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Aviation Biofuel Sustainability Survey

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About NRDC

The Natural Resources Defense Council (NRDC) is an international nonprofit environmental organization with more than 1.3 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Livingston, and Beijing. Visit us at www.nrdc.org and follow us on Twitter @NRDC.

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EXECUTIVE SUMMARY

As the aviation industry makes carbon reduction and lessening dependence on fossil fuels key strategic priorities, certain airlines are entering the biofuel marketplace, working to source, develop, and invest in supplies. The Natural Resources Defense Council (NRDC) believes this is a significant step in the right direction, especially since the alternative—promoting heavy, synthetic fuels—would damage brand value and undermine corporate stewardship.

But the aviation industry has a responsibility to use biofuels that are certified as sustainable because the sector's massive purchasing power has the potential to reshape the supply chain. Poorly sourced biofuels—produced using the wrong feed stocks or employing damaging management practices—could drive deforestation, food insecurity, and carbon pollution, and thereby damage brand value. Sustainable aviation biofuels, on the other hand, could create wealth and jobs, help provide energy security, and reduce carbon pollution.

Fortunately, several airlines, manufacturers, consortia, and associations are genuinely thinking through the lifecycle sustainability of aviation biofuels. NRDC hopes these efforts continue. For now, however, it is important to evaluate biofuel sustainability as it is currently being implemented. Doing so will document the present state of adoption of these policies, and highlight progress if these ideas are placed into practice.

To assess the current state of aviation biofuel sustainability certification, and to support the use of certification in the aviation fuel supply chain, NRDC has generated its inaugural *Aviation Biofuel Sustainability Survey*. The survey provides analysis focused on airlines that have used, or are making public claims of plans to use, biofuels in their operations, and evaluates them on their actions in using and promoting sustainably produced biofuels in their sourcing activities.

NRDC asked 22 airlines to respond to our questionnaire, and received responses from 12. The results of the questionnaire are as follows:

- No airlines are direct members of the Roundtable on Sustainable Biofuels (RSB), though 11 of the 12 participate in the Sustainable Aviation Fuel Users Group (SAFUG), which is a member of the RSB.
- Only two airlines have committed to sourcing only RSB-certified biofuels.
- No airlines have committed to Bonsucro, the Roundtable on Responsible Soy (RTRS), or the Roundtable on Sustainable Palm Oil (RSPO) certification.
- One airline has committed to using other credible sustainability certification mechanisms in its biofuel sourcing, while two others have made vague commitments to using only certified biofuels.



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- Five airlines disclose (or will disclose¹) the total volumes of biofuels used, and four disclose the sustainable biofuels used.
- Five airlines reported that they used 100 percent sustainable biofuels (as a proportion of their total biofuel use) in 2011 and 2012 (even though they have not committed to doing so).²
- Seven airlines reported that they monitor the lifecycle greenhouse gas emissions of their biofuels; however, only four airlines disclose these numbers.
- Only two companies have reported that they assessed the potential indirect land use change (ILUC) risks associated with their biofuel supplies, but seven airlines are actively engaged in researching and working to avoid ILUC in general.

Recognizing the infancy of aviation biofuel development, and of aviation biofuel sourcing, we have elected to report results in this initial survey anonymously. As the marketplace develops, we intend to publish airline names and their progress toward sourcing certified sustainable biofuels.

Based on the responses received at this stage, the following findings and recommendations are featured in the report:

1. Five airlines sourced biofuels that were reviewed by an independent sustainability advisory board as RSB-compliant. While these airlines have generally been sourcing what they consider to be sustainable biofuels, they are not using certification to independently verify sustainability claims or committing to the future use of certification. **It is important that airlines send clear market signals now**, notifying current or potential suppliers of the importance of sustainability certification. Projects are now being designed, funded, and developed with aviation as a target end-user, and should have sustainability certification baked into their operations and the supply chain from the start. Failure to engage with suppliers today and send clear signals risks exposure for all parties in the future once these supplies begin to scale.
2. Airlines' commercial commitment to the RSB is minimal at this stage, even if their notional commitment to its research and certification efforts through SAFUG is widespread. Only two airlines have made firm commitments to use RSB certification in their sourcing efforts. If they are using biofuels, **airlines should make a public commitment to source 100 percent certified sustainable biofuel by 2015**, or as soon as they initiate biofuel purchases if this occurs later than 2015. Making this commitment would build on the airlines' positive work to date in studying and using sustainable biofuels. A robust requirement around certification is a necessary next step. The RSB certification standard is global, robust, and appropriate for aviation biofuels, and **we recommend the principle use of RSB certification in aviation biofuel sourcing**.

