

International And National Climate Change Related To Aviation Activities In Indonesia

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Abstract: *This article purported to explore international and national climate change related to aviation in Indonesia. It consist of four chapters name chapter one regarding general review such as contribution of aviation to CO₂, climate change impacts on aviation, consequences of overall temperature rise, risk of air transport resulting from sea-level rise, aviation hazard in the context of climate change; chapter two regarding global climate change related to aviation; chapter three regarding legal ground such such as Indonesian Constitution of 1945, Act No. 6 Year 1994, Act No. 23 Year 1997, Act No. 17 Year 2004, Act No. 1 Year 2009, Act No. 32 Year 2009 and Presidential Regulation No. 46 Year 2008; chapter four regarding national climate change related to aviation such as the impact of global warming, action taken to reduce global climate change, climate change (forest fires) related to aviation activities and action to reduce climate change such as policy approach, socialization and coordination of a national action plan, eco friendly airport, alternative fuel for aircraft operation, sustainable air transport and aviation alternative fuels, emission trading scheme, establishment of national committee on climate change and aviation biofuels and renewable energy at the airport.*

Keywords: *Climate change, forest fires, alternative fuel and emission trading scheme*

Date of Submission: 16-11-2017

Date of acceptance: 28-11-2017

I. INTRODUCTION

According to the country's National Disaster Mitigation Agency (BNPB), there are five provinces in Indonesia on emergency alert for the spread of forest fires in peat-lands, namely Riau province, West and South Kalimantan. According to Sutopo Purwo Nugroho, BNPB's spokesman, the status will help the local governments to fight forest fires and the decision was taken after several regencies and districts in the provinces had earlier declared an emergency alert status. In Riau province had declared herself to be on emergency alert as far back as January to tackle any potential forest fires that could get out of control when the weather gets drier.⁴

According to the World Bank (WB) the environmental crisis destroyed 2.6 million hectares of peat-lands and estimated that it had caused US\$16 billion in economic losses. In this connection, the government of the Republic of Indonesia (ROI) had pledged to avoid a repeat of that disaster and has put in place mechanisms and processes to combat forest fires and trans-boundary haze. Indonesian President Joko Widodo (Jokowi) had called for preventive measures, tougher law enforcement, more community involvement and better governance of private land and concessions. According to Maliki Osman, Singapore's Senior Minister of State for Foreign Affairs (SMOSFA), efforts to manage and prevent forest fires that have been done by the Riau provincial

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⁴ Saifulbahri Ismail @ SaifulCNA., *Asia Pacific : 5 Indonesian provinces on emergency alert for forest fires amid dry season.* 27 July 2017.

government have been very impressive. It is worthwhile to note here that over the past week, police in Palembang, South Sumatra have arrested two peoples for allegedly clearing land by burning, taking into account that two peoples violate the regulations.⁵

In this connection, air transport has an impact on the environment. This impact takes several forms, including the disturbance caused by aircraft noise, aircraft emissions. A major concern for the industry is greenhouse gas (GHG) emissions from aviation and their implication for climate change. In this regard, according to the United Nations Intergovernmental Panel on Climate Change (IPCC), aviation produces around 2% of the world's manmade emissions of carbon dioxide (CO₂). Despite growth in passenger numbers at an average of 5% each year, aviation has managed to decouple its emissions growth to around 3%. This is through massive investment in new technology and coordinated action to implement new operating procedures.⁶

As aviation grows to meet increasing demand, the IPCC forecasts that its share of global manmade CO₂ emissions will increase to around 3% in 2050, however, a growing carbon footprint is unacceptable for any industry which is why the aviation industry, from manufacturers to airports, airlines, air traffic management, are all working hard to limit GHG. The largest contributor to human-induced CO₂ is power generation (24%), mostly produced in coal and gas fired stations. Next is land use change at 18%, then agriculture, industry and transport at 14% each (aviation is part of transport). Buildings (8%), other energy related activities (5%) and waste (3%) make up the rest.⁷ This article purported to explore the international and national climate change related to aviation activities in Indonesia as follows.

