REA 2026

# Biomass Feedstock Paper

REA - RENEWABLE ENERGY ASSOCIATION

# Executive Summary

The UK faces rising demand for sustainably sourced biomass feedstocks as part of its energy security and net zero transition, in line with the Climate Change Act 2008 and carbon budgets.

Bioenergy is consistently projected to remain a critical component of the UK energy system. NESO Future Energy Scenarios project **bioenergy demand of around 190-216 TWh by 2050,** reflecting its ongoing role in a balanced low-carbon system, including increasing deployment of BECCS from the 2030s onwards. The Climate Change Committee and emerging greenhouse gas removals pathways similarly assume a major role for bioenergy in delivering both decarbonisation and negative emissions.

At the same time, demand for sustainable biomass is expected to rise across multiple sectors, including power, transport fuels and greenhouse gas removals, creating a more competitive and complex biomass market. This reflects both the UK's decarbonisation objectives and the growing need for firm, dispatchable low-carbon power to complement variable renewables and support new sources of electricity demand, including data centres.

Concerns around sustainability, energy sovereignty and land use have increased interest in expanding domestic biomass production. Around **two-thirds of UK bioenergy feedstocks are currently sourced domestically,** and there is significant potential to increase the contribution of sustainably sourced domestic biomass over time, particularly through the expansion of crop-based feedstocks, while maintaining the important role of existing waste, residue and forestry resources.

However, meeting future demand is not a choice between domestic production and imports. **Expanding sustainably sourced domestic biomass should be a strategic priority,** strengthening UK energy security, supporting rural economies and improving supply resilience. UK resources alone, however, cannot meet projected future biomass demand, and **sustainably sourced imported biomass will continue to make a valuable strategic contribution.** Consistent with the 2023 Biomass Strategy, the UK should therefore pursue a balanced approach, combining sustainably sourced domestic and imported biomass to provide the diverse, resilient and secure supply base needed to deliver affordable decarbonisation.

This paper sets out the current state of domestic and imported biomass supply and explains why both will remain necessary for decades to come. It examines the opportunities and constraints associated with scaling domestic feedstocks, the continuing role of well-managed imported biomass, and the policy choices required to support a resilient and sustainable biomass market.

Securing future supply will require a clear understanding of the financial incentives, logistical constraints and environmental considerations that shape biomass supply chains within a global market, alongside a realistic assessment of investment timescales. **Biomass supply chains, processing infrastructure and energy crop systems take years, and often decades,** to develop. Sustained investment therefore depends on stable policy and regulatory frameworks, as these supply chains cannot be rapidly scaled or

reestablished in response to short-term policy changes.

The paper concludes that urgent policy clarity is needed to unlock investment and support supply chain growth. In particular, **Government should provide immediate certainty through the Carbon Budget 7 delivery plan, the response to the Greenhouse Gas Removals Review, the BECCS business model and the Common Biomass Sustainability Framework,** alongside a coherent approach across DESNZ, Defra and DfT on land use, carbon accounting and sustainability standards. Longer-term funding certainty, flexible transition pathways for existing biomass assets, and support mechanisms that enable the expansion of domestic feedstock production will be essential to deliver secure, resilient and sustainably sourced biomass supply chains through to 2050.

# Introduction

Biomass is already a significant component of the UK energy system, providing around 14% of electricity generation, nearly 12% of total energy consumption, and around 13% of dispatchable power capacity. Alongside renewables, storage and other low-carbon technologies, it plays an important role in maintaining energy security, balancing the electricity system and reducing emissions across the power, heat and transport sectors.

While the allocation of biomass resources between end uses will evolve over time, bioenergy is expected to remain an important part of the UK's long-term energy system and net zero pathway. Biomass resources are finite, but available evidence suggests future UK demand sits within the range of sustainable domestic and international supply, provided appropriate investment and policy frameworks are in place.

This paper examines the current state of domestic and imported biomass supply, the opportunities and constraints associated with scaling sustainably sourced domestic feedstocks, and the role that both domestic and imported biomass will need to play in delivering a secure, resilient and cost-effective pathway to net zero. It also highlights the policy actions needed to support investment in biomass supply chains, recognising that feedstock production systems and associated infrastructure take many years to develop and deploy.