3. The majority of airlines surveyed were monitoring and researching the greenhouse gas lifecycle emissions of biofuels and ILUC, however, fewer than half of the airlines decided to publicly disclose the greenhouse gas performance, volumes, or sustainability of the biofuels they use. **We recommend total transparency in the volumes, greenhouse gas profile, and sustainability certification used in aviation biofuel sourcing.** Transparency serves the dual purpose of building confidence with important stakeholders and sending a clear and consistent message to potential suppliers in the marketplace who are watching to see if airlines are fully committed to sourcing certified biofuels. We were discouraged by the failure and refusal of some airlines to respond to this survey, and are concerned that, among the responding airlines, fewer than half had been transparent in their sourcing and development activities around aviation biofuels.
4. None of the airlines in our survey are current members of the RSB standard organization. **We strongly encourage all airlines intending to use biofuels to join the RSB and become directly engaged members.** Many airlines participate indirectly through industry associations such as SAFUG or the International Air Transport Association (IATA). As large-volume buyers with a direct stake in the quality and credibility of the sustainability standards applied to their fuel supply chains, their engagement will send important market signals that sustainability is critical and needs strong standards and verification.
5. **SAFUG and its member airlines should make a firm commitment to the use of the RSB or comparable certification standards.** SAFUG members have played a leadership role—and sent a positive market signal—by indicating their early support for the RSB; the value of their initial efforts has been critical for raising awareness and should not be minimized. However, the RSB is now operational, generating certifications, and winning important government recognition.³ It is important for SAFUG members to now take the next logical step and commit to using RSB sustainability certification for their procurement of biofuels if they are to prompt real market development, solidify their leadership position, and reap the benefits of their early commitments.

The *Aviation Biofuel Sustainability Survey* is the first step in what will be an ongoing effort, forming the basis for continuing measurement, monitoring, and communication on the use of both sustainable biofuels and sustainability certification by airlines.

SECTION I. AVIATION BIOFUEL SUSTAINABILITY CERTIFICATION SURVEY

BACKGROUND

In order for global average temperatures to remain within bounds that may avoid the dangerous impacts of climate change, global carbon dioxide emissions need to peak within the next decade, and decrease, at the very least, by 50 to 85 percent compared to year 2000 levels by mid-century.⁴ This means it will be critical to limit total cumulative greenhouse gas emissions in the next four decades. However, most of this “carbon budget” is already locked in by existing capital stock.⁵

Even though aviation accounts for a small percentage of total global emissions, it is important to limit emissions growth from aviation as the global carbon budget is extremely tight.⁶ Left unregulated, the International Civil Aviation Organization estimates that aviation’s fuel burn is predicted to triple by mid-2030 and quadruple by 2050 (see figure 1).

Fortunately, the market for aviation biofuel is rising and will continue to grow significantly in the next decade. Today, aviation biofuels are seen only in demonstration and small commercial applications, but airlines are becoming increasingly motivated to source and help encourage the development of alternative fuels as the increasing cost and price volatility of jet fuel represent severe economic challenges to their profitability and long-term viability.

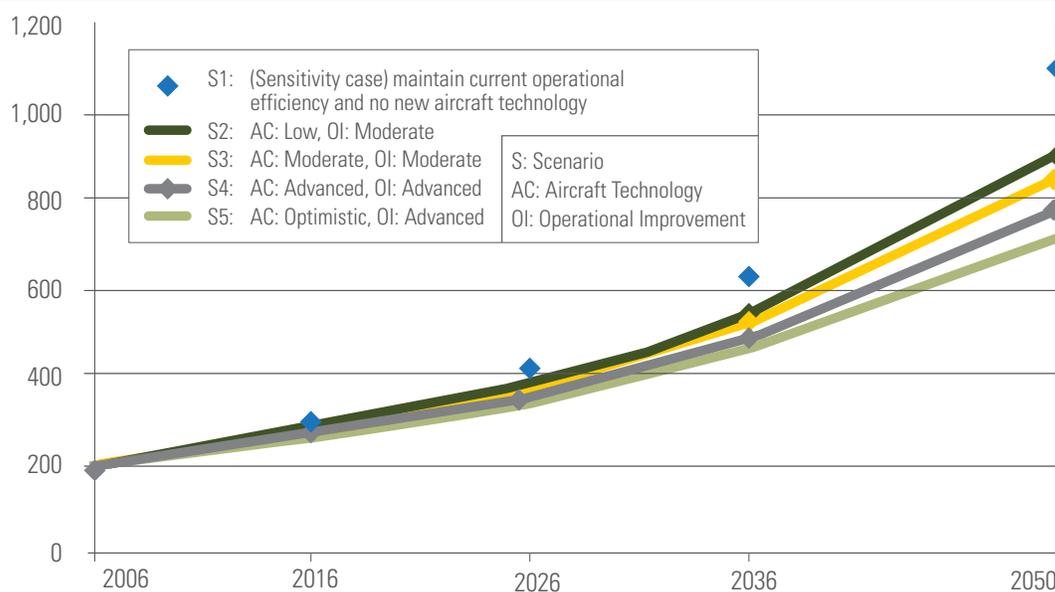
Federal government, too, is evolving as an active promoter and buyer of aviation biofuels. For example, the U.S. Department of Defense (DOD) is establishing interagency

