1 |
| 5 | 336 | 360 | 0.2 |

Add row | Remove row(s) | Remove all | OK | Cancel



| | minimum | maximum | new |
|---|---|---|---|
| 1 | 0 | 2 | 2 |
| 2 | 2.1 | 5 | 1 |
| 3 | 5.1 | 10 | 0.2 |
| 4 | 10.1 | 20 | 0 |

Add row | Remove row(s) | Remove all | OK | Cancel

The scores are then multiplied together to give a value from 1 to 4; scores between 0 and 1 are excluded from the analysis:

| | Gradient | >10% | 5-10% | 2-5% | <2% |
|---|---|---|---|---|---|
| Aspect | | **0** | **0.2** | **1** | **2** |
| N | **0.2** | 0 | 0.04 | 0.2 | 0.4 |
| SE / SW | **1** | 0 | 0.2 | 1 | 2 |
| S | **2** | 0 | 0.4 | 2 | 4 |

# Appendix 4

Methodology and Assumptions: Offshore Wind (SCALE)

# For offshore wind Arup's SCALE Model was used

## SCALE Model

Arup's SCALE deployment model is a cutting-edge analysis tool that carries out temporal and geospatial modelling of the relative Levelised Cost of Energy (LCOE) of offshore wind locations. The model consists of modules that enable assessment of key aspects when making development decisions:

- LCOE: Relative LCOE across a specified model boundary, built up from our detailed understanding of offshore wind and all aspects of offshore wind farms
- Constraints: Understand implications of geospatial constraints and consenting risks (e.g. protected habitat areas) and high-density activities (e.g. fishing or shipping)
- Optimisation & Dispatch model: Optimisation to determine optimal locations for offshore wind deployment in terms of the balance of the lowest LCOE and lowest overlap with geospatial constraints.

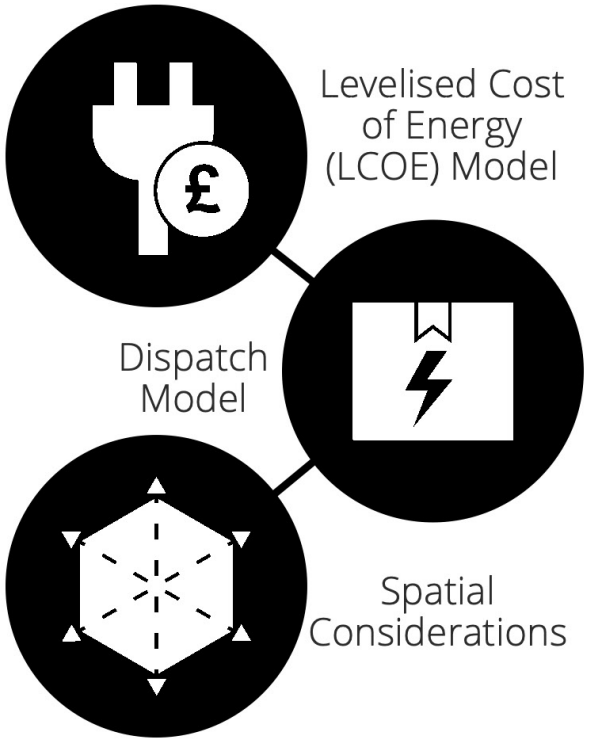



Figure C1: Arup SCALE Model Modules

# Arup's SCALE Model

## LCOE Analysis

Within the SCALE LCOE module, LCOE is calculated as the sum of lifetime costs (including Devex, Capex, Opex and Decex), divided by the sum of lifetime energy generation. Only Capex has been reported for this study.

## Geospatial Considerations Analysis

Within the SCALE geospatial module, the geographic model boundary is divided into hexagonal cells. For each of cell and every geospatial consideration, the model considers hard, soft and ignored considerations (geospatial datasets) in turn for each geospatial scenario.

Hard consideration: If a cell has any overlap with a GIS layer classified as a hard consideration, it is flagged in the model and excluded from the dispatch model for that particular geospatial scenario run.

Soft consideration: The area of overlap between a cell and a GIS layer classified as a soft consideration is calculated. This is repeated for all layers selected as soft considerations, and then summed together to give a total area of soft consideration overlap for each cell.

Ignored consideration: Any GIS layers that have been set to be ignored do not have any impact on the analysis.

## Dispatch Model

The dispatch model (SCALE deployment module) outputs the optimal areas for deployment of offshore wind over time. Based on user defined input assumptions; the optimal model output balances the lowest LCOE with the lowest interaction with other geospatial factors. This output is shown in the form of 1GW clusters which follow user defined deployment pathways.

# Input Parameters

The following project specific assumptions have been used to define the modelling input parameters for Arup's SCALE modelling. The output should be reviewed in the context of these assumptions and the provided output is appropriate for relative comparison of scenarios in the context of the below assumptions only.