# Biomass feedstock - current state of play

## Diverse domestic feedstock supply chains

According to the Government's 2023 Biomass Strategy (DESNZ, 2023) as well as Baringa (2025), an estimated two-thirds of biomass used for UK energy production (around 110 TWh out of a total ~160 TWh/ year) comes from domestic feedstocks, although data on multiple different sources lacks transparency and some (e.g. dispersed data on domestic wood fuel) may be of poor quality.

UK domestic biomass resources are highly diverse, spanning a wide range of primary and secondary feedstocks. These include agricultural residues such as straw and manure, forestry and woodland residues, purpose-grown energy crops, industrial by-products, waste wood, organic material from construction and demolition activities, and the biogenic fraction of municipal solid waste. Currently, most domestic biomass supply comes from secondary sources, including residues and waste streams.

## Overview of UK domestic biomass feedstock types

- **Agricultural residues (straw, livestock manures)**
- **Forestry and woodland residues, including low-grade timber**
- **Purpose-grown energy crops (annual crops for anaerobic digestion; perennial crops such as miscanthus and short rotation coppice willow)**
- **Intermediate crops grown between main rotations for energy use and Sustainable Aviation Fuel pathways**
- **Divertible food/feed/fuel commodity crops (e.g. wheat, sugar beet, oilseeds), with end use determined by market conditions**
- **Biogenic fraction of municipal and commercial solid waste (energy-from-waste plants)**
- **Industrial residues**
- **Waste wood and construction and demolition wood streams**

These feedstock categories broadly align with the UK Common Biomass Sustainability Framework (CBSF), which provides a more detailed regulatory classification of biomass streams across residues, processing residues, wastes, energy crops and other crops for sustainability and traceability purposes.

## Potential to scale crop-based feedstock supply

On the agricultural side, domestic primary biomass production supports the rural economy, in many cases complementing rather than competing with food production, diversifying farm income and offering financial security from robust long-term offtake contracts. Supply is currently dominated by a relatively small area of primary energy crops, mainly annual crops used for anaerobic digestion (biogas), grown on around 100,000 hectares of land, only a fraction of total utilised agricultural area. Perennial energy crops such as miscanthus and willow are grown on roughly one-tenth of this area, indicating significant headroom for expansion.

There is well-understood potential for diversification and scale-up of agricultural biomass supply, with estimates suggesting up to around 10 million tonnes could be produced from approximately 700,000 hectares under expanded deployment (Adams and Lindegaard, 2016; Biomass Connect, 2023; PBC4GGR, 2025).

Scaling domestic biomass production delivers wider rural economic benefits beyond farmgate income, supporting employment across plant propagation, establishment, contracting, harvesting, transport and processing. These are largely local, non-tradable activities embedded in rural economies. UK evidence suggests that expansion of perennial energy crops could support several thousand full-time equivalent jobs across the supply chain, alongside diversified farm income from lower-productivity land, complementing rather than competing with food production.

However, realising this potential depends on establishing a clear and stable route to market. Evidence from farmer and stakeholder engagement conducted by Biomass Connect indicates that the constraint is not a lack of interest in biomass crops, but a lack of system confidence. Farmers generally view perennial crops as a potential source of diversified and more stable long-term income, particularly on lower-quality or marginal land, but investment decisions are constrained by establishment costs, long payback periods and uncertainty over future demand.

A key finding is that revenue certainty and long-term contracting are as important to farmers as headline profitability, with policy and market instability acting as a major barrier to uptake. This reflects a broader system constraint where deployment is limited less by agronomic potential than by investment confidence and policy durability. Given the long lead times required to establish perennial energy crops, often several years to reach full yield, current uncertainty risks delaying deployment beyond the timeframe needed to contribute to net zero and energy security objectives, reinforcing the need for a clear and stable long-term policy framework.

The relatively limited extent of UK woodland (13.5% of land area, among the lowest in Europe) means agricultural biomass plays a more strategically important role than in more forest-rich countries such as France and Germany, both of which are around one -third forested. Expansion of agricultural feedstocks therefore represents a significant opportunity for domestic energy security and rural economic development, but one that is contingent on stable policy frameworks and credible long-term markets.