biofuel partnerships with the U.S. Department of Energy and U.S. Department of Agriculture. The DOD has purchased large test volumes of aviation biofuels and has set ambitious goals for commercial procurement. The U.S. Air Force has also set a goal for procuring half of its U.S.-based jet fuel supply from bio-feedstocks by 2016, which will represent approximately 400 million gallons of aviation biofuel per year.⁷ The U.S. Navy has a goal of procuring 336 million gallons annually by 2020.⁸

More globally, the European Union (E.U.) has recently promoted a 600-million-gallons-per-year aviation biofuel target to be achieved by 2020. China has recently set a target of 7.5 billion gallons per year of aviation biofuel in their aviation sector by 2020, and the U.S. civil aviation sector and DOD have also set ambitious targets, as described earlier, including a 1-billion-gallon-per-year target by 2018 (see figure 2). (See appendix A for a list of some flight activities that have occurred over the last five years.) Even one-tenth of this projected growth would represent dramatic development for the aviation biofuels industry.

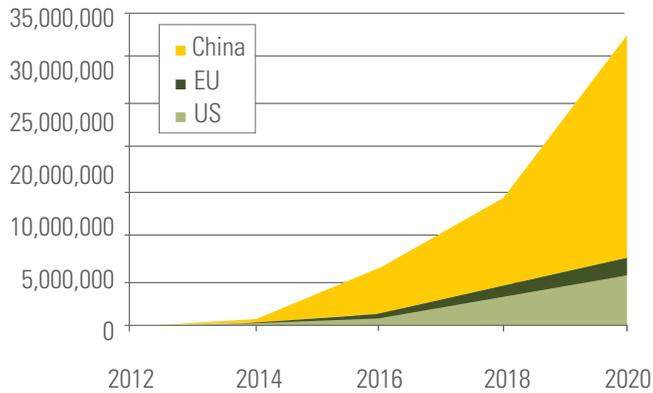
The trend toward inclusion of aviation in government carbon tax and carbon emissions trading programs is helping focus alternative aviation fuel efforts on biofuels. Aviation is now included in carbon emissions trading programs in Australia and New Zealand, the European Union Emissions Trading System (beginning in 2014), and the pilot emissions trading program in Shanghai. At the same time, a global carbon

Figure 1. Global Aircraft Fuel Burn (International and Domestic Traffic Combined)



Note: Results were modeled for 2006, 2016, 2026, and 2036, then extrapolated to 2050.
Modified from: International Civil Aviation Organization, ICAP Environmental Report 2010

Figure 2. Published Aviation Biofuel Targets (tonnes per annum)



Sources: Civil Aviation Administration of China; U.S. Department of Defense; U.S. Department of Agriculture; Airlines for America

reduction framework and market-based measure is being pursued by the International Civil Aviation Organization with greater urgency than in years past. The inclusion of airlines in these systems has been a significant driver of the airline industry's desire to develop biofuel. For example, the E.U. trading system counts biofuels as a zero emission source, so any use of biofuels would count towards an airline's compliance obligation.

Given the advances in technology and policy, and industry commitments to carbon neutral growth after 2020, NRDC believes that the sector's recent focus on sustainable aviation biofuels is a significant step in the right direction. Drop-in biofuels are an environmentally preferable option over competing alternatives such as unconventional fossil fuels like coal-to-liquids (CTL) and tar sands, which, without expensive controls, produce nearly double the carbon pollution as conventional fuel and are associated with significant negative environmental impacts.

In order for biofuels to deliver on their promise of sustainability, however, fuel suppliers and end-users must commit to robust sustainability standards in their biofuel sourcing. This will incentivize upstream biofuel operators to pursue compliance and certification under prevailing sustainability standards.

These market signals are critical in driving adoption through the supply chain. Biofuel operators are making long-term design, employment, and operational decisions to optimize production for the requirements of their marketplace, and many are now focusing on aviation as a key market. Sending a clear signal that production must be compatible with sustainability standards and independently audited and verified through credible certification programs will cause operators to proactively build this into their planning and operations.

NRDC'S AVIATION BIOFUELS SURVEY

Airlines are large fuel buyers and potential strategic partners of biofuel companies. Their purchasing power has a leveraged impact across the biofuel production landscape; these signals reach far upstream and across multiple operators. Where airlines are engaging more directly in the marketplace—through investments, partnerships, and other development activities—they have a direct role in the use of certification throughout the supply chains in which they are direct participants. Airline commitments to the use of sustainability certification are also critical for ensuring the ongoing viability and success of the certification systems themselves, which require broad adoption and recognition to be successful over the long term.

