National Alliance of Forest Owners

February 5, 2018

Response of the National Alliance of Forest Owners to BIOENERGY REVIEW (2018) - CALL FOR EVIDENCE of the Committee on Climate Change

INFORMATION ON THE SUBMITTING ORGANIZATION

The National Alliance of Forest Owners (NAFO) is a national advocacy organization based in the United States and is committed to advancing U.S. federal policies that support the long-term economic, social and environmental benefits of sustainably managed privately-owned forests. NAFO member companies own and manage more than 45 million acres of private working forests in the United States – forests that are managed to provide a steady supply of timber. NAFO's membership also includes state and national associations representing tens of millions of additional acres.

NAFO seeks common sense policy solutions to sustain the ecological, economic and social values of forests and to assure an abundance of healthy and productive forest resources for present and future generations. Approximately 360 million acres – or 70% – of the working forests in the U.S. are on private land, owned by individuals, families, small and large businesses, and an increasing number of Americans who invest in working forests for retirement. Private U.S. working forests support 2.4 million U.S. jobs, $99 billion in payroll, and $282 billion in sales and manufacturing. These working forests are vital to our nation's natural resource infrastructure, providing forest products, open space, wildlife habitat, clean water and air, recreation, and more. U.S. forest owners are the world's leaders in sustainable forestry. Individual states administer the world's most effective framework of forestry laws, regulations, and agreements in a way that is carefully tailored to local conditions and needs.

When forest owners are confident that they will have a market for their wood when it matures, they are more likely to invest in forest health treatments that prevent disease and infestation, in regular maintenance that reduces the risk of natural disturbance like wildfire, and in replanting to grow more trees. Research shows that demand for wood products keeps markets strong, which protects working forests from conversion to other land uses, like development. Keeping forests intact means keeping forests' economic and environmental benefits intact too. According to the U.S. Department of Agriculture, from 1953 to 2011, in a time of expanding population and increasing demand for homes, paper products, and energy, the total volume of trees grown in the U.S. increased by 50%. Today, private forest owners are growing 40% more wood than they remove.

Today the greatest threat of deforestation comes from the conversion of forests to non-forest uses that produce a higher economic value. The families, businesses, and

individuals that own nearly 70% of the United State's working forests depend on the returns they get from the products their forests produce to make additional investments in sound, long-term forest management, which provides substantial conservation benefits. When existing markets for their products are strong, or when new markets like bio-energy emerge, they provide forest owners the means to keep their land forested by keeping their forests economically competitive with other uses. Forests are a renewable resource—as the value of forests increase, forests themselves will multiply.

RESPONSE

GHG emissions and sustainability of bioenergy imports

Our 2011 Bioenergy Review concluded that UK and EU regulatory approaches should be strengthened to better reflect estimates of the full lifecycle emissions of bioenergy feedstocks, taking into account both direct and indirect land-use change impacts. Whilst changes have been made to these regulatory frameworks, both life-cycle emissions and the wider sustainability impacts of bioenergy remain highly contested issues, particularly in relation to bioenergy imports. Given the potential role for bioenergy in the UK's low-carbon transition, and the potential increase in bioenergy feedstock production in the future, it will be essential that policy is based on the latest available evidence and that bioenergy is genuinely sustainable.

The term 'sustainable' here is used to cover a wide-range of issues relating to GHG emissions, biodiversity, water use, land-use, land-rights, air-quality and other social and environmental issues.

1. What is the latest evidence on lifecycle GHG emissions of biomass and other biofuels imported into the UK? How could this change over time as a function of scaling up supply? We are particularly interested in evidence that considers the full range of relevant issues including changes to forest and land carbon stocks, direct and indirect land-use change and wider market effects.

Any assessment of the GHG emissions lifecycle impacts must take into account market response and appropriate landscape and temporal scales, recognize that biomass is at the bottom of the value chain, and focus on substitution for coal. Assessments need to avoid commercially unlikely scenarios involving the use of whole trees for biomass and foregoing high value uses for timber or consider only the direct emissions during the production and transportation of pellets assuming no changes in forestlands, harvest rotations, or forest inventories.