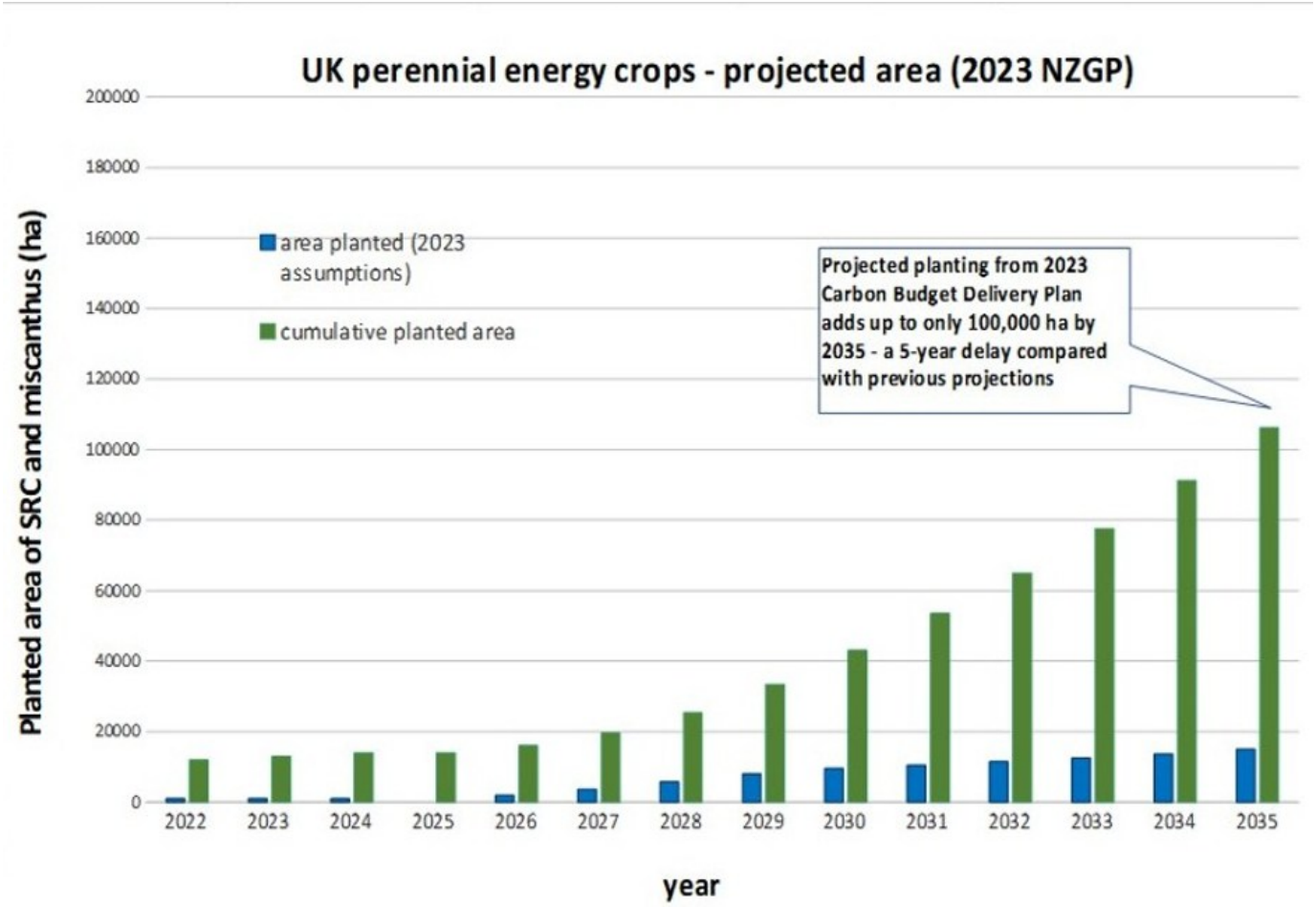


*Figure 1. Roadmap for planting UK perennial energy crops, revised in line with 2023 Biomass Strategy and Carbon Budget Delivery Plan. The previous CCC and DESNZ goal of 700,000 hectares by 2050 now looks unattainable, but the critical phase for planting contractors and the supply chain will be boosting annual planting rates from ~1000ha to ~10,000ha.*

The timeframe to 2030 is already short in terms of establishing new perennial crop supply chains, developing processing and logistics infrastructure, and enabling major investment decisions. Early clarity from Government is therefore critical if supply chains are to scale in time to contribute materially towards mid-century targets. Lead times for biomass feedstock supply as well as capital investment mean starting now, with regular progress reviews. Agricultural feedstocks and perennial energy crops are more likely options for domestic biomass supply before 2050, when compared with longer-rotation forestry, which takes decades to mature.