To assess the current state of aviation biofuel sustainability certification, and to support the use of certification in the aviation fuel supply chain, NRDC is publishing this initial *Aviation Biofuel Sustainability Survey*, the first step in what will be an ongoing effort; it forms the basis for continuing measurement, monitoring, and communication on this important topic.

This analysis focuses on airlines that have used, or are making public claims of plans to use, biofuels in their operations, and evaluates them in terms of their actions in using and promoting sustainably produced biofuels in their sourcing activities.

At this early stage of biofuel adoption, we are publishing results anonymously—individual airlines are not identified by name in the survey. The advanced biofuel marketplace is evolving rapidly, but faces many challenges; for aviation biofuels this is especially true. Accordingly, many airlines are beginning slowly and cautiously in determining their biofuel strategies. Similarly, the marketplace for sustainability certification is relatively young and rapidly evolving. By not identifying airlines in this first survey, we avoid specific and possibly premature critiques of airline activities while they work to form their strategies. Yet, there is an opportunity and need to spotlight the use of certification in this formative stage, so this survey examines airlines as a group and describes the activities of individual airlines without yet naming them. We report on their use of leading certification standards, participation in industry initiatives to promote sustainability certification, public commitments to sustainability in their sourcing, and the monitoring and disclosure of important sustainability metrics.

In order to encourage the use of certification and to highlight positive industry and company performance, as well as areas for improvement, we expect to build on this survey effort over time. This will include monitoring airlines against past claims and current performance, publishing a scorecard for each airline using biofuels, and ranking the relative performance of each airline with respect to their support and use of sustainability certification in their biofuel sourcing activities.

SURVEY CONTENT

NRDC's *Aviation Biofuel Sustainability Survey* addresses five key areas of airline activity related to the use and development of sustainably certified biofuels:

- 1. Airline membership in sustainability standards organizations or other relevant groups working to promote sustainability certification in aviation biofuel development:** Four multi-stakeholder standards organizations—the RSB, Bonsucro, RTRS, and RSPO—are given special consideration. These organizations cover biofuels derived from all feedstocks, sugar cane, soy, and palm oil, respectively. All are relevant to the aviation biofuel industry, and airline membership represents direct engagement in crafting sustainability standards and the certification systems for their application.

Membership in SAFUG and the Commercial Alternative Aviation Fuels Initiative (CAAFI) are also given consideration. These initiatives are working to support the development of aviation biofuels sustainability standards and risk mitigation recommendations. All SAFUG members, for example, have signed a pledge indicating support for the RSB and other standards engaged in the ISEAL best-practices approach.

- 2. Airlines' public commitments to the use of sustainability certification in biofuel sourcing:** Because all airlines in the study have already used or have made public commitments to use aviation biofuels, the survey honors airline commitments to the use of certification by 2015. RSB certification is given the most weight, due to its ISEAL membership, and also because it is most relevant to the aviation sector: it is global, covers all biofuel technologies and feedstocks, and is designed to benchmark to relevant national biofuel sustainability regulatory requirements. As a globally operating industry, we believe airlines should harmonize around the RSB. The other internationally recognized multi-stakeholder initiatives are given secondary consideration. Finally, other credible sustainability evaluation mechanisms are being pursued by several airlines; these are assigned value as well, but ranked lowest among the three options for reasons explained later in the report (see Biofuel Sustainability Certification on page 9).

- 3. Airline disclosures related to biofuel use, sustainable biofuel use, and the percentage of sustainable-certified biofuels they used relative to their total biofuel use:** Airlines are encouraged to disclose their use of biofuels and their use of sustainability certification. This is our most important metric for commitment to the use of certification, and accordingly this category is assigned more weight than all others in the survey. It is important to explain that commercial sourcing activity today has a higher impact in our evaluation than simple commitments to certification. This reflects our belief that

airlines sourcing biofuel today, and sustainable biofuel in particular, are having powerful and positive impacts in the development of sustainable aviation biofuels.

- 4. Airlines' monitoring and disclosures related to the lifecycle greenhouse gas emissions profile of the biofuels they source:** Airlines are encouraged to both monitor this information through credible means and to disclose it to the public.
- 5. Airline actions to determine the ILUC impacts of the biofuels they source, and to engage in efforts to better understand, manage, and avoid ILUC in biofuel production:** Airlines are encouraged to engage both internally and externally on this issue.



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SURVEY METHODOLOGY

We evaluated airline performance based on responses to questionnaires submitted to a complete list of airlines that had used biofuels, or made public commitments to use biofuels, as of January 2012. Of the airlines that responded, we consulted public data (including company website, regulatory filings, public statements, and other sources) to confirm or question the responses. Where necessary, we responded to airlines to seek clarification or correction. While we were diligent to verify the responses from airlines, we cannot warrant that all results in the final information scored were accurate.