Over the past several years, a variety of papers have been released that document the lifecycle advantages that biomass has over coal as a fuel for generating electricity. While not all perfect by any means, for the most they employ proper methodologies and assumptions, including:

- Biomass is ultimately derived from working forests which are managed for long-term;

- Working forests are managed for high value saw timber;
- Biomass is a low value output in the form of thinnings, forests residues such as limbs and tops, and mill residuals;
- Reduced forest markets result in conversion at the worst case and at best an aging forest stand susceptible to pests, disease, fire and degradation.
- Vibrant and expanding forest markets encourage sound management practices and expanded forest growth.
- Ultimately, biomass adds increased return but is not of sufficient value to alter management decisions.
- Biogenic carbon must be measured at the landscape level, either nationally or regionally, and changes considered on a 100-year time scale.
- Counter-factuals that assume no harvesting or substantially reduced harvesting in the absence of a bioenergy market are not realistic.

References:

- *Use of North American woody biomass in UK electricity generation: Assessment of high carbon biomass fuel sourcing scenarios*, Ricardo Energy and Environment, report for DECC
- *Response to Chatham House report 'Woody Biomass for Power and Heat: Impacts on the Global Climate'*, IEA Bioenergy
    - *Press Release: Over 125 academics join IEA Bioenergy urging Chatham House to reconsider flawed policy recommendations*, IEA Bioenergy
- *Forest Carbon Accounting Considerations in US Bioenergy Policy*, Society of American Foresters, published in the Journal of Forestry
- *Science Fundamentals of Forest Biomass Carbon Accounting*, letter from the National Association of University Forest Resources Programs, signed by over 100 academics and researchers
- *Carbon savings with transatlantic trade in pellets: accounting for market driven effects*, Dr. Madhu Khanna, et al.
- *Sustainability guidelines and forest market response: an assessment of European Union pellet demand in the southeastern United States*, Christopher Galik (Professor at Duke University Nicholas Institute for Environmental Policy Solutions) and Robert Abt (Professor at NC State University College of Natural Resources)

2. Under what circumstances can imported biomass and other biofuels deliver real GHG emissions savings (considering full life-cycle emissions and indirect/wider market effects)? Conversely, what evidence is there for ruling out certain sources on the grounds of lifecycle GHG emissions or sustainability risks?

See answer to Question 1.

3. Currently the UK imports a significant proportion of wood pellets for biomass electricity production from North America, particularly the south-east USA.

    a) What are the wider market impacts of demand for wood pellets on forestry management practices and carbon stocks at the landscape level in North America?

Private forest owners in the United States have a long history of investing in forest management and maintaining their land in forest. A principal contributor to this is the existence of markets for their timber. This is eminently clear if one considers the product

development over the past 50 years – new paper products, engineered wood such as OSB, use of wood fiber in a variety of technologies, to name a few. Pellets, which are produced from low grade left-overs, whether limbs, tops, other residues or smaller whole trees such as thinnings, are the most recent market, and a comparatively small one at that, with little overall impact on forest management or carbon stocks at the landscape level. Study after study by the U.S. Forest Service shows stocks are stable or increasing across the 750 million acres of public and private forestland United States.

References:

- *Forest Inventory and Analysis Program*, USDA Forest Service
- *Forest Resources of the United States*, USDA Forest Service
- *Forest Carbon Accounting Considerations in US Bioenergy Policy*, Society of American Foresters, published in the Journal of Forestry
- *An Assessment of the Downturn of the Forest Products Industry in the Northern Region of the United States*, USDA Forest Service Northern Research Station
- *Effect of policies on pellet production and forests in the US South*, USDA Forest Service Southern Research Station
    - *Study Finds Increasing Wood Pellet Demand Boost Forest Growth, Reduces Greenhouse Gas Emissions, Creates Jobs*, USDA blog post by Robert Johansson, USDA Chief Economist
- *United States Forest Inventory and Harvest Trends on Privately-Owned Timberlands*. https://www.forest2market.com/hubfs/Blog/20160620_Forest2Market_Inventory_and_Harvest_Trends.pdf
- *Sustainability guidelines and forest market response: an assessment of European Union pellet demand in the southeastern United States*, Christopher Galik (Professor at Duke University Nicholas Institute for Environmental Policy Solutions) and Robert Abt (Professor at NC State University College of Natural Resources)
- *Historical Perspective on the Relationship between Demand and Forest Productivity in the US South*, Forest2Market
    - *Forest2Market Report Shows Increased Demand for Wood Fiber Leads to Forest Growth*, Forest2Market blog post
- *Status and prospects for renewable energy using wood pellets from the southeastern United States*, US Department of Energy Oak Ridge National Laboratory
- *Ecological objectives can be achieved with wood-derived bioenergy*, US Department of Energy Oak Ridge National Laboratory
- *Wood Supply Trends in the US South, 1995-2015*, Forest2Market
    - *Forest2Market Study Shows US Wood Pellet Industry No Threat to US South Forests*, Forest2Market blog post
- *How is wood-based pellet production affecting forest conditions in southeastern United States?*, US Department of Energy Oak Ridge National Laboratory, published in the Journal of Forest Ecology and Management

