



工 作 文 件

航空与代用燃料会议

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议程项目3：挑战与政策制定

可持续航空燃料政策制定中的挑战和机会

(由国际民航组织秘书处提交)

摘要

可持续航空燃料(SAFs)的开发、生产和部署存在若干挑战。本文件对运用政策措施克服这些挑战的办法提出了建议，并介绍了发展可持续航空燃料工业可以为可持续发展所有支柱领域带来的益处和机会，这与联合国可持续发展目标相吻合。

会议的行动在第6段。

1. 引言

1.1 本文件阐述了可持续航空燃料(SAFs)政策制定过程中面临的几个主要挑战，并强调了与可持续航空燃料的开发、生产和部署相关的潜在机会和益处。我们可能需要新政策来支持新的可持续航空燃料工业的发展，从而对众多联合国可持续发展目标(SDGs)做出贡献。开发、生产和使用可持续航空燃料的益处远不止是立竿见影地减少国际航空对全球气候的影响，还能够为促进经济发展、扩大就业、加强基础设施和减少各国经济不平等提供机会。

1.2 与此类似，在为支持可持续航空燃料工业制定政策时，联合国可持续发展目标提供了有用的框架。可持续发展目标框架能够鼓励各国采用协调统一的规章条例、为伙伴关系的发展创造条件、并促进采取行动分享信息，以扩展相关的经济和社会益处。新的可持续航空燃料生产供应链的发展为制定相关政策提供了机会，以促进包容和平等的教育和培训，满足劳动力需求，并将提供机会，促进涵盖所有人的社会、经济和政治发展，无论年龄、性别、残障、种族、民族、出身、宗教或经济或其它状态如何。从头创建一个新工业是满足积极和多样化经济、社会和环境目标以及扩大清洁能源发展的不可多得的机会。

2. 可持续航空燃料政策制定方面的挑战

2.1 新兴可持续航空燃料工业面临的大挑战是能源价格波动带来的高风险(实际的和认为的)，这能够造成价格冲击。我们需要足够的政策来缩小可持续航空燃料和传统航空燃料之间的生产成本差距，降低可持续航空燃料投资风险、并整合可持续航空燃料供应链涉及的所有利害攸关方的工作。

2.2 CAAF/2-IP/04 介绍了目前促进代用燃料生产的国家政策、目标和任务。它强调，大多数政策侧重于地面交通运输，可持续航空燃料的政策寥寥无几。其中一个可能的原因是，与本地控制程度更高的地面交通运输相比，由于航空的国际化性质，其政策改革和目标的设计和和实施面临众多挑战。

2.3 与地面交通运输的代用燃料相比，可持续航空燃料缺乏激励措施，导致市场扭曲，例如，本应用于可持续航空燃料的可持续燃料生产被转而用于有激励措施可用的可再生柴油。这在美国和欧盟尤其可能发生¹。为了发展一个能够满足国际民航组织及其成员国宏伟目标的可自立的可持续航空燃料工业，可持续航空燃料应当能够与其它交通运输燃料平等竞争，这一点至关重要。

2.4 从研发新燃料和生产工艺，到原料开发、燃料生产设施、配送网络，再到最终消费，为可持续航空燃料的开发和生产制定一个一体化政策是很复杂的，因为它涉及不同领域的众多利害攸关方(例如原料和燃料生产者、国家内部和国家之间的政府机构、航空公司、认证机构、机场等)。国家和地区框架下可持续航空燃料政策和可持续性的标准各不相同，这会阻碍、限制或扭曲那些希望将可持续航空燃料出口到不同市场的生产者之间的竞争。可持续航空燃料工业依赖于不断降低的代用燃料成本并结合不断提高的传统燃料价格，才能克服成本桎梏²。

2.5 在可预见的未来，商业航空没有可以替代液体燃料的能源可用，而地面交通运输可以依赖其它的能源例如电能来降低其对传统燃料的依赖性，并减少其碳排放。因此，在航空领域优先使用可持续航空燃料或者至少保障航空与其它交通运输领域公平竞争，是减少整个交通运输部门碳排放的好办法。