Table C1: Key Input Assumptions and Decision Points Agreed with the Client Team

| Decision Point / Input Assumption | Agreed Action |
|---|---|
| Areas of Search (i.e. Arup SCALE model geographic boundary) | Uses a subset of the Crown Estate Round 4 Leasing Bidding Areas in the vicinity of Liverpool Bay. Bidding areas not in this vicinity, such as those on the east coast of the UK or near Solway Firth will be excluded. |
| Wind Farm Density | Uses 5 MW/km$^2$ as typical representation of wind farm density. |
| Wind Turbine Size | Uses 20MW turbines. |
| Year of Assessment / Operational Year | Target operational year of 2035. |
| Ports and Substations | Uses listed shortlist of ports in the vicinity of the area of search.<br>Uses National Grid primary substations in the vicinity of the area of search. |
| Target Capacity | Uses a target capacity of 50GW for the 'Unconstrained Scenario'. Note, this will be refined in later project stages. |
| Hard Constraints | For the 'Unconstrained Scenario', Hard Constraints will include existing and proposed offshore wind farms and their associated site agreements and lease areas. |

# Geographic Model Boundary

An overview of the agreed area geographic model boundary is presented adjacent.

The area represents a subset of the Crown Estate Round 4 Leasing Bidding Areas, in the vicinity of the Liverpool City Region.

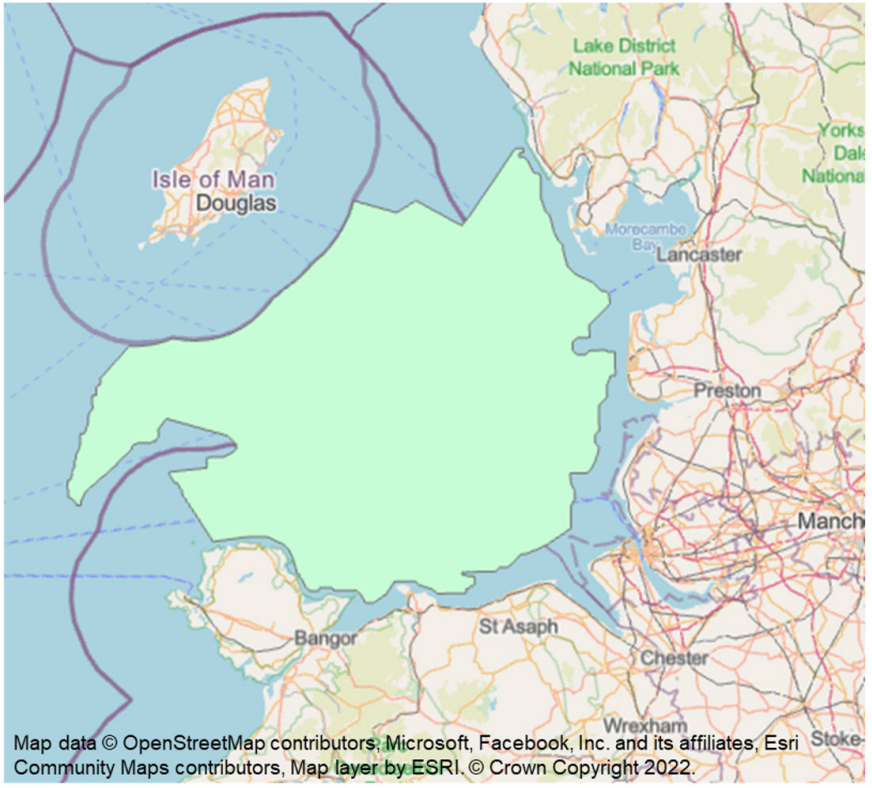



Figure C2: Geographic Model Boundary

# Ports & Substations

An overview of the shortlisted ports and substations is presented below.

### Ports

- Barrow
- Cammell Laird
- Holyhead
- Liverpool
- Mostyn
- Seacombe

### Substations

- Birkenhead
- Flintshire
- Boddelwyddan
- Pentre-Mawr
- Ince
- Capenhurst
- Connah's Quay
- Deeside
- Rocksavage
- Frodsham
- Weaver Junction
- Fiddlers Ferry
- Rainhill
- Kirkby
- Washway Farm

# Appendix 4A

SCALE Scenarios

# Scenarios

Five geospatial scenarios were considered in SCALE modelling. In each scenario, geospatial considerations were treated differently in terms of classification as 'hard', 'soft', or 'ignored' constraints (as described in the 'SCALE Model' section of this report). The scenarios are intended to provide a spectrum of outputs that represent a range of potential offshore wind deployment scenarios, related to the specific input parameters in each scenario. The scenarios are not intended to represent the specific requirements of the offshore wind consenting process for a given offshore wind leasing round. An overview of the geospatial considerations scenarios modelled is presented in Figure C3.