The *Aviation Biofuel Sustainability Survey* is largely populated by verifiable data and publicly available information; however, the final evaluation is necessarily determined by unverified data provided by the company, such as total volume of biofuel use, and NRDC's assessment of a company's intentions and actions for sustainable biofuel.



SURVEY PARTICIPATION

Twenty-two airlines were identified and surveyed in this effort. Of these, 12 provided responses to our survey. The remaining airlines were unresponsive, and several declined to participate. Only airlines that provided responses were included in this effort. In the future, we will endeavor to evaluate, to the best of our ability, the performance of all airlines using or making commitments toward the future use of biofuels, and we will identify those that are unresponsive to the survey.

RESULTS

- No airlines are direct members of the RSB, though 11 of the 12 participate in SAFUG, which is a member of the RSB.
- Only two airlines have committed to sourcing only RSB-certified biofuels.
- No airlines have committed to Bonsucro, RTRS, or RSPO certification.
- One airline has committed to using other credible sustainability certification mechanisms in its biofuel sourcing, while two others have made vague commitments to using only certified biofuels.
- Five airlines disclose (or will disclose⁹) the total volumes of biofuels used, and four disclose the sustainable biofuels used.
- Five airlines reported that they used 100 percent sustainable biofuels (as a proportion of their total biofuel use) in 2011 and 2012 (even though they have not committed to doing so).¹⁰
- Seven airlines reported that they monitor the lifecycle greenhouse gas emissions of their biofuels; however, only four airlines disclose these numbers.
- Only two companies have reported that they assessed the potential ILUC risks associated with their biofuel supplies, but seven airlines are actively engaged in researching and working to avoid ILUC in general.

FINDINGS

- Airlines' commercial commitment to the RSB is minimal at this stage, even if their notional commitment to its research and certification efforts through SAFUG is widespread. Only two airlines have made firm commitments to the use of RSB certification in their sourcing efforts, and none in our survey are current members of the standard organization. Only one airline, which has not publicly committed to using biofuels and therefore was excluded from this survey, is a direct member of the RSB.
- Five airlines sourced biofuels from one aviation biofuel broker. These biofuels were verified by an independent sustainability advisory board as RSB-compliant, meeting the principles and criteria specified in the RSB standard. However, the fuels were not officially certified using the RSB certification system. It is unclear whether the broker or the airlines buying from them will require full RSB certification in future biofuel supplies.
- Five out of the six airlines that used biofuels in 2011 and 2012 used more than 75 percent sustainable biofuels. Only one airline did not consider sustainability. Overall, while airlines have generally been sourcing what they consider to be sustainable biofuels, they are not using certification to independently verify sustainability claims or committing to the future use of certification. It is critical that airlines take the next logical step and use certification so that their efforts to use sustainable biofuels can be verified and communicated to the public and the marketplace. Moreover, this will help to standardize the term "sustainability," putting all market participants on a level playing field.
- Fewer than half of the airlines decided to publicly disclose the greenhouse gas performance and sustainability of the biofuels they use. Given the sensitivities around the green house gas intensity and sustainability of both biofuels and aviation, we had anticipated that more airlines would be proactive in communications around these concerns.
- The majority of airlines scored were monitoring and researching the greenhouse gas lifecycle emissions of biofuels and ILUC.
- We were unable to compile a full picture of total volumes of biofuels used by airlines over the time period covered in this survey. Our background research indicates that a total volume of between 600,000 and 2 million gallons were used across the aviation industry. Of this, our survey and follow-up research indicate that fewer than 30,000 gallons were deemed sustainable. None of the leading certification systems were used for formal verification in these efforts, although they did reference the RSB principles and criteria.

SECTION II. AVIATION BIOFUEL SUSTAINABILITY CERTIFICATION OUTLOOK AND CONCERNS

Despite powerful drivers and significant targets for biofuel adoption, we recognize that a number of economic, political, and market challenges lie ahead. Financing and scaling biofuel production is a key challenge and many airlines are economically constrained in their ability to support and invest in biofuel supplies. The political and regulatory landscape is also uncertain. Nonetheless, the aviation biofuel market continues to progress quickly and promises to advance biofuel developments in general. Hence, the sustainability of this development is of critical importance.



Biofuels have tremendous potential to achieve the environmental, economic, and energy security goals upon which government support policies are predicated. They can convert waste streams into valuable resources and provide economically viable agriculture in regions and communities with otherwise marginal or degraded lands.