b) What evidence is there that wood pellet production displaces other uses of forestry products in North America? (e.g. panel board or lumber production)

There is no credible evidence that wood pellet production has had adverse effects on forest management or species composition, or has displaced any supply of timber. Harvesting for pellet production is a small fraction of overall harvest. Wood product exports represent less than 10% of total wood products manufacturing in the United States. Of that, pellets represent less than 7% on average of total wood product exports from the United States during 2014-2016, based on a communication from the Foreign

Agricultural Service of the US Department of Agriculture. The chances of this small component displacing other uses of forest products in the United States is minimal to non-existent.

References:

- *Wood Supply Trends in the US South, 1995-2015*, Forest2Market
  - *Forest2Market Study Shows US Wood Pellet Industry No Threat to US South Forests*, Forest2Market blog post
- *Money Does Grow on Trees as U.S. Forest Product Exports Set Record* (2015). *https://www.fas.usda.gov/data/money-does-grow-trees-us-forest-product-exports-set-record*
- *The Risk of Indirect Wood Use Change*, Poyry, prepared for the Netherlands

c) What are the most likely alternative/counterfactual uses of forestry products used for wood pellet production?

There are no counter-factuals for pellet production. A substantial amount of material used for pellet production is low-value with no other market. As pellet production utilizes smaller diameter trees, there may be localized competition with OSB and pulp mills in the particular wood basket affording forest owners in the area a higher price for their timber and easing the cost of re-forestation. But the amount harvested for pellet facilities will remain small and will have little effect on the timber supply available for other products. As our answers here plainly show, robust markets actually contribute to stable and increasing forest acreage in the United States of America.

- See references above.

d) How are these wider market impacts (sub-questions a-c) likely to change over time if demand for wood pellets significantly increases?

As our answers above demonstrate, markets benefit forest regeneration and retention. Current demand for pellet production is less than 1% of forest inventory in southern US forests and is not likely to increase dramatically above that. So the absence of any impact is likely to continue.

4. Aside from GHG emissions, what evidence is there of other sustainability impacts associated with imported biomass or other biofuels? What evidence is there for how these might change as a function of scaling up supply (from the US, and internationally)?

Our answers above demonstrate that there are no "other sustainability impacts" associated with pellet production in the United States.

5. Are there any benefits resulting from importing biomass or other biofuels into the UK (e.g. development benefits)? How might these vary internationally? What are the conditions required for any benefits to be realised?

Timber markets provide substantial benefits, as documented in the above references. As further shown, pellet markets contribute to these benefits, albeit on the low end of the value chain. These benefits include economic contributions to rural economies in the United States, encouragement of forest regeneration and retention, and the

environmental benefits of forested landscapes such as water quality, species habitat and carbon sequestration.

Studies have repeatedly found that forest owners will respond to increased demand for biomass energy (or any other forest product) by increasing forest growth, and thereby increasing forest carbon stocks. In the case of biomass energy, such responses can take several forms, including (1) increased consumption of existing harvest residuals, (2) increased productivity through investments in forest management practices, and (3) land use changes such as afforestation, reforestation, or avoided deforestation.