II. RESEACH METHOD

This research uses the normative juridical type with normative legal research methods, including reviewing and analyzing the legal material and legal issues related to the aviation. In this research, the result will be achieved in the form of prescriptions about what have to be done to resolve the issue. The sources of legal materials used in this research consist of 1st, 2nd and 3rd law material. The 1st law materials which are authoritative legal materials, meaning that such legal materials have the authority, namely legislation, official records. Such legislations used as the 1st legal materials are regulated by Indonesian Constitution of 1945, Act No. 6 Year 1994,⁸ Act No. 23 Year 1997,⁹ Act No. 17 Year 2004, Act No. 32 Year 2009,¹⁰ and Presidential Regulation No. 46 Year 2008,¹¹ Chicago Convention of 1944,¹² Act No. 1 Year 2009,¹³ including its implementation regulations, whilst the 2nd law materials are over all publications regarding the law and regulation which are not official documents but related to the subject matter. Such publication concerning the law and regulations includes text books, theses, law dissertation. The 3rd law materials used in the research are legal dictionaries, comments on the court decision, also the opinions of legal experts published via journals, magazines or others.¹⁴

⁵.Ibid.

⁶<https://aviationbenefits.org/environmental-efficiency/aviation-and-climate-change/>

⁷.Ibid.

⁸ Act Concerning *Ratification of United Nations Framework Convention on Climate Change* (Act No.6 Year 1994). State Gazette of the Republic of Indonesia No.42 Year 1994, Supplement State Gazette of the Republic of Indonesia No.3557 .

⁹ Act Concerning *Environmental Management* (Act No.23 Year 1997. State Gazette of the Republic of Indonesia No.68 Year 1997, Supplement State Gazette of the Republic of Indonesia No. 3699 (19 September 1997).

¹⁰.Act Concerning *Protection and Management of Environment*, (Act No.32 Year 2009), State Gazette of the Republic of Indonesia No.140 Year 2009 (3 October 2009).

¹¹.Presidential Regulation *Concerning National Council for Climate Change*, (Pres.Reg.No.46 Year 2008) [4 July 2008] .

¹² ICAO Doc.7300/6 *concerning Convention on International Civil Aviation*, signed at Chicago on 7 December 1944.

¹³.Act Concerning *Civil Avition*, Act No.1 Year 2009, State Gazette of the Republic of Indonesia, No.1 Year 2009, Supplement State Gazette No. 4956.

¹⁴ .Ahmad Sudiro and Martono K., *The Development of Civil Aviation Laws and Regulations Applicable in Indonesia*. Vol. 5(12) www.ijmi.org 46 (December 2016).

III. DISCUSSION AND RESULT

Chapter One

General Reviews

This chapter provides contribution of aviation to CO₂, climate change impacts on aviation, consequences of overall temperature rise, risk of air transport resulting from sea-level rise, aviation hazard in the context of climate change as follows.

1. Contribution of Aviation to CO₂.

Aviation is responsible for 2% of manmade CO₂ emissions worldwide, CO₂ is not the only GHG emitted by aircraft, however 91.5% and 92.5% of aircraft engine exhaust is normal atmospheric oxygen and nitrogen. The exhaust from aircraft engines is made up of: 7% to 8% CO₂ and water vapor; around 0.03% nitrogen oxides, unburned hydrocarbons, carbon monoxide and sulfur oxides; traces of hydroxyl family and nitrogen compounds and small amounts of soot particles.¹⁵

The water vapor trails created by aircraft also have an impact, but research is inconclusive about whether these have a net warming or cooling effect on the earth. Under some meteorological conditions they can remain in the atmosphere and form ‘cirrus clouds’, which may have an effect on climate change. For example, some research suggests these clouds may have different cooling and warming effects, depending on whether flights are during the day or night. This type of research can identify if there are any potential benefits in altering operational behavior. More work is being done in this area and the aviation industry is assisting with research into the effects of contrails on climate change, including putting high-altitude atmospheric testing equipment on some passenger aircraft.¹⁶

There are many references to aviation having a greater effect than other industries because of the height at which the emissions are released. The most significant GHG, CO₂, do not have any additional impact due to difference in altitude, the impact is the same. However, other emissions such as NO_x and water vapor can have more of an effect at higher altitudes. This greater effect is expressed by scientists as a multiplier. Recent research suggests that aviation CO₂ emissions should be multiplied by 1.9 times to take account of the added impact of these other gasses at altitude. However, it is important to realize that most other emitters also release non-CO₂ gasses and require a multiplier to determine their overall climate change impact. The background rate for road transport, for example, is 1.5 times its CO₂ emissions.