However, the rush to develop first-generation biofuels raises important questions about the long-term sustainability and environmental impacts of the biofuel industry. Concerns ranging from greenhouse gas emissions, land use change—

such as deforestation of native forests for new crop growth—and impacts on critical habitat and biodiversity, labor rights, water consumption, and food security have understandably eroded government and public support. Of these, direct land use change and indirect land use change are perhaps the most important factors influencing the environmental benefits, or harms, of biofuel production; they are also particularly complex, requiring the best available science to ensure they are accounted for adequately.

For example, Fritsche, Hennenberg, and Hünecke found that the lifecycle emissions reduction impacts of biofuels can vary by more than 200 percent depending on assumptions regarding direct and indirect land use change impacts from biofuels.¹¹ While there can be variability in these land use change emissions factors, they are important to include in policy in a scientifically supportable way, and this variability should not delay their adoption.

The greatest difficulty in developing a responsible biofuel industry lies in identifying which technologies and supply chains truly deliver on biofuels' promise of sustainability and in directing incentives and investments to these, while simultaneously discouraging the development of socially and environmentally detrimental fuels.

Until recently, the sustainability performance of fuel suppliers and major end-users in the biofuel supply chain has been difficult to determine. Only relatively small volumes of sustainably certified biofuels are commercially available, and the markets are relatively immature. In many cases it can be difficult to delineate between those suppliers and end-users that are focused on delivering and utilizing sustainable biofuels and those that are not. Also, few sustainability certification options have been available until recently, and there are differing regulatory and voluntary standards that operators have sought to navigate. It has been difficult to identify and compare the sustainability performance of biofuels sourced by major end-users on a company-by-company basis.

However, with the recent introduction of biofuel and biomass sustainability standards over the last two years, we can now illuminate the relative performance of major biofuel

suppliers and end-users using objective criteria and information.

In the hope of ensuring biofuels deliver on their promise of sustainability, the United States, European Union, and other governments are instituting sustainability standards and life cycle greenhouse gas reduction thresholds in their biofuel policies and carbon emissions regulations (see table 2). Many investors and biofuel developers are emphasizing sustainability and greenhouse gas reduction in their investment decisions. The E.U. Emissions Trading Scheme is a carbon cap and trade system that includes aviation as of 2012. Qualifying biofuels (RED-compliant) will not have emissions allowance obligations. There are discussions underway to differentiate among biofuels by their carbon intensity, and for the emissions allowance system to reflect these differences.

The success and growth of the biofuel industry will mainly rely upon confidence among the public, markets, and governments that biofuel production is sustainable. The science, policies, and market recognition of biofuel sustainability are already evolving and will continue to evolve. Working to clarify these issues for producers, downstream buyers, governments, and the public at large, a number of sustainability certification schemes launched their systems in 2011 and 2012. Biofuel operators and investors are now making operational and certification decisions with regulatory compliance, end-user requirements, and new market opportunities (e.g. aviation) in mind. Biofuel purchasers should be aware of these certifications and make efforts to manage risk through the adoption of certification in the procurement activities.

Table 1. Biofuel Sustainability Policies and Regulations

United States: The Renewable Fuel Standard mandates the use of biofuels—increasing from 9 billion gallons/year to 36 billion gallons/year by 2022—and establishes Renewable Identification Numbers (RINs) that are assigned to each gallon of biofuel according to technology/feedstock pathway and associated emissions reductions. The Renewable Fuel Standard requires that eligible biofuels demonstrate threshold greenhouse gas reductions, and offers several classes of qualified feedstocks, with criteria such as land use change. While the standard has not traditionally extended to jet fuel, it has driven considerable investment in second generation biofuel and thus remains relevant. In the near future, it is likely that the Renewable Fuel Standard will support biomass-derived jet fuel.

European Union: The E.U. Renewable Energy Directive (RED) establishes renewable energy mandates and tax credits available to eligible biofuels. Eligibility is contingent on criteria such as land use change and greenhouse gas reduction thresholds. The European Commission is weighing the use of ILUC emissions factors in greenhouse gas reduction calculations. The RED recognizes several certification systems, including the Roundtable on Sustainable Biofuels, whose certifications qualify the related biofuel as RED-compliant.

BIOFUEL SUSTAINABILITY CERTIFICATION

The premier biofuel sustainability certification option is the Roundtable on Sustainable Biofuels (RSB): <http://rsb.org/>. The RSB is an international, multi-stakeholder standard organization that has developed a feedstock-and technology-neutral global standard for biofuel sustainability, covering all aspects of the supply chain. It is the only fully qualified biofuels standard of the ISEAL Alliance, an international organization that helps to ensure best practices in standards organizations and certifications systems.

Other emerging multi-stakeholder, feedstock specific international standards include: Bonsucro, an international sugar cane supply chain sustainability standard, and an associate ISEAL member: <http://www.bonsucro.com/>; the Roundtable on Sustainable Palm Oil (RSPO): <http://www.rspo.org/>; and the Roundtable on Responsible Soy (RTRS): <http://www.responsiblesoy.org/>.