References:

- Sedjo, R, *Carbon Neutrality and Bioenergy: A Zero-Sum Game?*, Resources for the Future Discussion Paper 1-9 (Apr. 2011), *available at* http://www.rff.org/documents/RFF-DP-11-15.pdf
- *Historical Perspective on the Relationship between Demand and Forest Productivity in the US South*, Forest2Market
    - *Forest2Market Report Shows Increased Demand for Wood Fiber Leads to Forest Growth*, Forest2Market blog post
- Galik, C. and Abt, R. 2015. Sustainability Guidelines and Forest Market Response: An Assessment of European Union Pellet Demand in the Southeastern United States. GCB Bioenergy, May. (http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12273/full)
- *Forest Carbon Accounting Considerations in US Bioenergy Policy*, Society of American Foresters, published in the Journal of Forestry

Sustainability policy and certification

The sustainability framework for bioenergy in the UK has evolved significantly since 2011. Changes have included the tightening over time of lifecycle GHG emissions limits for bioenergy supported under Government incentive schemes, changes to EU rules on liquid biofuels and the development of certification schemes. Nonetheless questions remain regarding the current framework's capacity to guarantee high sustainability standards.

The term 'sustainability framework' refers here to the policies, regulations and incentives in place to promote bioenergy sustainability in the UK.

6. What are the strengths, weaknesses and gaps of the current sustainability framework for bioenergy in the UK? How could the current sustainability framework for bioenergy in the UK be improved to address these issues?

Our understanding is that the current UK sustainability framework is the result of considerable consultation and analysis and is viewed as the most stringent in the world. Considering the strength of sustainable forestry in the United States, see answer 8 below, we see no need or room for improvement at least with regard to imports from the United States.

7. Ofgem has identified a number of certification schemes that it considers appropriate for demonstrating compliance with the 'Land Criteria' under the Renewable Obligation sustainability standards. Are these certification schemes adequate? Why/why not? How could they be improved?

Our understanding of the Ofgem requirements suggest they are adequate, particularly as they employ a risk assessment process for supply chain assessments.

8. What certification schemes currently represent 'best practice'? Why?

The combination of markets, best management practices, and certification schemes in the United States has produced the most sustainable forest ownership and management in the world. Recognizing that documentation is necessary to confirm this fact, the National Alliance of Forest Owners requires its members, who own or manage investments in over 45 million acres of commercial private forestland in the United States, to verify their commitment to sustainable forestry principles. Most do so through participation in one or more of the three internationally-recognized independent third-party certification schemes operating in the United States – Sustainable Forestry Initiative (SFI), American Tree Farm System, and Forest Stewardship Council.

While NAFO concentrates on larger commercial forest owners in the United States, The American Tree Farm System (ATFS), a program of the American Forest Foundation, is the largest woodlands system in the world aimed at family forest owners. ATFS provides education, outreach, and support to help family woodland owners manage their land, while also certifying their land to 8 Standards of Sustainability. ATFS certification is an internationally recognized, third-party audited certification system. Currently, there are 74,000 family woodland owners in ATFS who own more than 20 million acres in the United States.

The United States government has also recognized the value of both current forest management practices and forest certification. An excellent example is provided by the 2016 decision of the US Environmental Protection Agency (EPA) that compliance with state best management practices supported by these certification schemes, and particularly by the SFI Procurement Standard, have created sufficient protections for water quality that federal regulation was, and is, not necessary.

References:

- https://nafoalliance.org/wp-content/uploads/2018/02/Sustainable-Forest-Management-Commitment-11-10.pdf
- *Implementation of Forestry Best Management Practices*, Southern Group of State Foresters
- *EPA Decision on Forest Roads*, https://www.gpo.gov/fdsys/pkg/FR-2016-07-05/pdf/2016-15844.pdf
- FSC Controlled Wood Standard
- FSC Chain of Custody Standard
- SFI Fiber Sourcing Standard
- SFI Chain of Custody Standard
- https://www.treefarmsystem.org/view-standards
- SBP Framework

9. Ofgem has set out approaches to calculating bioenergy GHG emissions for demonstrating compliance with the 'GHG Criteria' under the Renewable Obligation sustainability standards. Are these approaches adequate? Why/why not? How could they be improved?

We understand this is a reference to the UK sustainability framework discussed above. Our understanding is that the current framework is the result of considerable consultation and analysis and is viewed as the most stringent in the world. Considering the strength of sustainable forestry in the United States, see answer 8 above, we see no need or room for improvement at least with regard to imports from the United States.

10. Please highlight any further measures you feel are required to ensure bioenergy feedstocks used in the UK are sustainable and deliver significant life-cycle GHG emissions savings. Why are these measures needed?

As the above answers amply demonstrate, we feel that the UK has "captured the field" to ensure bioenergy feedstocks used in the UK are sustainable and deliver significant life-cycle GHG emissions savings. We can offer no improvements.