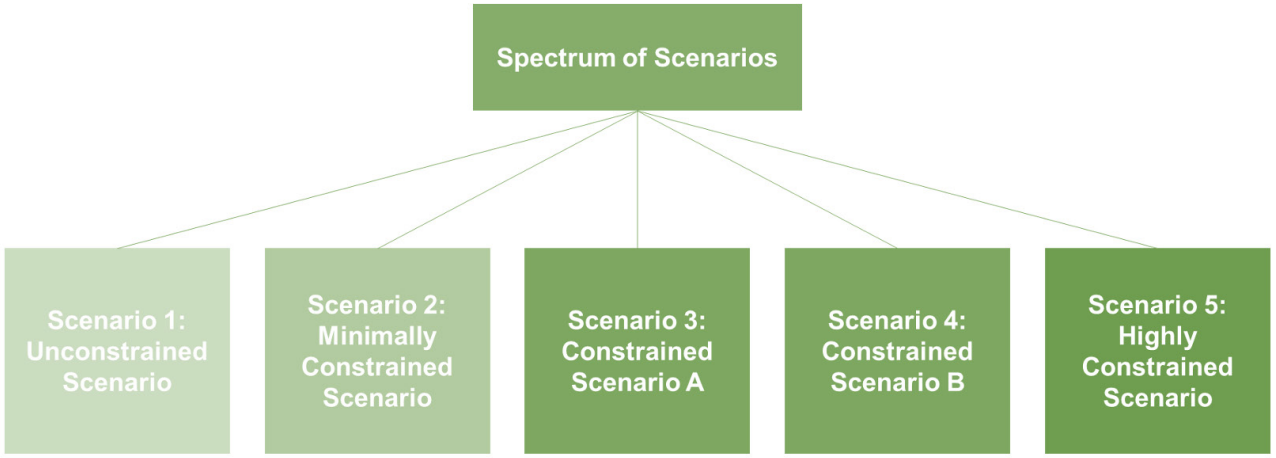



Figure C3: Offshore Wind Geospatial Considerations Scenarios Modelled Using SCALE

# Scenarios 1

Table C2 provides a description of Scenario 1, and the treatment of 'hard' and 'soft' constraints in the scenario.

Table C2: Description of Scenario 1 and treatment of geospatial constraints

| | Scenario 1 – Unconstrained Scenario (Technical Potential) |
|---|---|
| Description | All constraints – except for those constraints that would entirely prohibit development of offshore wind – are ignored. This scenario provides insight into the 'technical potential' of offshore wind deployment capacity in the geographic model boundary, where consideration of entirely prohibitive constraints is not a necessary requirement. |
| Hard geospatial constraints | • Wind Site Agreements<br>• Wind Leasing R4 Preferred Projects<br>• Nuclear Power Stations (10km buffer)<br>• Coastal Firing Ranges |
| Soft geospatial constraints | • None |

# Scenario 2, 3, 4 & 5

### Geospatial Considerations

A range of geospatial considerations were treated as hard constraints across Scenarios 2, 3, 4 and 5, under the assumption that offshore wind would not realistically be able to co-exist with these considerations. An overview of these considerations is presented in Figure C4.

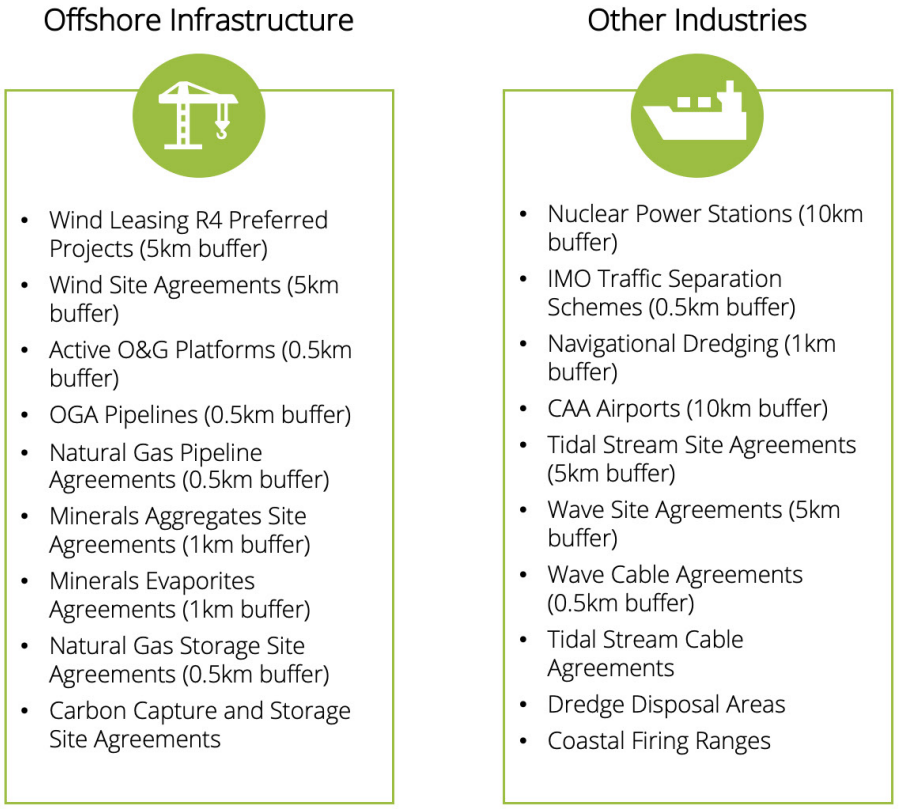



Figure C4: Geospatial Considerations Treated as 'Hard' Across Constrained Scenarios (Scenarios 2, 3, 4 and 5)

# Scenario 2, 3, 4 & 5

Table C3 provides descriptions for Scenarios 2, 3, 4 and 5, and an overview of the hard and soft geospatial constraints that were included in each scenario, in addition to the hard constraints presented in Figure C4.