3. 可能的可持续航空燃料政策

鉴于国际航空的性质，可持续航空燃料政策必须基于对本地、区域和全球影响的全面评估。为了成功地刺激可持续航空燃料的部署，利害攸关方需要降低可持续航空燃料投资方面的风险。可以采用多种政策战略来解决技术和市场风险的问题，有些政策战略可以在 CAAF/2-IP/04 中找到。例如，需要支持原料生产研发、可持续航空燃料生产所用的工艺技术以及能增加可持续航空燃料部署的政策，以加快和推进供应链的发展。表 1 列出了一些可持续航空燃料政策行动、借助这些行动可以克服的挑战以及相关的主要利害攸关方。

¹ 美国能源部，《代用航空燃料：挑战、机会和后续步骤》，2017年，http://energy.gov/sites/prod/files/2017/03/f34/alternative_aviation_fuels_report.pdf

² 《国际可持续交通杂志》9:542-550，2013年，P.Gegg, L.Budd和S.Ison。

表 1. 政策行动、相关风险和利害攸关方示例

可能的政策行动	应对的挑战	主要利害攸关方
补助或税收减免	原料研发和工艺流程开发	联邦能源和研究机构、大学
贷款保障	与投资相关的风险	联邦能源、农业和国防机构
生产设施补助	资本获取	联邦机构、可持续航空燃料生产者
补贴	传统航空燃料和可持续航空燃料之间的成本差距。 促进市场发展。	农民、可持续航空燃料生产者
激励措施	传统航空燃料和可持续航空燃料之间的成本差距。 促进市场发展	农民、可持续航空燃料生产者
燃料混合要求	促进市场发展	航空公司、可持续航空燃料生产者

4. 发展可持续航空燃料工业的积极影响

4.1 联合国可持续发展目标 (SDGs) 为在三个维度—经济、社会和环境—上以平衡和一体化的方式支持可持续发展提供了框架。在制定政策以激励、支持和鼓励可持续航空燃料的研究、发展、生产和部署的同时反映可持续发展目标的具体目标和指标将能确保从这一新的工业中获取最大的益处和优势。

4.2 假以时日，当可持续航空燃料和其它交通运输燃料的价格对等时，各国将获得更加可负担、可靠、可持续和现代化的燃料，使其整个经济受益。这样，可持续航空燃料不仅将对各国的环保工作做出贡献，而且将对其经济发展做出贡献。

4.3 在国内生产能源将产生经济效益，并可能在目前仅有进口的领域提供能源出口的机会。发展可持续航空燃料工业将在若干年中为建筑行业创造就业，而可持续航空燃料工业将带来长期的永久性就业。例如，英国交通部 (DfT) 承诺投资 2 200 万英镑，建设五个利用基于废物的原料的新代用燃料工厂³。英国航空公司⁴承诺使用可持续航空燃料，预计到 2050 年，其二氧化碳减排将达到 24%。他们预计英国经济增加值总额在 2030 年将高达 2.65 亿英镑，出口价值将达到 2.2 亿英镑。2030 年之前预计建设的 12 个英国可持续燃料生产设施可以带来 3 400 个直接工作岗位，并通过使用可持续航空燃料代替传统航空燃料，将在全球出口中另外增加 1000 个工作岗位。

5. 对可持续发展目标做出贡献的机会

5.1 在制定政策以确保可持续航空燃料可以与传统航空燃料相竞争的时候，抓住可能实现的相关益处十分重要。特别是，可持续航空燃料的进一步开发和部署能够对联合国 13 项可持续发展目标做出贡献(参见附录)。例如，确保可持续航空燃料可以与其它交通运输燃料相竞争可以为减少国家内部和国家之间的不平等(可持续发展目标 10) 提供机会。使用可持续航空燃料本身就能应