It is important for the Committee to understand that forest management in the United States, while not monolithic, is not freewheeling. Federal laws, such as the Endangered Species Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Clean Water Act, and the Coastal Zone Management Act, provide a framework under which forest management is conducted. These laws have produced best management practices (BMPs) adopted by states and molded to fit the forest ecosystems within the particular state. Many states have mandatory forest practice laws, some comprehensive others focused on particular practices. However, compliance with BMPs is measured at over 90% in states regardless of regulatory requirements.

There is no evidence that any particular market will alter or distort these compliance rates. Increasing markets, improvements in forest management, and compliance with environmental protections have combined to produce over 50% more volume in forests since 1950.

- *EPA Decision on Forest Roads*, https://www.gpo.gov/fdsys/pkg/FR-2016-07-05/pdf/2016-15844.pdf
- *Implementation of Forestry Best Management Practices*, Southern Group of State Foresters
- *Forest Inventory and Analysis Program*, USDA Forest Service
- *Historical Perspective on the Relationship between Demand and Forest Productivity in the US South*, Forest2Market
    - *Forest2Market Report Shows Increased Demand for Wood Fiber Leads to Forest Growth*, Forest2Market blog post
- *Wood Supply Trends in the US South, 1995-2015*, Forest2Market
    - *Forest2Market Study Shows US Wood Pellet Industry No Threat to US South Forests*, Forest2Market blog post

11. Some large UK users of imported biomass use a risk-based approach to assess the sustainability risks associated with importing biomass from specific jurisdictions. What is the role for these approaches?

With the diversity of governance reliability around the world, it makes sense to employ risk-based approaches to focus resources where most needed. Once the national assessment identifies a low level of risk, an assessment approach allows the producers to maintain a supply from diverse sources without imposing costly verification requirements while monitoring the overall sustainability of the wood basket.

Supply of bioenergy feedstocks

We have not provided answers in this section

In our 2011 Bioenergy Review we considered scenarios for the amount of sustainable bioenergy resource available to the UK over the coming decades. Our central 'Extended Land Use' scenario suggested that around 10% of the UK's primary energy demand could be met from bioenergy in 2050, with over half coming from domestic feedstocks. We are now looking to develop new supply scenarios through to 2050 to reflect the latest evidence on sustainability and different assumptions about the potential future availability of imported and domestically produced bioenergy resources.

To support the development of these scenarios and our wider work, the CCC is currently undertaking new analysis on how the use and management of land in the UK can deliver deeper emissions reduction and increased sequestration. This analysis will provide updated data on the potential supply of non-waste and non-food bioenergy resources from UK sources. For projections of international bioenergy resources and waste-based UK bioenergy resources we will review the latest evidence and publicly available literature. We are particularly interested in quantitative estimates of resource potential, broken down by feedstock type, that are underpinned by explicit assumptions relating to sustainability.

12. What are the most credible and up-to-date estimates for global bioenergy resource potential through to 2050, broken down by feedstock type? What key assumptions underpin these estimates?

    Please provide details of any assessments of global bioenergy resource explicitly tied to sustainability standards (covering GHG emissions, biodiversity, water use, land-use, land-rights, air-quality and other social and environmental issues)

13. What is the latest evidence relating to the availability of 'marginal' and abandoned agricultural land for growing bioenergy crops (where possible, reflecting broader sustainability requirements e.g. water stress, biodiversity, social issues)? Is this evidence adequately reflected in global resource estimates?

14. What are the most credible and up-to-date estimates for the amount of bioenergy resource that could be produced from UK waste sources through to 2050? Where possible please state any assumptions relating the reduction, reuse and recycling of different future waste streams.

15. What factors (opportunities, constraints, assumptions) should the CCC reflect in its bioenergy resource scenarios through to 2050?

16. What should be the assumptions on the share of international resource which can be accessed by the UK (e.g. per capita, current or future energy demand)?

17. What are the prospects for the development and commercial production of 3rd generation bioenergy feedstocks (e.g. algae)? What are the timescales, costs, risks, opportunities and abatement potential of using algae to make biofuels?

Scaling up UK sustainable supply

We have not provided answers in this section

An objective of our current work on bioenergy is to better understand and reflect the potential for scaling-up of the supply of sustainably produced domestic (UK) bioenergy resources through to 2050. We aim to identify and develop policy recommendations for 'low-regrets' measures/strategies that can be implemented in the near term.