Table C3: Description of the scenarios and treatment of geospatial constraints

| | Scenario 2 – Minimally Constrained | Scenario 3 – Constrained A | Scenario 4 – Constrained B | Scenario 5 – Highly Constrained |
|---|---|---|---|---|
| Description | All constraints - except those consistently treated as hard across constrained scenarios - are ignored. This scenario provides insight into the offshore wind deployment potential if consideration of broader spatial interactions is not a necessary requirement. | A 13km buffer is introduced as hard representing an indicative distance from shore to minimise visual impact. The scenario also provides clarity on the impact on preferred deployment locations when prioritising the desire to avoid environment designations, fishing areas and shipping lanes. | To understand the impact of limiting coexistence with shipping, Scenario 3 was replicated, but with shipping lanes treated as hard. | In this highly constrained scenario, environmental designations, a 13km coastal buffer, seabird foraging, fishing and shipping were all treated as hard. This scenario represents the scenario in which other geospatial considerations and marine activities are prioritised over offshore wind. |
| Hard geospatial constraints In addition to those factors specified in Figure 5 | • None | • 13km coastal buffer | • 13km coastal buffer<br>• Shipping lanes (3.5 nautical mile buffer) | • 13km coastal buffer<br>• Fishing zones<br>• Shipping lanes (3.5 nautical mile buffer)<br>• Seabird foraging<br>• Environmental designations (SPA+5km, SAC, MCZ, MPA) |
| Soft geospatial constraints | • None | • Fishing zones<br>• Shipping lanes (3.5 nautical mile buffer)<br>• Seabird foraging<br>• Environmental designations (SPA+5km, SAC, MCZ, MPA) | • Fishing zones<br>• Seabird foraging<br>• Environmental designations (SPA+5km, SAC, MCZ, MPA) | • None |

# Appendix 4B

SCALE Results

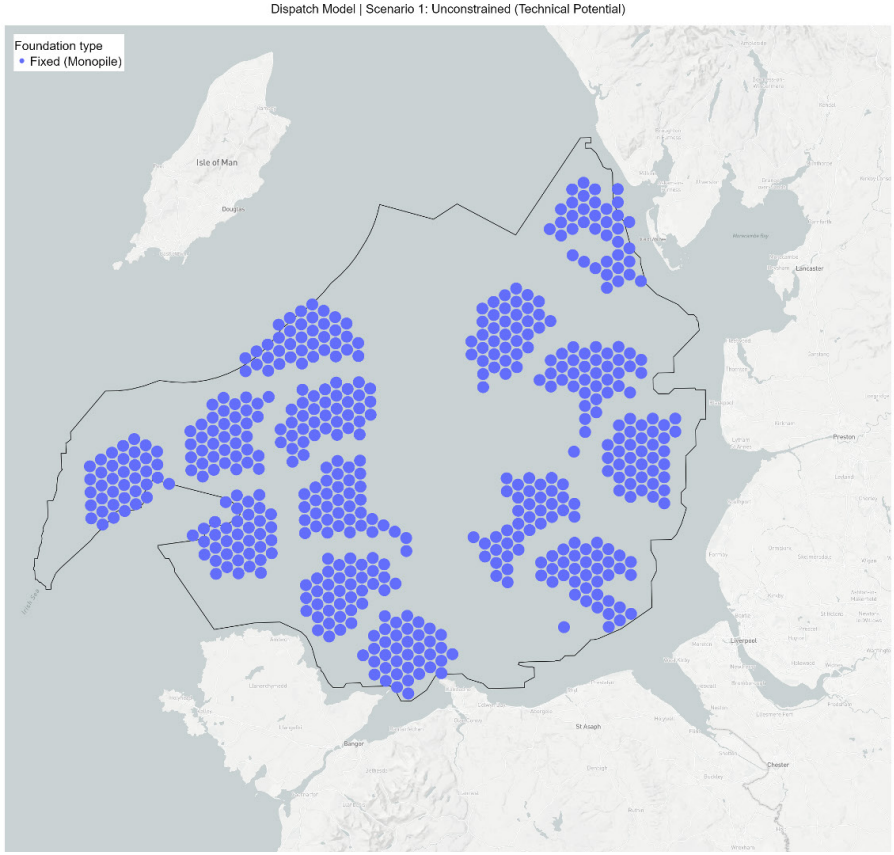
# Results

### Scenario 1: Unconstrained Scenario (Technical Potential)

The model results for Scenario 1 are presented in Figure C5. The results of the model indicate that there is potential for deployment of approximately 14GW new offshore wind capacity in the geographic model boundary, based on the specific input assumptions for the scenario.

The results provide an indication of the potential for offshore wind deployment in the geographic model boundary, where consideration of spatial interactions, beyond those that are deemed entirely prohibitive, is not a necessary requirement.