Airlines have generally directed their engagement in standards development through participation in industry organizations working on this topic. The two primary bodies are the Sustainable Aviation Fuel Users Group (SAFUG): www.safug.org; and the Commercial Alternative Aviation Fuel Initiative (CAAFI): www.caafi.org. Through SAFUG, there have been a number of important efforts to create regional roadmaps for aviation biofuel commercialization, and in some cases, collaborative organizations have been formed among airlines, local biofuel developers, policy makers, non-government organizations, and other stakeholders to study and promote regional development of aviation biofuels (for example, Sustainable Aviation Fuels Northwest, and Midwest Aviation Sustainable Biofuels Initiative). These have been proven to be critical initiatives for communicating the importance of sustainability and connecting market participants across the supply chain.

Airlines also address sustainability verification and certification in other ways, such as through the formation of independent sustainability advisory boards that evaluate the sustainability performance of the biofuels they source. However, while these alternative methods can prove useful, this runs counter to important goals for transparency, harmonization, and clarity around sustainability evaluation, certification, and communication—and instead risks fragmentation and confusion.



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CONCLUSION AND RECOMMENDATIONS

The aviation biofuel industry is only just emerging, but the pace of activity toward commercialization is accelerating. Now is a critical time to examine development and sourcing activities and to help create a central role for sustainable practices and sustainability certification in the development of the industry. This will benefit all stakeholders, helping to ensure that biofuels deliver on their promise to become a viable, sustainable, and acceptable aviation fuel solution long-term.



Toward this end, we strongly recommend the following actions based on the findings of this survey:

- 1. It is important that airlines send clear market signals now**, notifying current or potential suppliers of the importance of sustainability certification. Projects are now being designed, funded, and developed with aviation as a target end-user, and these should have sustainability certification baked into their operations and the supply chain from the start. Failure to engage today and send clear signals risks exposure for all parties in the future once these supplies begin to scale.
- 2. If they are using biofuels, airlines should make a public commitment to source 100 percent certified sustainable biofuel by 2015**, or as soon as they initiate biofuel purchases if this occurs later than 2015. This would build on their positive work to date in studying and using sustainable biofuels. A robust requirement around certification is a necessary next step. The RSB certification standard is global, robust, and appropriate for aviation biofuels, and **we recommend the principle use of RSB certification in aviation biofuel sourcing.**
- 3. We recommend total transparency in the volumes, greenhouse gas profile, and sustainable certification used in aviation biofuel sourcing.** Transparency serves the dual purpose of building confidence with important stakeholders and sending a clear and consistent message to potential suppliers in the marketplace who are watching to see if airlines are fully committed to sourcing certified biofuels. We were discouraged by the failure and refusal of some airlines to respond to this survey questionnaire, and concerned that, among the responding airlines, fewer than half had been transparent in their sourcing and development activities around aviation biofuels.
- 4. Airlines intending to use biofuels should join the RSB and become directly engaged members.** Many airlines participate indirectly through industry associations such as SAFUG or the International Air Transport Association. As large volume buyers with a direct stake in the quality and credibility of the sustainability standards applied to their fuel supply chains, they should be more directly engaged.
- 5. SAFUG and its member airlines should make a firm commitment to the use of the RSB.** SAFUG members have played a leadership role—and sent a positive market signal—by indicating their early support for the RSB; the value of their initial efforts has been critical for raising awareness and should not be minimized, however, the RSB is now operational, generating certifications and winning important government recognition.¹² It is important for SAFUG members to now take the next logical step and commit to using RSB sustainability certification for their procurement of biofuels if they are to prompt real market development, solidify their leadership position, and reap the benefits of their early commitments.

APPENDIX A.