18. What are the main opportunities to scale-up the supply of sustainably-produced domestic bioenergy supply in the UK? Where possible please provide details on the scale of opportunity.

19. What risks are associated with scaling-up domestic supply and how can these risks be managed?

20. What 'low-regrets' measures should be taken now (e.g. planting strategies) to increase sustainably-produced domestic bioenergy supply?

21. What international examples of best-practice should the UK should look to when considering approaches to scaling-up domestic supply?

22. What policy measures should be considered by Government to help scale-up domestic supply?

Best-use of bioenergy resources

We have not provided answers in this section

Our 2011 review developed a hierarchy of appropriate uses for bioenergy feedstocks based on minimising costs and maximising abatement. We concluded that if CCS technology is available it is appropriate to use bioenergy in applications with CCS, making it possible to achieve negative emissions under the right circumstances. This could include power and/or heat generation, hydrogen production, and biofuels production for use in aviation and shipping. If

CCS is not available, bioenergy use could be skewed towards heat generation in energy-intensive industry, and to biofuels in aviation and shipping, with no appropriate role in power generation or surface transport. In either case, we concluded the use of woody biomass in construction should be a high priority given that this can potentially secure negative emissions through a very efficient form of carbon capture.

We are now looking to update this analysis to reflect the latest technological and market developments. We are particularly interested in technologies such as biomass gasification, CCS and advanced second and third generation biofuels as well as the potential role of hydrogen to support decarbonisation across the economy. To support our consideration of these areas, the CCC is currently undertaking analysis into the potential of the hydrogen economy and we are planning to undertake further investigation into non-energy uses of bioenergy resources.

23. Gasification has been identified as a potentially important technology for unlocking the full potential of bioenergy to support economy-wide decarbonisation.
    a) What are the likely timescales for commercial deployment of gasification technologies?
    b) What efficiencies and costs are likely to be achieved? What scope is there for improvement and/or cost reductions over time? Please differentiate between feedstocks where possible/necessary.
    c) What are the main barriers and uncertainties associated with the development, deployment and use of gasification technologies?
    d) What risks are associated with gasification technologies and how can these be managed?
    e) What policies and incentives are required to facilitate commercial deployment?

24. Bioenergy with Carbon Capture and Storage (BECCS) has been identified as a key potential mechanism for achieving the UK's 2050 carbon target due to the 'negative emissions' it could offer.
    a) What are the potential timescales for commercial deployment of BECCS technologies?
    b) What are likely to be the optimal uses of BECCS (e.g. electricity generation, hydrogen production)?
    c) What efficiencies and costs are possible?
    d) How will performance and cost differ according to feedstock type? What are likely to be the optimal feedstock types for BECCS? What are the implications for domestic supply vs imports (e.g. feasibility, considerations in scaling up over time)?
    a. What are the main barriers and uncertainties associated with the development, deployment and use of BECCS?

b. What are the risks associated with the pursuit of BECCS that go beyond the risks that relate to supplying sustainable feedstocks and CCS more generally? How can these be managed?

25. Once developed BECCS is a technology that could be deployed in many different countries around the world. What principles and mechanisms should be used to determine where BECCS is deployed and how any associated negative emissions are accounted for? Should any UK participation in any international BECCS scheme be counted as additional to efforts to meet domestic carbon budgets?

26. There is currently substantial interest in the development of 'advanced' biofuels for use in sectors such as aviation, shipping and/or heavy duty transport.

    a) What are the most promising technologies/processes for advanced biofuel production up to 2050? Please provide details on each technology/process including advantages/disadvantages, timescales for commercial deployment, feedstock type, fuel type and end-user.

    b) What efficiencies and costs are likely to be achieved? What scope is there for improvement and/or cost reductions over time? Please differentiate between technologies/processes.

    c) What are likely to be the optimal feedstock types for advanced biofuel technologies?

    d) What are likely to be the optimal end-uses of advanced biofuel technologies?

    e) What are the main barriers and uncertainties associated with the development, deployment and use of advanced biofuel technologies?

    f) What risks are associated with the pursuit of advanced biofuel technologies and how can these be managed?

    g) What policies and incentives are required to facilitate commercial deployment of advanced biofuels?