As 'soft' constraints are not considered in this scenario, offshore wind clusters are deployed in areas with the lowest calculated LCOE.



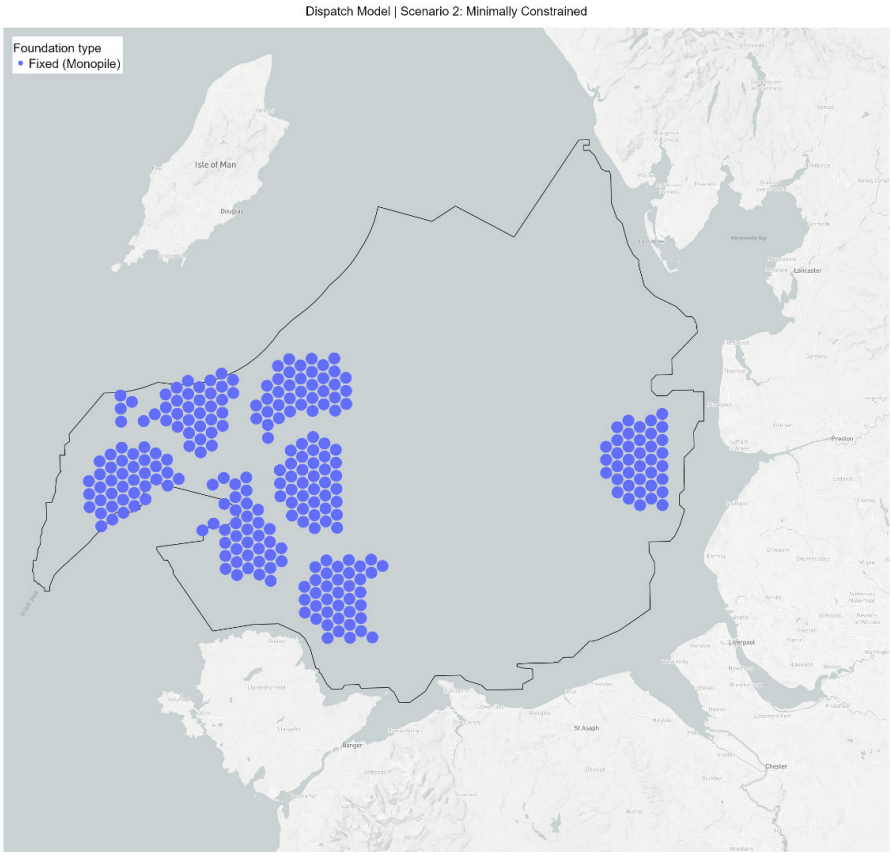
# Results

### Scenario 2: Minimally Constrained Scenario

The model results for Scenario 2 are presented in Figure C6. The results of the model indicate that there is potential for deployment of approximately 7GW new offshore wind capacity in the geographic model boundary, based on the specific input assumptions for the scenario.

The addition of the hard constraints specified in Figure C4 (that are consistently treated as hard across Scenarios 2, 3, 4 and 5) significantly reduces the area available for offshore wind deployment. This results in a lower deployed capacity potential than Scenario 1.

As with Scenario 1, as there are no 'soft' constraints considered in the assessment, LCOE is the main driver for deployment location, in areas which do not overlap with hard constraints.