³ http://biofuels-news.com/display_news/12812/uk_promotes_advanced_biofuelpowered_planes/

⁴ <http://airlinesuk.org/wp-content/uploads/2017/01/Airlines-UK-Responding-to-the-Carbon-Challenge.pdf>

对气候变化(可持续发展目标 13)以及本地空气质量的影响,对健康生活以及促进各年龄段人群的福祉(可持续发展目标 3)做出贡献。同时,可持续的工业化能够鼓励建造具备抵御灾害能力的基础设施并促进推动创新(可持续发展目标 9)。规划完善的可持续航空燃料原料开发可以保护、恢复和促进可持续利用陆地生态系统、可持续管理森林、防止荒漠化、制止和扭转土地退化和遏制生物多样性的丧失(可持续发展目标 15)。鼓励性别平等和增强所有妇女和儿童权能(可持续发展目标 5)的政策可以随时调整成为一个建构完善的可持续航空燃料政策的一部分。同样,培训劳动力以支持一个新的可持续航空燃料工业能够创造机会,确保包容和公平的优质教育(可持续发展目标 4)。一个不断成长和强大的可持续航空燃料工业能够帮助促进持久包容的经济增长、促进充分的生产性就业和人人获得体面工作(可持续发展目标 8)。

5.2 因此,通过建设一个新的可持续航空燃料工业,各国可以实现经济、社会和环境优势,为联合国可持续发展目标中制定的远大和变革性愿景做出贡献。鉴于可持续航空燃料工业仍在起步阶段,这些优势需要得到推广和展示,以将可持续航空燃料工业的益处扩展到更多的国家中。

6. 第二次航空与代用燃料会议的行动

6.1 请第二次航空与代用燃料会议:

- a) 认识到,与地面交通代用燃料拥有若干政策相比,可持续航空燃料的部署政策寥寥无几;
 - b) 确认需要在航空领域优先使用可持续航空燃料,或者至少确保航空与其它交通运输部门能够平等竞争;
 - c) 鼓励各国实施全面政策,以激励可持续航空燃料的研究、开发、生产和部署;
 - d) 鼓励各国实施充足政策,以缩小可持续航空燃料和传统航空燃料之间的成本差距,降低可持续航空燃料投资风险,并整合可持续航空燃料供应链涉及的所有利害攸关方的工作;
 - e) 确认需要在航空代用燃料涉及的不同层面的各个利害攸关方之间进行政策接轨,以避免不一致的政策;和
 - f) 鼓励各国推广和展示可持续航空燃料工业发展可能带来的并对 13 项联合国可持续发展目标(SDGs)做出贡献的经济、社会和环境优势。
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APPENDIX

SAF CONTRIBUTION TO UN SDGS

SDG 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture – To increase productivity and production of SAF feedstock, resilient agricultural practices will have to be implemented, while considering maintaining ecosystems, strengthening capacity for adaption to climate change, extreme weather, drought, flooding, and other disasters, and progressively improving land and soil quality. Transferring these practices to food production, in particular in developing and least developed States, could help end hunger and malnutrition whilst ensuring that SAF production avoids competition with food production.

SDG 3 – Ensure healthy lives and promote well-being for all at all ages – Using SAF could result in reduced emissions of particulate matter and sulphur oxides, thereby reducing aviation’s impact on local air quality (LAQ)⁵. Further research is ongoing to quantify the impact of SAF on LAQ.

SDG 4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all – Access to affordable and quality technical, vocational, and tertiary education, including university, can increase the number of youths and adults who have relevant skills for employment and entrepreneurship as needed to develop a local SAF supply. SAF creates a new industry with needs for new technical skills. ICAO has been convening hands-on training Seminars and Symposia for Member States focused on the exchange of latest knowledge on environmental subjects, as well as assisting States to implement environment-related ICAO policies, Standards and Recommended Practices (SARPs) and guidance, providing inclusive and equitable quality education to all. In addition, webinars and web courses are made available free of charge on the ICAO Website.