## Circular use of waste-based feedstocks

A significant share of domestic supply comes from waste streams, including mixed wastes, residues and end-of-life materials. Data across these streams is distributed across multiple sectors and supply chains. Expansion of these secondary feedstocks may be constrained by wider resource efficiency policies, including the Resources and Waste Strategy and Circular Economy Growth Plan, but energy recovery from wastes and residues remains an important part of the system for materials that cannot be reused or recycled, consistent with cascading principles and the waste hierarchy.

For example, waste wood is material that has reached the end of its usable life and cannot be reused or recycled. Its use supports a range of system functions, including low-carbon electricity generation equivalent to around 1.5 million UK homes, supports around 54 operational sites with, sustains around 1,500 direct jobs alongside several thousand additional supply chain roles, and contributes approximately £894 million per annum to the UK economy. Its use in biomass power stations is a clear example of the circular economy in practice, diverting material away from landfill and export to jurisdictions with lower environmental standards.

While increasing domestically sourced feedstocks remains a policy objective, Government support will be needed to maintain existing domestic supply chains for waste-based biomass, including extensions to Renewable Obligation support or equivalent mechanisms for waste-based biomass power facilities.

## Secure and sustainable imported feedstocks

Imported biomass feedstocks continue to play a critical and complementary role alongside domestic supply in meeting UK energy demand. Imported biomass is primarily supplied through established flows of pelletised low-value forestry fibre and wood industry processing residues to the power stations at Drax, Lynemouth and TeesREP in the north of England. International supply chains provide scale, flexibility and contracting depth that support system resilience and enable investment in large-scale low carbon energy generation.

- Forest harvesting residues, low-grade roundwood, thinnings and wood processing residues, supplied as bulk pellets for heat and power generation, and potentially Sustainable Aviation Fuel (SAF) production
- Used cooking oil and waste fats for biodiesel and HEFA (renewable diesel and SAF)

These feedstocks are sourced from large, working forests and mature global supply chains operating inline with stringent UK sustainability governance frameworks, including sustainability criteria within Contracts for Difference (CfD), ensuring carbon savings and land use protections.

Sustainable woody biomass provides markets for low value forestry and wood processing residues such as sawdust, thinnings and offcuts, supporting efficient use of harvested material within managed forest systems. In well managed forests, harvesting is part of an ongoing cycle of growth, regeneration and replanting, where removals are balanced by growth across the forest landscape, helping maintain or increase forest carbon stocks in the long term.

The scale and efficiency of international supply chains means emissions from transport are small relative to total lifecycle savings. At scale, sustainably sourced wood pellets still deliver substantial emissions reductions compared with fossil fuels, typically around 80 to 90 percent versus coal, even when accounting for supply chain emissions.

Imported sustainable biomass is important to the bankability of larger-scale projects. Project developers need to demonstrate secure, long-term feedstock supply to attract finance. International suppliers provide the scale, reliability and contracting certainty needed to support investment in such projects.

Evidence from system modelling (Baringa 2025) indicates that biomass generation can reduce overall system costs by lowering exposure to gas price shocks, reducing reliance on marginal gas plant and improving wholesale price stability. Unlike natural gas, which remains highly exposed to geopolitical shocks and commodity market volatility, imported biomass is largely supplied through long-term contracts with predictable pricing. In 2022, around 60 percent of UK wood pellet imports came from the US, 16 percent from Canada and 18 percent from Europe. These diversified supply chains have remained resilient through multiple energy crises, helping reduce volatility within the UK fuel mix.

# The Future of Biomass

## Biomass power

Biomass generation remains an important component of a least-cost pathway to net zero. Baringa analysis suggests that, in the near term, removing biomass from the power sector could require an additional 4.7 GW of capacity to be procured through the Capacity Market, potentially increasing costs by £500 million to £900 million per year. Beyond its role in balancing a renewables-dominated electricity system, biomass power may also play an increasingly important role in meeting demand for firm, dispatchable low-carbon power from growing sectors such as data centres and other strategic industrial users.