When these non-CO₂ emissions and the multiplier are taken into account, the IPCC estimates aviation accounts for about 3% of total manmade climate impact. However, using a radiative forcing multiplier whilst calculating the emissions of individual flights is considered inappropriate by a number of experts as it is a tool used to describe longer-term impacts. On top of this, other sectors generally do not have non-CO₂ impacts added when using carbon calculators.¹⁷

Looking to the future, the industry is taking many measures to mitigate its climate change impact and the IPCC estimates that aviation’s total contribution, including CO₂ and other effects, would likely rise to 5% (with a worst-case scenario of 15% of human emissions) by 2050. However, it is important to note that the proportional impact of aviation will also depend on the success of other sectors to regulate their emissions.¹⁸

2. Climate Change Impacts on Aviation

Aviation stake-holder effort to operate under changing climate condition. Such effort to reduce fuel burn and thus CO₂ emissions in aviation have been very impressive. Operational measures in line with new air traffic management systems (ATMS), as well as technological concepts, all have the potential to continue reducing these CO₂ emissions. At its July 2014 session, CAeM, which was partly held in conjunction with the Meteorology Divisional Meeting of the International Civil Aviation Organization (ICAO), decided to establish an expert team to tackle some of the challenges that the aviation industry is facing related to atmospheric science and climate.¹⁹

¹⁵<https://aviationbenefits.org/environmental-efficiency/aviation-and-climate-change/>

¹⁶ *Ibid.*

¹⁷ *Ibid.*

¹⁸ *Ibid.*

¹⁹ WMO Secretariat., Climate change impacts on aviation: An interview with Herbert Puempel;
<https://public.wmo.int/en/resources/bulletin/climate-change-impacts-aviation-interview-herbert-puempel>

The ICAO Global Air Navigation Plan and Aviation System Block Upgrades provided a 15 year forward vision of the global ATMS aimed at helping the industry cope with the pressing challenges of growth and related environmental effects. The meteorological and climatologic research communities can support this vision by providing their best possible estimates of potential climate change impacts. This information would enable aviation stakeholders to make informed decisions. While ICAO addresses relevant mitigation measures to reduce emissions by the sector, WMO will support the long-term adaptation strategies of aviation stakeholders.²⁰

Since 2000, Herbert Puempel, the Chairperson of the CAeM Expert Team on Science, Aviation and Climate, has been the WMO representative on the ICAO Committee on Aviation Environmental Protection (CAEP). According to Herbert Puempel, the potential impact of climate change on aviation operations have been instrumental in raising aviation stakeholders' interest in the related risks for the air transport sector. In this connection, a perspective of what flying through changed atmospheric conditions could look like in the near future.²¹

On the Fourth (2007) and Fifth (2014) Assessment Reports of the IPCC discuss the climate change impact on aviation. The aim of discussion was to the consequential rise in sea level due to the increasing melting of ice caps and glaciers and thermal expansion of the oceans, is fairly well understood and documented. In regions with strong monsoons, tropical storms, sea-level rise and storm surges linked to more intense extratropical cyclones will threaten the viability of airports at coastal locations unless protective measures are taken. These effects are likely to be exacerbated in those regions by very intense precipitation linked to the storms. The intense precipitation can lead to flooding where rainfall runoff hits storm tides head-on, for example, the extreme floods that occurred in Myanmar during Tropical Storm Nargis. Effective planning of new airports in such regions requires hydrological, climatologic and technical expertise,²² identify impacts on aviation as a significant part of the transport sector. But there was a need to go beyond the interpretation of the "general" results of the two Assessment Reports, and look for specific scientific and user issues to be addressed in dedicated studies. Such studies are being carried out by several authors and we can now distinguish the impacts that will be caused by large-scale phenomena as well as small- to micro-scale effects.²³

3. Consequences of Overall Temperature Rise

The consequences of the large-scale phenomena related to overall temperature rise is, expected higher temperature maxima, coupled in some regions to higher values of specific humidity could have severe consequences on take-off performance at airports at high-altitudes or with short runways, limiting payload or fuel uptake. These effects will require more detailed analyses for different regions, but will be a major concern for elevated airports in subtropical regions. The established method of scheduling long-haul departures for the cooler evening and night hours in some regions such as the Middle East, Central and Southern American high-altitude airports will be further affected by reduced overnight cooling where high cloud cover, partially caused by long-lived contrails, is often present. In these cases, the warming effect of contrail-related cirrus clouds, which reduce radiative cooling at night, may have to be considered as an additional problem. This would reduce the already limited hours of operation even further in some regions.²⁴

4. The Risk of Air Transport Resulting From Sea-Level Rise

The consequential rise in sea level due to the increasing melting of ice caps and glaciers and thermal expansion of the oceans, is fairly well understood and documented. In regions with strong monsoons, tropical storms, sea-level rise and storm surges linked to more intense extratropical cyclones will threaten the viability of airports at coastal locations unless protective measures are taken. These effects are likely to be exacerbated in those regions by very intense precipitation linked to the storms. The intense precipitation can lead to flooding where rainfall runoff hits storm tides head-on, for example, the extreme floods that occurred in Myanmar during