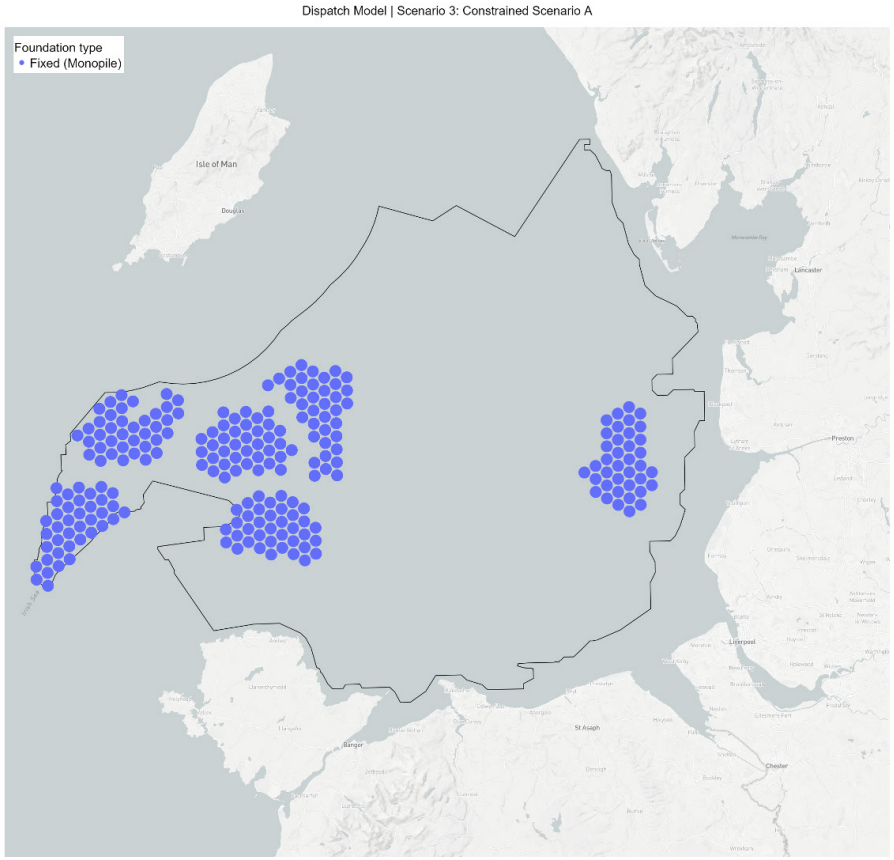
# Results

### Scenario 3: Constrained Scenario A

The model results for Scenario 3 are presented in Figure C7. The results of the model indicate that there is potential for deployment of approximately 6GW new offshore wind capacity in the geographic model boundary, based on the specific input assumptions for the scenario.

The addition of the 13km buffer to shore as a hard constraint pushes the offshore wind clusters further away from the coastline and reduces the overall area available for offshore wind deployment, resulting in lower overall deployment capacity potential than Scenario 2.

The treatment of environmental designations, seabird foraging, fishing and shipping as 'soft' constraints also pushes the offshore wind clusters away from the coastline into less constrained areas.



# Results

### Scenario 4 & Scenario 5

The results of the model indicate that in the geographic model boundary, the potential offshore wind deployment capacity for Scenarios 4 and 5 is 0GW, based on the specific input assumptions for the scenario.

The reason for this result is that shipping lanes, which are treated as a hard constraint in Scenarios 4 and 5, are prevalent across the geographic model boundary. When treated as a hard constraint, shipping therefore significantly reduces the available area for deployment of new offshore wind capacity, with insufficient area remaining for deployment of 1GW offshore wind farm clusters (based on scenario-specific input parameters).

# Appendix 4C

SCALE Limitations

# Limitations

An overview of the limitations associated with the assessment is presented below.

- Deployment is based on 1GW windfarms. Smaller sized projects are not considered, however there is also potential for smaller and larger offshore windfarm projects within the geographic model boundary.
- The model does not take into consideration any onshore transmission network limitations, such as the maximum grid capacity of onshore substations.
- Port and supply chain capacity are likewise excluded from the scope of the model, and it is assumed that these will be developed at such a scale as to not provide a limitation to the deployment of offshore wind.
- The LCOE model is based on radial connections to shore and does not consider potential offshore transmission hubs that could lead to benefits at a whole system scale and could influence the most favourable locations for offshore wind deployment.
- The LCOE model utilises cost rate assumptions which are subject to change in line with factors such as (but not limited to) market conditions and cost reductions over time, and the commercial, regulatory and legislative environment.
- The LCOE model calculates an estimate for Annual Energy Production (AEP) based on project input parameters, built in calculations and location-specific wind speed data. This estimate is subject to change in line with changes to factors such as (but not limited) variation in site-specific conditions and wind speed.
- The foundation type results for offshore wind clusters shown in Figures C5, C6 & C7 are based on the agreed input assumptions for each scenario and do not represent recommendations for offshore wind foundation development in UK waters.

*Arup limitation/disclaimer: see end of report.*

# Appendix 5

Assumptions: Rooftop Solar (Absolar)

# Rooftop Solar – Provided by ABSolar

Green Britain Foundation contracted ABSolar Solutions Limited (https://www.absolar.co.uk/) to provide estimates for rooftop solar potential in the study area (Liverpool City region, Greater Manchester, Cheshire West and Cheshire, Cheshire east). Regional estimates were scaled up from sampling of residential and non residential buildings based on ABSolar's digital model.

The following model parameters were provided by Absolar on 20th February 2023.

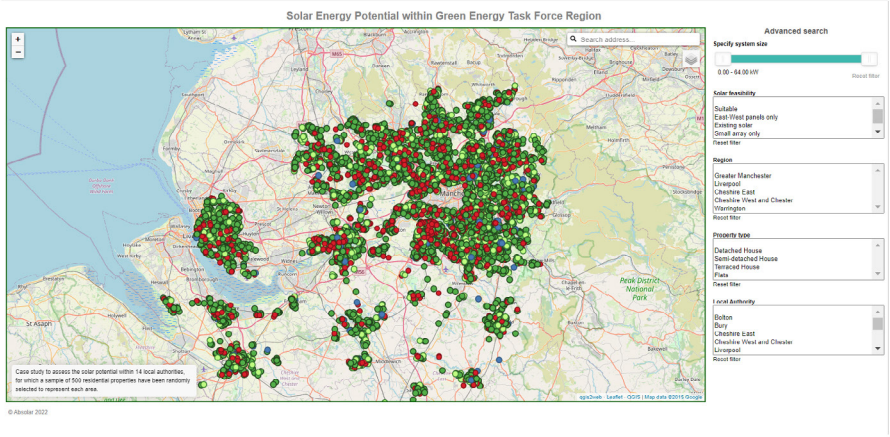
Table D1: ABSolar model parameters provided to Arup