- **Capital investment:** Increasing the proportion of UK fibre at large-scale biomass power stations will require significant upfront capital investment, including for biomass processing facilities and power station modifications. This will require a clear and secure future for these assets of at least 10-15 years.
- **Timeline:** Increasing the volume of domestic feedstock would require lead times of at least 5 years to start to be delivered. Lead times include the development of supply chain infrastructure, land management decisions, and growing periods.
- **Technical specifications:** Large biomass installations such as Drax and Lynemouth are coal-conversion plants, this means that there are considerations to ensure feedstock compatibility with boiler specifications, both in terms of chemistry and physical characteristics. As a result, feedstock going into these plants must be processed to enable plants to receive and efficiently combust non-pelletised feedstocks.
- **Cost and GHG emissions:** There is potential to realise some cost and GHG emission savings compared to imported wood pellets. However, the extent to which these benefits could be realised are highly variable and dependent on power station operating models, feedstock catchment areas (distance), mode of transportation and degree of fibre processing required.
- **Scale:** Realising the full potential of these sites in the long-term, such as installing BECCS which could run at baseload to optimise the negative emissions potential, will necessitate significant volumes of feedstock that will require the continued role of imported sustainable biomass to meet demand.

## Emerging growth markets

Three major market segments are likely to drive a substantial increase in UK biomass demand over the next two to three decades, over and above the current level of around 170 TWh per year (DESNZ, 2023), notwithstanding some reallocation of existing resources. Baringa's analysis of future biomass pathways highlights growing demand across the power, heat, transport and carbon removal sectors. Future allocation of biomass between end uses will reflect strategic choices, with significant overlap between applications, particularly between BECCS, power generation and other energy uses. A key requirement across all pathways is therefore the development of diverse and resilient domestic and international supply chains capable of meeting multiple competing demands.

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## Greenhouse Gas Removals (BECCS):

BECCS is consistently identified as a core component of UK greenhouse gas removal pathways, with early movers in this nascent industry emerging from energy-from-waste, anaerobic digestion, and biomass-based BECCS using domestic agricultural and forestry residues. However, delivering BECCS at the scale projected in net zero pathways will require the inclusion of large-scale biomass power stations, which in turn will continue to depend on a combination of domestic and imported sustainable biomass to ensure sufficient volume, operational continuity and investment viability. The Climate Change Committee's Seventh Carbon Budget projects BECCS removals increasing to 19 $MtCO_2e$ per year by 2040 and 25 $MtCO_2e$ per year by 2050, making it the UK's largest engineered greenhouse gas removal technology.

## Green Gas:

Significant expansion of anaerobic digestion and biomethane production is widely anticipated, with analysis suggesting feedstock availability is not a major constraint and biomethane production potentially reaching around 50 TWh by 2030 and over 100 TWh by 2050. Growth is expected to be primarily met through agricultural residues, manures and energy crops integrated within existing rotational systems, supporting both agricultural productivity and decarbonisation of the gas grid. This represents a largely domestically anchored demand stream.

## Sustainable Aviation Fuel (SAF):

The UK SAF mandate is expected to drive significant new demand for biomass-derived feedstocks over the next two to three decades. Current production is dominated by HEFA pathways based largely on imported wastes and residues, with future growth expected from a wider range of technologies including alcohol-to-jet and Fischer-Tropsch processes. SAF feedstock supply will draw on both domestic and imported feedstock, with the balance determined by certification frameworks, conversion technologies and relative cost competitiveness as the market scales. Demand is expected to reach around 13 TWh by 2035.

# A Roadmap

Scaling sustainably sourced domestic biomass requires sustained investment in feedstock production and conversion technologies over the next two decades, underpinned by public leverage of private capital across all scales.

This depends on clear long-term signals on biomass's strategic role in energy security and decarbonisation, supported by durable policy frameworks and credible long-term offtake arrangements. Supply chains develop over decades and cannot be rapidly scaled or reversed in response to short-term policy change.