SDG 5 - Achieve gender equality and empower all women and girls – A sound policy framework along the SAF supply chain at a national, regional, and global level could help to ensure full and effective participation of women and equal opportunities for leadership at all levels of decision-making in political, economic, and public functions in this new industry.

SDG 7 – Ensure access to affordable, reliable, sustainable and modern energy for all – This is the SDG mostly closely related to SAF, since it is inherently a new source of clean energy for aviation, and its deployment will be a key element for reducing aviation’s dependence on fossil fuels, contributing to the diversity of energy sources for aviation and reducing the risks associated with a single energy source.

SDG 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all – All steps are being taken to make the SAF industry sustainable since its onset, helping to decouple economic growth from environmental degradation. Especially on Small Island Developing States with heavy international tourist aviation traffic, a local supply of SAF could reduce high CAF importation costs. Additionally, the SAF supply chain can present broad positive social and economic effects in a variety of ICAO Member states, contributing to promote the sustained, inclusive and sustainable economic growth expected by SDG8.

SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation – Research and development for developing new types of alternative fuel has grown significantly during the last 10 to 20 years as a result of the use of mandates, tax breaks, subsidies, and

⁵ CAAF/09-WP/05

advantageous funding arrangements between alternative fuel producers and national governments.⁶ Thus, investing in more research on SAF diversity, scaling-up of development, and deployment will contribute to SDG 9 by promoting inclusive and sustainable industrialization and fostering innovation.

SDG 10 – Reduce inequality within and among countries – In the spirit of the ICAO “No Country Left Behind” campaign, ICAO will continue to facilitate communication of initiatives and promotion of the development of partnerships between ICAO Member States, including the sharing of information and best practices related to the development of supply chains for SAFs, aiming at spreading the economic and social benefits associated with this new industry development to an increasing number of ICAO Member States. Additionally, it shall be noted that developing countries are taking the lead on several SAF deployment initiatives, which confirms the potential contribution of the SAF development to this SDG.

SDG 11 - Sustainable cities and communities – Improvements in LAQ from SAF use and the sustainable production of SAF also contribute to SDG 11, helping to make cities and human settlements inclusive, safe, resilient and sustainable.

SDG 12 – Ensure sustainable consumption and production patterns –Sustainability criteria required for SAF production will assure its contribution to SDG 12, which focuses on ensuring sustainable consumption and production patterns, such as an environmentally sound management of wastes throughout their life cycle to reduce their release to air, water, and soil. Further, SAF might enable a substantial reduction in waste generation by for example using municipal solid waste as feedstock. Sustainability certification of SAF might also encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

SDG 13 – Take urgent action to combat climate change and its impacts – Production and deployment of SAFs is inherently a strategy to reduce global greenhouse gas emissions due to their reduced emissions on a life cycle basis when compared with CAF, as was acknowledged during CAAF/1⁷. This action is in line with SDG 13, which appeals to States to take urgent action to combat climate change and its impacts.

SDG 15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss – Sustainability criteria for SAF will consider land-use change effects that may be associated with SAF production. This will contribute to a sustainable use of terrestrial ecosystems, such as forests. For example, the production of SAF from forestry residues can be an essential component of sustainable forest management.

SDG 17 – Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development – SDG 17 is in line with SDG 10, which calls for a reduction in inequality within and among countries. In the spirit of the ICAO “No Country Left Behind” campaign, ICAO will continue to facilitate communication of initiatives and promotion of the development of partnerships between ICAO Member States, including the sharing of information and best practices related to the development of supply chains for SAFs, aiming at spreading the economic and social benefits associated with this new industry development to an increasing number of ICAO Member States. The Global Framework for Aviation Alternative Fuels (GFAAF) is a good example of ICAO action in contributing to this SDG.

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⁶ Panoutsou et al., 2013

⁷ CAAF/09-WP/3