27. In 2015 the Government published the Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050. These Roadmaps explored decarbonisation options across multiple industrial sectors and the estimated deployment potential, timescales, cost data and abatement for each option (including bioenergy). Are there any substantial changes from these estimates that the CCC should consider when assessing abatement options in industry? If so please provide your reasoning and details of any recent evidence that relates to these changes.

28. In our 2011 review we identified wood in construction as a potentially effective method of CCS and a high priority 'non-energy' use in our best-use hierarchy.

    a. What lifecycle GHG emissions savings can be achieved by using WIC? Under what circumstances does WIC fail to deliver GHG emissions savings? Please

consider the full range of impacts associated with using WIC including substituted product emissions (e.g. cement), product equivalence (impacts on co-products), end-of-life options and biogenic carbon storage.

b. What is the potential for increasing the amount of wood used in construction in the UK? What are the barriers and how can they be overcome?

c. What is the potential for using UK-produced timber in construction rather than imports? What are the barriers and how can they be overcome?

d. What is the expected lifetime of different wood products in construction (e.g. cross-laminated timber)?

e. What currently happens to wood in construction at the end of its useful life? What other viable options should be developed?

29. There are also a number of other potential non-energy uses of bio-feedstocks including bio-based plastics and bio-based chemicals.

    a. What other non-energy uses of bio-feedstocks have the most potential through to 2050 in terms of GHG abatement, cost, timescales and market size?

    b. What are the barriers to increasing these non-energy uses and how can these barriers be overcome?

    c. What risks are associated with the pursuit of other non-energy uses of bio-feedstocks and how can these be managed?

GHG emissions reporting and accounting

GHG emissions reporting rules for bioenergy are different to those for other forms of energy. Emissions relating to the use (combustion) of bioenergy resources are not reported in the country of use but rather in the country where bioenergy resources are produced. Only Annex 1 countries under the Kyoto Protocol currently account for land-use emissions as part of binding emission reduction targets. In addition under Paris Agreement rules emissions (as under the Kyoto Protocol) will be reported against land-use baselines that may already assume a degree of land-use change. For these reasons and others, bioenergy GHG accounting has been criticised for not properly reflecting the impacts of bioenergy.

30. What are the strengths and weaknesses of the current approach to GHG emissions accounting for bioenergy in the UK and internationally? Specifically, what are the main gaps in the current land use emissions accounting rules?

First and foremost, there is scientific consensus that, because it is part of the natural carbon cycle, biogenic carbon is fundamentally different than fossil carbon. Thus, when forests are managed sustainably, biogenic CO_2 emissions are balanced by carbon sequestered during regrowth. Relying on this scientific premise, studies repeatedly show that combusting biomass for energy offers substantial GHG mitigation benefits

when compared to fossil fuel alternatives. Second, there is strong evidence that forests in the United States are currently being managed sustainably and will be for the foreseeable future. Thus, when forest carbon stocks are evaluated over appropriate time and spatial scales, there is ample support for the proposition that forests are capable of meeting increased demand without reducing overall forest carbon stocks.

It is well-established that all wood products—including biomass combusted for energy—are part of the natural forest carbon cycle. CO_2 is sequestered in forests through photosynthesis and emitted through decomposition and combustion. Thus, as long as forests across the landscape are managed sustainably and forest carbon stocks remain stable (or increase) over time, biomass energy and other parts of the forest products sector do not increase net atmospheric GHG concentrations. Active, sustainable management of forested lands provide a number of distinct climate change mitigation benefits which serve to reduce net GHG emissions over time: (1) durable forest products such as lumber used in construction continue to store carbon for decades after harvest, (2) manufacturing forest products is much less carbon intensive than alternative products such as concrete or steel, and (3) biomass used for energy can directly displace fossil fuel emissions over multiple harvest cycles.

Accounting for net CO2 emissions from biomass energy is scale-dependent, and much of the controversy surrounding biogenic CO2 emissions has arisen from studies relying on inappropriate spatial and time scales. This is particularly true for forest-based biomass, which is managed on longer rotation cycles. With respect to spatial scales, studies repeatedly demonstrate that a broad, landscape-based approach is necessary to account for the harvest and regrowth that happen simultaneously in different stands over time. Moreover, such an approach is consistent with the spatial scales over which working forests are managed. Likewise, accounting for net CO2 emissions from biomass requires a long time scale that captures the longer rotation lengths over which forests are managed. A longer time scale is also consistent with climate science because cumulative net emissions, not near-term annual emissions, will determine peak warming.