| Decision Point / Input Assumption | Agreed Action |
|---|---|
| Residential buildings | Defined by Ordnance Survey as residential houses including RD02 (Detached Houses), RD03 (Semi-detached Houses), and ED04 (Terraced Houses). |
| Suitable roof area | Roof segments that are south facing (+/- 60 degree), able to receive an adequate amount of solar radiation (850,000 kWh/sqm/year), and are able to install at least 5 solar panel modules – equivalent to 1.75 kWp. |
| East/West facing areas | Roof areas that are facing East of West are identified as optional as some of these areas are able to receive a high amount of solar radiation; and in practice an increasing number of households are installing solar panels on East/West facing roofs due to spatial limitation. These are not included in the study. |
| Small roof areas | Roof areas that are south-facing but too small to install at least 5 solar panel modules (equiv. 1.75 kWp) are identified as optional. These are not included in the study. |
| Dimension of reference solar module | 1.6m x 1.0m (L, W) |
| Install capacity | 350 Wp per module |

# Sampling

## Rooftop Solar - Residential sampling data provided by ABSolar

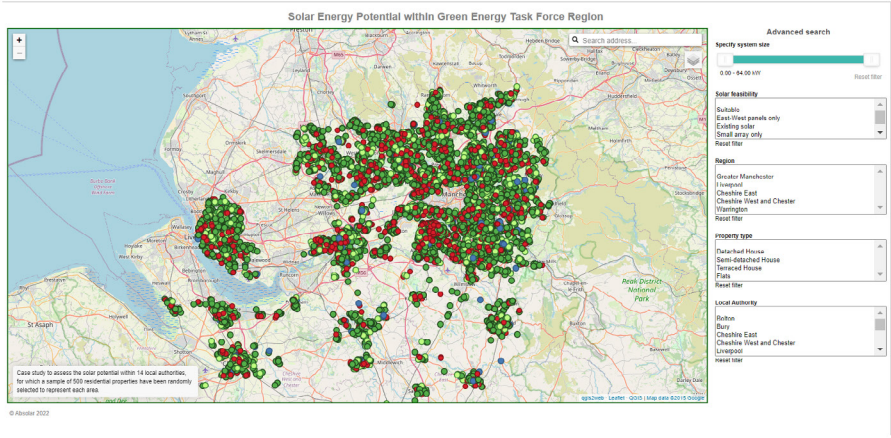
- 2 million residential properties within the study region
- 8,250 residential properties sampled
- Assessed for east/west facing, existing solar, feasibility for >1.4KW (5 panels), small arrays (<5 panels) and if unsuitable
- Assessed per type (det, semi, terr, flat)
- Regional estimates scaled from sample; ABSolar advise that capacity/ energy only included for 5 panel feasibility rooftops



# Sampling

## Rooftop Solar - Commercial sampling data provided by ABSolar

- 34,000 non residential buildings with >100m2 roof area within study area
- 1,750 non residential sampled and assessed on similar basis
- Assessed for existing solar, feasibility for >1.4KW (5 panels), small arrays (<5 panels) and if unsuitable
- Property numbers given per class and Laua to compare with samples and multiply averages for scaling
- Regional scaling estimate has been done by Arup based on method defined by ABSolar.



# Appendix 6

Assumptions: Tidal Range Energy

# Tidal Range

## Mersey Tidal Power: Assumptions

Information provided to Green Britain Foundation by LCRCA on 16th March:

- Barrage options: several location options based on 700 MW and output in the region of 1.2 – 1.4 TWh
- Lagoon options: options at 700 MW, 1800 MW, 2400 MW and **3600 MW***. These schemes would realise around 1.2—1.4 TWh, 3.3-3.6TWh, 4.4-4.8 TWh or **6.6-7.2 TWh**.

We have selected the 3600 MW rated lagoon for the purpose of the study, as the purpose of the task force is to understand the technical potential of the region. We have taken an equivalent 6.6 TWh as the associated annual energy production as a conservative estimate.

Assumptions:

- All outputs depend on whether flood and ebb or ebb only generation is adopted, and any supplementary pumping is adopted to increase generation.
- 1800 MW and 3600 MW rated options best match National Grid connections (information supplied by LCRCA)

# Data and usage disclaimers

As listed in this document, data from this work has come from a range of sources.

## ARUP SPECIFIC disclaimer

*Arup input into this study has been prepared specifically for and under the instructions of Green Britain Foundation under an appointment dated 23/12/22.*

*This study may be provided to third parties solely to inform any such person that our study has been prepared and to make them aware of its substance but not for the purposes of reliance. No third party is entitled to rely on this report unless and until they and we sign a reliance letter in the form attached to our appointment. We do not in any circumstances accept any responsibility or liability to retail investors whether via bond issue or otherwise and no such party is entitled to rely on this report.*

*We emphasise that the forward-looking projections, forecasts, or estimates are based upon interpretations or assessments of available information at the time of writing. The realisation of the prospective financial information is dependent upon the continued validity of the assumptions on which it is based. Actual events frequently do not occur as expected, and the differences may be material. For this reason, we accept no responsibility for the realisation of any projection, forecast, opinion or estimate.*

