ICAO INS13801

ICAO Alternative Fuels Task Force AFTF

Work update

Program Penurunan Emisi pada Perhubungan Udara melalui ICAO Carbon Offseting andReduction Scheme fr International Aviation (CORSIA) dan Aviation Biofuels

Jakarta 5 April 2017

MRV of Sustainable Alternative Fuels

- Paragraph 6 of the Resolution A39-3 requests the Council to develop a methodology to ensure that an aircraft operator's offsetting requirements under the scheme can be reduced through the use of sustainable alternative fuels

- For MRV purposes, the sustainable alternative fuel needs to:
  - Meet requirements defined in sustainability criteria; and
  - Have a default emission value for each feedstock/production pathway
- Tracking the quantity of alternative fuel, based on fuel purchase records
  - Typically, aviation fuels are blended in fuel distribution infrastructure → it is not feasible to determine the alternative fuel content of fuel at the point of uptake to an aircraft
  - Work in CAEP is on-going to finalize the recommendations on how to best track the fuel purchase records from the fuel producer to the aircraft operator

ICAO Alternative Fuels Task Force (AFTF) current work for CORSIA

- AFTF agreed this approach to estimate the Sustainable Alternative Fuels (SAF) use in CORSIA:

2.4.1 An aircraft operator's offsetting requirements under CORSIA in a given year can be reduced through the use of sustainable alternative fuels:

- that meet sustainability requirement defined in X {AFTF Task S.06 on Sustainability Criteria} and
- have an emissions factor that is defined in Y {AFTF Tasks S.01 and S.02 for ILUC and Core Default LCA Values},
- according to Z {Formula from Appendix C of CAEP/10-IP/12}.

ICAO Alternative Fuels Task Force (AFTF) current work for CORSIA

- ✓ Calculation of default **Life-Cycle-Assessment (LCA) CO2 emissions** values of different feedstock-to-jet-fuel pathways that could be used by operators to report their emissions reductions from the use of SAFs (land use change emissions being excluded).

- ✓ Calculation of default computations of **Induced Land Use Change** (ILUC=dLUC+iLUC) emissions from alternative fuels for all world regions, for use to report alternative fuels emissions in the CORSIA.

- ✓ Definition of **Sustainability requirements** of SAF's

LCA work

Appendix A: List of first priority feedstock-to-fuel pathways for the development of core LCA default values

Conversion	Feedstock	Analysis Lead
Fischer-Tropsch (F-T) Synthesis	Agricultural residues	ANL
	Forestry residues	ANL
	Short-rotation woody biomass	ANL
	Herbaceous energy crops	ANL
	MSW	ANL
Hydroprocessed Esters and Fatty Acids (HEFA)	Tallow	JRC
	UCO	JRC
	Corn oil	ANL
	Canola / Rapeseed	JRC
	Soybean	JRC
	Palm oil	JRC
	Camelina	JRC
	Palm fatty acid distillate	Allocation pending data screening
	Jatropha	JRC
	Tall oil	Allocation pending data screening
Synthesized Iso Paraffins (SIP)	Sugarbeet	MIT (or U Toronto)*
	Sugarcane	MIT (or U Toronto)*
Alcohol-to-Jet (ATJ) (via isobutanol)	Sugarcane	MIT
	Corn grain	MIT
	Herbaceous energy crops	MIT
	Agricultural residues	MIT
	Forestry residues	MIT

* Pending agreements regarding data sharing.

Nomenclature

ANL: Argonne National Laboratory,
JRC: EU Joint Research Center,

MIT: Massachusetts Institute of Technology,

U Toronto: University of Toronto.

LCA work

- The different modelling experts in LCA-Task Group will work on calculating **core LCA values** for the feedstock to fuel pathways in Appendix A. Approach and results will be checked within the task group.

- Between AFTF/3 (Feb-2017) and AFTF/4 (June-2017) the modelling experts will continue their analyses of the different pathways.

- At AFTF/4 (June-2017), modelling progress and preliminary values to date will be presented and discussed.

- AFTF will be asked to agree to preliminary default core LCA values.

ILUC Work

- The **Induced Land Use Change (ILUC)** emissions from alternative fuels for varied world regions, will be combined with the “core" lifecycle (LCA) emissions that extend from feedstock production to the tank of the aircraft.

- Per agreement AFTF is currently using the **Global Trade Analysis Project (GTAP) model**, supported by 28 organizations around the world. The GTAP model and data bases are publically available.

- The AFTF also agreed to run in parallel the IIASA GLOBIOM model as a possible additional source of data to be considered.