Stability in forest carbon stocks is an essential prerequisite for establishing that biogenic CO_2 emissions do not increase net atmospheric CO_2 concentrations. Thus, while some stand-based changes are inevitable, given urban development and other external pressures, it is essential to ensure that, at a broader landscape level, forest carbon stocks are not depleted as a result of biomass energy. Whether viewed nationally, or on a regional basis, studies consistently find that forest carbon stocks have remained stable—and in many cases increased significantly—over the past 60 years, and this stability has occurred despite significant increases in demand for forest products. Further, projections by the U.S. Forest Service and others suggest that this stability will continue for decades to come. The proper conclusion is that markets, whether for housing or for bioenergy, are not part of the problem but are in fact a large part of the solution for sustainable and healthy forests.

References:

- *Use of North American woody biomass in UK electricity generation: Assessment of high carbon biomass fuel sourcing scenarios*, Ricardo Energy and Environment, report for DECC
- *Response to Chatham House report 'Woody Biomass for Power and Heat: Impacts on the Global Climate'*, IEA Bioenergy

- *Press Release: Over 125 academics join IEA Bioenergy urging Chatham House to reconsider flawed policy recommendations*, IEA Bioenergy

- *Forest Carbon Accounting Considerations in US Bioenergy Policy*, Society of American Foresters, published in the Journal of Forestry
- *Science Fundamentals of Forest Biomass Carbon Accounting*, letter from the National Association of University Forest Resources Programs, signed by over 100 academics and researchers
- *Carbon savings with transatlantic trade in pellets: accounting for market driven effects*, Dr. Madhu Khanna, et al.
- *Sustainability guidelines and forest market response: an assessment of European Union pellet demand in the southeastern United States*, Christopher Galik (Professor at Duke University Nicholas Institute for Environmental Policy Solutions) and Robert Abt (Professor at NC State University College of Natural Resources)
- http://www.renewableenergyworld.com/articles/print/rewna/volume-3/issue-4/bioenergy/how-manomet-got-it-backwards-challenging-the-debt-then-dividend-axiom.html
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31. What are the risks, in terms of GHG emissions, associated with importing biomass or other biofuels from countries that have not committed to limiting or reducing emissions under the Kyoto Protocol or Paris Agreement? How can these risks be managed?

Pellets were exported from the United States long before the Paris Agreement was signed. The monitoring of US forests by the Forest Inventory and Analysis program of the US Department of Agriculture (USDA) has shown for decades that US forests are stable or increasing nationwide. Pellet exports have had no effect on this fact. The climate agreements have focused attention on this remarkable story, which we never tire of re-stating. However, the existence of international agreements and whether the U.S. participates in those agreements does not impact the management of American forests and the sustainable practices of American forest owners. USDA will continue to monitor forests and all federal and state laws governing forest management will remain in effect as will compliance with the certification standards. We see no risks of increasing GHG emissions from importing biomass from the U.S. The current U.S. Administration's views on whether to in international agreements addressing climate change has no impact on the scientific issues being addressed in this call for evidence.

References:

- *Forest Inventory and Analysis Program*, USDA Forest Service

32. What alternative method(s) for bioenergy emissions accounting should be considered? What would the implications of these alternative method(s) be?

The proper, scientifically recognized accounting methodology for bioenergy (biogenic) carbon emissions is based on the natural carbon cycle. As long as forests across the landscape are managed sustainably and forest carbon stocks remain stable (or increase) over time, biomass energy will not increase net atmospheric GHG concentration. And in any event, most feedstocks, including forest residues, thinnings and mill residuals, should be treated as carbon neutral in and of themselves.

Indicators

As part of the 2018 Bioenergy Review the CCC is planning to develop a set of indicators to track progress towards key bioenergy outcomes. We envisage these will cover key areas such as sustainability, policy development, supply and best-use.

33. What key areas should be reflected in these indicators?

Are forest stocks across the landscape, in our case the United States, stable or increasing?

34. Please provide details of any examples of international best-practice in the area of bioenergy indicators.

Pellets are imported from the sustainably managed forests of the United States of America. See answer to Question 8 and the references cited.

Other

35. Please submit any further evidence that you would like us to consider.