*Findings are time-sensitive and relevant only to current conditions at the time of writing. We will not be under any obligation to update the study to address changes in facts or circumstances that occur after the date of our report that might materially affect the contents of the report or any of the conclusions set forth therein.*

*In preparing this report we have relied on information supplied by others. We have relied in particular on the accuracy and completeness of such information and accept no liability for any error or omission in this report to extent the same results from errors or omissions in the information supplied by others.*

## ARUP Contact

Michael Dobson

Renewable Energy Lead, North West & Yorkshire

Appendix B

# Green Energy Task Force team

THE GREEN BRITAIN FOUNDATION

## DALE VINCE OBE

With over 25 years as a green entrepreneur, Dale Vince launched Ecotricity, the world's first green energy company back in 1995. Today, it powers more than 200,000 homes and businesses across the UK with renewable energy from the wind and sun – and recently sold the Electric Highway, Europe's first electric vehicle charging network. Dale also owns Devil's Kitchen, which makes vegan school dinners, and his latest business, Skydiamond – creating lab grown diamonds with renewable energy. His work focuses on three key areas – energy, transport and food – collectively responsible for 80% of our own carbon emissions.

He is Chairman and owner of Forest Green Rovers - recognised by FIFA as the "world's greenest football club" and became a United Nations Climate Champion in 2018. He launched his first book, Manifesto in 2020, and is Executive Producer of the Netflix Original documentary, Seaspiracy.

Our mission is to bring about a green britain.

We focus on the three areas of life that make up 80% of everybody's personal (and every organisation's) carbon footprint: Energy, Transport and Food — how we power ourselves, how we travel and what we eat... and our fourth pillar is making room for nature.

We provide data, insight and information to enable the changes that need to be made — in pursuit of a truly green Britain.

Dr. Amiera Sawas
Chief Research and Engagement Officer, Climate Outreach

## ABOUT CLIMATE OUTREACH

Climate Outreach is a team of social scientists and communication specialists passionate about widening and deepening public engagement with climate change. Through our research, practical guides and consultancy services, we help organisations engage diverse audiences beyond the usual suspects. We focus on building and sustaining cross-societal support for climate action, overcoming political polarisation, and turning concern into action. We have nearly two decades of experience working with a range of international partners including government, international bodies, media, business and charities.

## AUTHORS

Dr. Amiera Sawas, Chief Research and Engagement Officer, Climate Outreach
Rachael Orr, Chief Executive Officer, Climate Outreach
Dr. Isatis Cintron, Consultant and Post Doctoral Research Associate, Columbia University

## ACKNOWLEDGMENTS

Climate Outreach would like to thank the Mayors, Andy Burnham and Steve Rotheram, for setting up the Green Energy Task Force, and their unwavering commitment to building a more just and equal - and climate resilient - North West region.

We would also like to extend sincere gratitude to Cooperatives UK - especially Rose Marley and Emma Laycock - for bringing Climate Outreach to the taskforce and enabling our voice in this important work.

Dr. Amiera Sawas
Chief Research and Engagement Officer, Climate Outreach

We are also deeply appreciative of the support to this initiative provided by the Green Britain Foundation - namely Dale Vince and Dahlia Nahome; and by Arup - Michael Dobson, Lucy Stephenson and Michael Wilton.

Without a doubt the expertise and experience of the teams from regional and local authorities - in particular Mark Atherton (Greater Manchester Combined Authority), Martin Land (Liverpool City Region) and Melissa Crellin (Cheshire and Warrington) - rooted the taskforce's discussions in regional realities and needs. Their commitment to inclusivity in serving the diverse constituents of their local regions was always evident and commendable.

For everyone at Climate Outreach who discussed the evidence and recommendations for this report - thank you.

CO-OPERATIVES UK

## ROSE MARLEY, CHIEF EXECUTIVE, CO-OPERATIVES UK

As the voice of the UK's co-operative movement, Co operatives UK empowers and supports co operative enterprise with specialised knowledge and expertise, to grow the co operative economy and create a fairer society. From football clubs and farms, to convenience stores and pubs, there are more than 7,000 co operatives in the UK.

Rose joined Co-operatives UK as CEO in 2021 and immediately spearheaded the creation of an ambitious new strategy to grow the co operative economy, with a focus on engaging younger generations and building a tech & digital infrastructure capable of co op innovation in the 21st century. Rose is also Chair of the International Co operative Working Group (ICWG). The co operative movement in the UK has a strong history of international philanthropy.

Self-employed from a young age, Rose cut her teeth in the music business during the 'Madchester' era. Inspired by the lack of social mobility in the creative industries, she then turned her focus to social enterprise. Rose was the founding COO of Manchester City Council developments The Sharp Project and Space Studios where she was a founding director of award winning social enterprise SharpFutures. This led to Rose becoming the Social Enterprise Advisor to Greater Manchester Labour and Co operative Mayor, Andy Burnham, and lead for the young person's opportunities card Our Pass.

Rose lives in Manchester with her husband and two children.