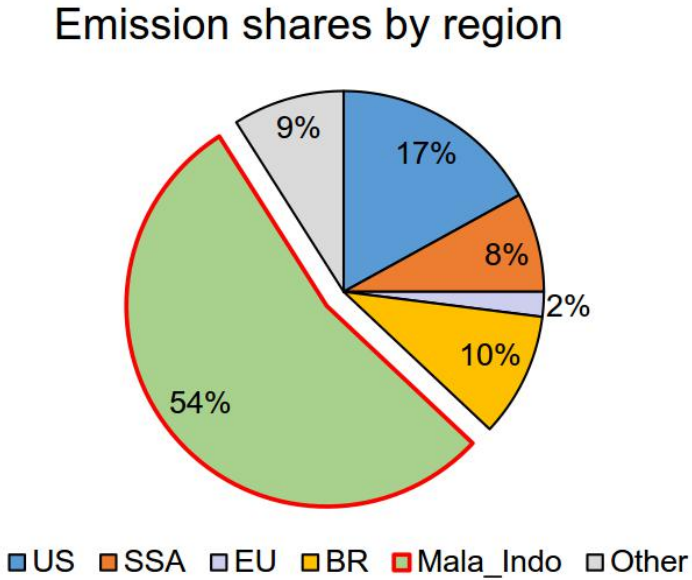
ILUC Work
Regions and Biofuel Pathways

Table 1: The regions and biofuel pathways to be tested

Region	Conventional biofuel	Advanced biofuel for ground	Aviation biofuel
USA	Corn ethanol	Cellulosic ethanol	Soy HEFA/CH jet
	Soy biodiesel / renewable diesel		Cellulosic F-T jet
EU	Rapeseed biodiesel	Cellulosic gasoline & renewable diesel	Rapeseed HEFA/CH jet
	Wheat / sugarcane ethanol		
Brazil	Sugarcane ethanol	Bagasse cellulosic ethanol	Soy HEFA/CH jet
	Soy biodiesel		
Malaysia & Indonesia	Palm oil biodiesel	Palm oil renewable diesel	Palm oil HEFA/CH jet

ILUC Work

- Conducting the four regional simulations will allow AFTF to determine the extent of regional differences in the resulting ILUC values.
- Initial results:



- The emissions excluded Biomass carbon.
  - Mala/Indo share will decrease if including since palm tree biomass carbon is high.
- For vegetable oil pathways, most emissions will be from Mala/Indo peat land drainage.

ILUC Work

- Preliminary test simulation results sowed different results from the GTAP-BIO model and the GLOBIOM model.
- Also preliminary modelling were done with data from 2004 and is proposed to be reviewed with data from 2011, offering much higher values for vegetal oil crops due to substitution in global vegetable oil markets.

Region	Pathway	Scenario	Shock (BGGE)	30-Yr Emissions (g CO2e MJ-1)	
				Old emissions	New emissions
USA	Soybean oil jet	IEA	2.76	**12.7**	**22.6**
Brazil	Soybean oil jet	IEA	3.68	**13.8**	**21.5**
EU	Rapeseed oil jet	IEA	3.22	**13.3**	**18.8**
USA	Soybean oil jet	FPA	5.16	**16.4**	**27.0**
Brazil	Soybeen oil jet	FPA	6.88	**15.5**	**22.5**
EU	Rapeseed oil jet	FPA	6.02	**16.2**	**22.1**
Mala/Indo	Palm oil jet	FPA	0.91	**20.9**	**58.0**

Sustainability Work

Theme	Principle	Criteria
Theme 1 Greenhouse Gases (GHG)	Principle: Sustainable alternative jet fuel should generate lower carbon emissions than conventional kerosene on a life cycle basis	Criterion 1: Sustainable alternative jet fuel shall achieve net greenhouse gas emissions reductions {of at least x % compared to fossil jet fuel} on a life-cycle basis as captured in Section 3.3 of Annex 16 Volume IV and its associated guidance.
Theme 2 Carbon stock	Principle: Sustainable alternative jet fuel should not be made from biomass obtained from land with high carbon stock.	Criterion 1: Sustainable alternative jet fuel shall not be made from biomass obtained from land converted after {ADD DATE – 2005, 2008, 2011} that was high carbon stock land such as primary forests, wetlands, or peat lands and/or contributes to degradation of the carbon stock in primary forests, wetlands, or peat lands.
		Criterion 2: In the event of recent {replace this with an actual year – we will use the same date as in criterion 1} land use conversion, as defined based on IPCC land categories, the operator shall calculate direct land use change emissions and, if direct land use change emissions exceed the default ILUC value, the DLUC value shall replace the default ILUC for that operator.
Theme 3 Water	Principle: Production of sustainable alternative jet fuel should maintain or enhance water quality and availability.	Criterion 1: Operational practices shall be implemented to maintain or enhance water quality.
		Criterion 2: Operational practices shall be implemented to use water efficiently and to avoid the depletion of surface or groundwater resources beyond replenishment capacities.
Theme 4 Soil	Principle: Production of sustainable alternative jet fuels should maintain or enhance soil health.	Criterion 1: Operational practices for crop production or residue collection shall be implemented to maintain or enhance soil health, such as physical, chemical and biological conditions.
Theme 5 Air	Principle: Production of sustainable alternative jet fuel should mitigate negative effects on air quality.	Criterion 1: Open-air burning as part of land clearance or harvesting should be avoided and where possible be eliminated.
		Criterion 2: Air pollution emissions shall be limited.
Theme 6 Conservation	Principle: Production of sustainable alternative jet fuel should maintain or enhance biodiversity, conservation and ecosystem services.	Criterion 1: Sustainable alternative jet fuel shall not be made from biomass obtained from protected zones and land with high biodiversity value unless evidence is provided that shows the activity does not interfere with the protection purposes
		Criterion 2: Operational practices shall be implemented to maintain or enhance biodiversity, {conservation value} {protected areas}, and ecosystem services within the area of {operation} {feedstock sourcing and fuel production} and minimize the risk of a damaging spread of cultivated non-native species and modified microorganisms outside the area of operation. (conservation may be removed , but if included it must be defined. The same statement is true for the term protected areas)
		Criterion 3: Sustainable Alternative Jet Fuel shall not be made from biomass obtained from {recently converted land} {land converted prior to XXXX} with prior conservation value.