## Provide immediate policy certainty

Government should urgently confirm outstanding policy decisions to promote policy and regulatory stability to underpin near-term investment confidence, ensuring consistent recognition and incentivisation of sustainably sourced domestic and imported biomass. This must include:

- Publishing the **Common Biomass Sustainability Framework,** this should provide clarity on implementation and work towards consistency in sustainability standards across bioenergy applications.
- Publish the updated **Carbon Budget Delivery Plan** and the Government response to the I**ndependent GGR Review**, setting out a clear roadmap for greenhouse gas removals, to include enabling **NPT-enabled projects** to access the **GGR Business Model.**
- Extend support for sub-100 MW biomass plants through the Renewables Obligation and establish a **post-ROC funding pathway,** including access to **Wholesale CfDs,** to support sustainable domestic biomass supply chains and circular economy benefits.
- Conclude **UK-EU ETS and electricity market negotiations** to support decarbonisation, market stability and investment, whilst safeguarding the UK's energy security interests.
- Finalise the **Power BECCS Business Model,** this should include addressing volume risk which remains a key risk of the business model design.

## Secure funding certainty and transition pathways

To leverage the bioenergy opportunity over the coming decades, the Government should also seek to provide long-term policy and regulatory certainty to unlock future bioenergy markets including BECCS, SAF and Green Gas. This should include:

- The **2027 Spending Review** will be critical to providing long-term funding certainty for future bioenergy applications, including BECCS. This must include allocating funding envelopes for the next round of CCUS clusters and projects, enabling the Transport & Storage infrastructure necessary to deploy BECCS at scale.
- Legislate for the integration of **GGRs into the UK ETS** and ensure compatibility with **UK-EU ETS linkage agreements.** This will underpin long-term GGR demand through compliance markets, supporting private investment and reducing overall subsidy burden.

## Scale sustainably sourced domestic feedstock

Cross-government policy should support the staged expansion of sustainably sourced domestic biomass from a low base, progressing from annual and rotational arable crops (e.g. hemp), through miscanthus and short rotation willow, to wider integration of perennial energy crops within livestock systems.

This should include:

- Ensuring future environmental land management schemes, including the **Sustainable Farming Incentive** and successor schemes, recognise perennial energy crops as permanent crops and reward their environmental and carbon co-benefits alongside agroforestry and other multifunctional land uses.
- Maintaining long-term support for biomass demonstration and knowledge exchange programmes, including **Biomass Connect, PBC4GGR and the Biomass Feedstocks Innovation Programme,** to strengthen the evidence base, improve farmer confidence and accelerate deployment.

Scaling domestic supply will ultimately depend on sustained demand-side confidence. Long-term offtake contracts, simple support mechanisms or contractual obligations, and clear government signals on future biomass demand will be essential to share risk, unlock private investment and increase planting rates towards around 10,000 hectares per year. Delivery will require coordinated policy across DESNZ, Defra and DfT, particularly on land use, carbon accounting and sustainability standards.

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# About the REA

The REA represents a wide variety of organisations, including generators, project developers, fuel and power suppliers, investors, equipment producers and service providers. The REA has dedicated member forums focused on biomass power, decarbonising heat, green gas and hydrogen, renewable transport fuels, thermal storage, and energy from waste (including advanced conversion technologies) and organics recycling. Members range in size from major multinationals to sole traders. There are around 450 corporate member organisations of the REA, making it the largest renewable energy trade association in the UK. The Membership represents over 200,000 jobs and contributes more than £50bn to the UK economy, giving a comprehensive view of the renewables sector.

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**For a more detailed discussion or for further information, please contact:**

**Helen Motwani - hmotwani@r-e-a.net**
**Head of Heat & Biomass UK, REA**

**James Heath - jheath@r-e-a.net**
**Senior Policy and Advocacy Officer - Bioenergy & International Lead, REA**

**This REA report was co-authored by Dr Jonathan Scurlock FRSA**

Dr Scurlock founded the consultancy Renewable Energy in Agriculture, specialising in the land-based renewable energy market. He was formerly Chief Adviser on renewable energy and climate change at the National Farmers' Union (NFU), where he led analysis and provided strategic advice on energy, climate change and net zero to NFU leadership and members.

**REA - RENEWABLE ENERGY ASSOCIATION**

York House, 23 Kingsway, London WC2B 6UJ
Tel: +44 (0)20 7925 3570 | Email: info@r-e-a.net Web: www.r-e-a.net
Company no: 04241430 Registered in England & Wales
(Registered name: The Association for Renewable Energy and Clean Technology)