AIRLINE PROJECTS AND PROCUREMENT ACTIVITIES

AIRLINE	ACTIVITY
Lufthansa	Daily flights for 6 months in 2011, Airbus A321, between Hamburg & Frankfurt with a 50% share of biofuels (plant oils and animal tallow) on one engine. Multiple Letters of Intent (LOIs) for biofuel supply and investment
Air New Zealand	Test flight, January 2009; Jatropha biofuel
Virgin Atlantic	Test flight, February 2008; coconut and babassu biofuel blend Memorandum of Understanding (MOU) with biofuel supplier
Virgin Australia	MOU with biofuel supplier
Aeromexico	Trans-oceanic commercial flight, June 2011; Jatropha biofuel
KLM	Commercial biofuel flights between Amsterdam and Paris; used cooking-oil biofuel Formed JV with Spring Associates and North Sea group called SkyNRG in an attempt to source and market aviation biofuels for KLM and other customers
Japan airlines	Test flight, February 2009; Jatropha, camelina, and algae biofuel blend
Qatar Airways	Gas-to-liquids alternative fuel use Launched Qatar Advanced Biofuel platform in 2009 – a collaboration to develop a portfolio of biofuel activities
British Airways	Joint venture with biofuel supplier
Air China	Test flight, November 2011; Jatropha biofuel
United	Multiple LOIs for biofuel supply Commercial offtake agreement with one supplier
Thomson Airways	Commercial biofuel flights on “green route”; used cooking-oil biofuel
Qantas	Multiple LOIs for biofuel supply; undertaking Australian aviation biofuel commercialization study
American Airlines	Multiple LOIs for biofuel supply
Alaskan Airlines	Commercial flights with biofuels; used cooking-oil and tallow blend Multiple LOIs for biofuel supply
FedEx	Multiple LOIs for biofuel supply; use of biofuels in ground operations
Jet Blue	LOI for biofuel supply
Southwest	Multiple LOIs for biofuel supply
US Airways	Multiple LOIs for biofuel supply
Finnair	Commercial biofuel trial flights; used cooking-oil biofuel
Etihad	Collaborative project to develop feedstock for biofuel
TAM Airlines	Test flight, November 2010; Jatropha biofuel Joint venture for biofuel development
National Research Council Canada	100% biofuel flight; 10/29/2012

APPENDIX B.

AIRLINE QUESTIONNAIRE

Please fill out the questionnaire below completely and accurately. We request that you return this questionnaire by May 16, 2012.

MEMBERSHIP

- Is the airline a member of any of the following: Roundtable on Sustainable Biofuels, Bonsucro, Roundtable on Responsible Soy, or the Roundtable on Sustainable Palm Oil?
- Is the airline a member of the Sustainable Aviation Fuel Users Group?
- Is the airline a member of the Commercial Alternative Aviation Fuel Initiative?
- Is the airline a member of any other consortia or organizations working to support alternative fuel development or sustainability certification? If so, please specify.

PUBLIC COMMITMENTS

- Has the airline made commitments to use sustainably certified biofuels?
 - By when?
 - Using which certification systems, or other sustainability verification mechanisms?
 - If other, please explain in detail.
 - What percentage of the airline's biofuel use has it publicly committed to be sustainably sourced?

BIOFUEL VOLUMES

- Does the airline publicly disclose the total volume of biofuels it uses in a year?
 - In what format(s) or media are these figures disclosed?
- Does the airline publicly disclose whether, and using what certifications/other mechanisms, the biofuels it sources are sustainable?
 - In what format(s) or media are these figures disclosed?
- How much biofuel was sourced by the airline in the last year, and how much of that biofuel was verified sustainable according to the above certifications/verification mechanisms?

GREENHOUSE GAS ASSESSMENTS

- Does the airline monitor the full life-cycle greenhouse gas emissions of its biofuels?
 - How are these measured, or what procedures are used to validate a third-party measurement?
 - Are these figures disclosed publicly?
 - In what format(s) or media are the figures disclosed?

LAND USE

- Has the airline assessed the potential indirect land use change impacts of its biofuel use?
 - If yes, how so?
- Is the airline developing measures to evaluate and avoid indirect land use change?

Endnotes

- 1 Several airlines have disclosure obligations under the Carbon Disclosure Project, and other initiatives in which they have credibly committed to disclosing details of their biofuel sourcing.
- 2 See finding number 2.
- 3 The RSB is recognized by the E.U. under the Renewable Energy Directive, and New South Wales, Australia.
- 4 This corresponds to a concentration of CO₂-e of 445 to 490 ppm in the atmosphere, which we know to be a weak target already. See Intergovernmental Panel on Climate Change; Climate Change 2007, Synthesis Report, Summary for Policy Makers. Current consensus points to a level of 350ppm as a safer threshold.
- 5 International Energy Agency, World Energy Outlook 2012.
- 6 According to the Air Transport Action group, the global aviation industry produces around 2 percent of all human-induced carbon dioxide emissions, which corresponds to 12 percent of emissions from all transport sources. See: <http://www.atag.org/facts-and-figures.html>.
- 7 <http://www.e2.org/ext/doc/E2MilitaryBiofuelSynopsis.pdf>
- 8 Ibid.
- 9 Several airlines have disclosure obligations under the Carbon Disclosure Project, and other initiatives in which they have credibly committed to disclosing details of their biofuel sourcing.
- 10 See finding number 2.
- 11 Fritsche, U., Hennenberg, K., Hünecke, K. (2010). *The "ILUC Factor" as a Means to Hedge Risks of GHG Emissions from Indirect Land Use Change*, Oeko-Institute, Darmstadt, Germany.
- 12 The RSB is recognized by the European Union under the Renewable Energy Directive, and New South Wales, Australia.



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