AFTF agreed to use as approach to assess sustainability:

"***alternative fuel sustainability certification, including acceptance of certification under one or several existing (regulatory or voluntary) sustainability standards***";

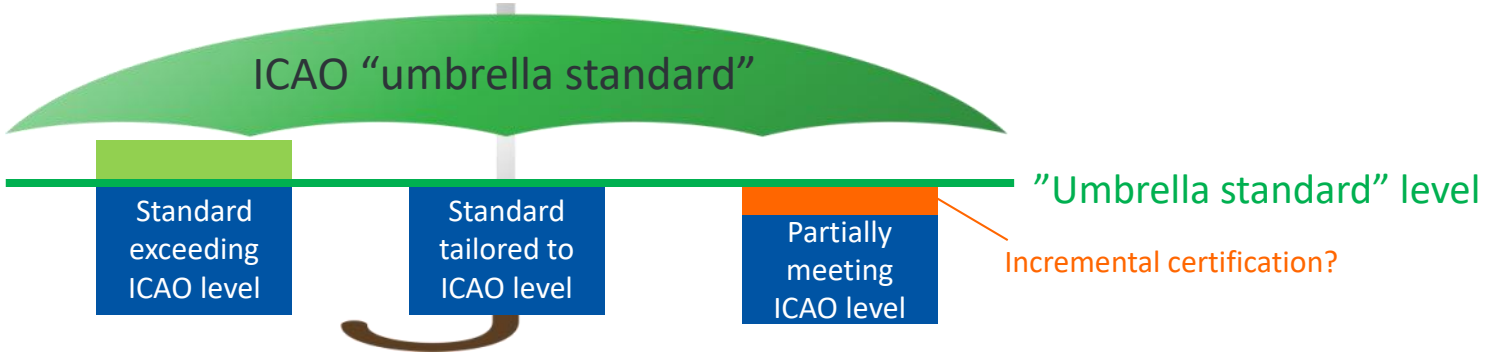
Sustainability Work

Theme 7 Waste and Chemicals	Principle: Production of sustainable alternative jet fuel should promote responsible management of waste and use of chemicals.	Criterion 1: Operational practices shall be implemented to ensure that waste arising from production processes as well as chemicals used are stored, handled and disposed of responsibly to safeguard the environment and to mitigate the risk to people.
		Criterion 2: {Promote} operational practices {shall aim to minimize} {shall be implemented to minimize} {responsible use} the use of {most harmful} {harmful} plant protection products such as pesticides {and phase out the use of the most harmful pesticides}.
Theme 8 Legality	Principle: Production of sustainable alternative jet fuel should comply with laws, regulations and international treaties that are applicable.	Sustainable alternative jet fuel production shall comply with all applicable laws, regulations and international laws and agreements
Theme 9 Human and labor rights	Principle: Production of sustainable alternative jet fuel should respect human and labor rights.	Sustainable alternative jet fuel production shall respect human and labour rights.
Theme 10 Land use rights and land use	Principle: Production of sustainable alternative jet fuel should respect land rights and land use rights including indigenous and/or customary rights.	Sustainable alternative jet fuel production shall respect existing land rights and land use rights including indigenous peoples' rights, {both formal and informal} {and ensure that free, prior and informed consent takes place}.
Theme 11 Water use rights	Principle: Production of sustainable alternative jet fuel should respect prior formal or customary water use rights.	Sustainable alternative jet fuel production shall respect the existing water rights of local and indigenous communities.
Theme 12 Local and social development	Principle: Production of sustainable alternative jet fuel should contribute to social and economic development in regions of poverty.	Sustainable alternative jet fuel production shall, in regions of poverty, improve the socioeconomic conditions of the communities affected by the operation.
Theme 13 Food security	Principle: Production of sustainable alternative jet fuel should promote food security in food insecure regions.	Sustainable alternative jet fuel producers in food insecure regions shall assess risks to food security in the region and locally.
		Sustainable alternative jet fuel production shall, in food insecure regions, enhance the local food security of directly affected stakeholders.

Next steps: Add the next level(s) of detail

Compliance mechanisms

- Rely on existing (regulatory or voluntary) sustainability standards as long as
  - their scope matches with the sustainability criteria that will be agreed upon within ICAO
  - their effectiveness has been demonstrated, including how the standards are implemented, verified and monitored

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