²⁰.*Ibid.*

²¹.*Ibid.*

²².*Ibid.*

²³.*Ibid.*

²⁴.*Ibid.*

Tropical Storm Nargis. Effective planning of new airports in such regions requires hydrological, climatologic and technical expertise.²⁵

5. Aviation Hazard in the Context of Climate Change

Airframe icing is traditionally seen as a problem for general aviation and, more specifically, for commuter aviation where there is limited engine power and rudimentary anti-icing devices. It nevertheless needs to be better understood in order to predict future scenarios. The presence of large supercooled droplets at a temperature range between -4 and -14 °C depends on a number of conditions. These include the availability of large amounts of water vapor, typically meso-scale bands of intense updrafts and a limited concentration of suitable aerosols acting as condensation nuclei, favoring the formation of large supercooled droplets. The general warming trend and increase of moisture in some latitude bands, with a more active dynamic of the flow, all point to an increased chance of occurrences of conditions favorable to icing. They also lead to an upward extension of the upper limit of icing layers due to the higher temperatures.

High-altitude icing is caused by ingestion of a high density of cycles at very low temperatures (below -50 °C) in the vicinity of convective cloud tops with ice contents in excess of 5 g/m³ of air. It is likely to increase with more intense cumulonimbus clouds and a rise of the tropopause due to the higher temperature and moisture of tropical air masses. The most energy-efficient modern (lean-burn) aviation engines appear to be more susceptible to these events than older, robust but thirstier turbines.²⁶

The likely increase in the occurrence and intensity of sand- and dust-storms, caused by longer drought periods and potentially stronger winds in subtropical latitudes, will require a thorough analysis of the impacts on safety and regularity of flights. There is emerging evidence that the drive to higher engine efficiency has pushed the operating temperatures in the combustion chambers of the most modern engines towards temperatures in excess of 1600 °C. At these temperatures, the silicates contained in typical sand- and dust-storms when sucked into the engine would melt and, thus, in a way similar to the volcanic ash, affect the performance and maintenance requirements.²⁷

Chapter Two

Global Climate Change Related to Aviation

This chapter provides aircraft noise, traffic congestion and air pollution; increases global surface temperature; increase surface air temperatures; increase infectious diseases; environmental refugees and tourism; local impact of aircraft emissions; air travelers; the role of tax to reduce GHG, etc as follows.

1. Aircraft noise, traffic congestion and air pollution.

People living near airports have long suffered from aircraft noise, traffic congestion and air pollution. Communities around airports have been concerned about these issues for years. However new evidence shows that air travel is contributing towards growth + CO₂ emissions. Air travel is the world's fastest growing source of GHG like carbon dioxide, which cause climate change. Globally the world's 16,000 commercial jet aircraft generate more than 600 million tons of CO₂, the world's major GHG, per year. Aviation generates nearly as much CO₂ annually as that from all human activities in Africa. Since 1960, the huge increase in aircraft pollution is largely due to the rapid growth in air traffic which has been expanding at nearly two and half times average economic growth rates. It is expected the number of people flying will virtually double over the next 15 years. This means increasing airport capacity, more flights, pollution and increasingly crowded airspace.²⁸

2. Increase Global Surface Temperatures

Some of the gases in our atmosphere such as CO₂, trap heat from the sun reflecting off the earth's surface, keeping the earth warm. This is the natural greenhouse effect. However human activities such as the burning of fossil fuels are increasing the concentrations of these gases in the atmosphere. These additional gases

²⁵.*Ibid.*

²⁶.*Ibid.*

²⁷.*Ibid.*

²⁸.www.aef.org.uk Friends of the Earth 26-28 Underwood St LONDON N1 7JQ Tel: 020 7490 1555 Fax: 020 7490 0881 web: www.foe.co.uk email: info@foe.co

are enhancing the greenhouse effect which is known as global warming. The effect of global warming is to increase global surface temperatures and ultimately cause climate change.²⁹

3. Increase Surface Air Temperatures

The several major GHG such as carbon dioxide, methane, nitrous oxides & water vapor is predicted to increase surface air temperatures are likely to rise between 1°C to 3.5°C over the next century. This rate of warming is likely to be greater than at any time in the last 10,000 years. Although the effects will vary from place to place there is expected to be an increase in the number of very hot days and a decrease in the number of very cold days. More extreme weather events. Global warming is likely to lead to more natural disasters such as hurricanes, droughts and floods. The number of major natural disasters has increased threefold since the sixties.³⁰

4. Increase Infectious Diseases

In addition, the likely increase in warmer and wetter weather could enable infectious diseases such as malaria and yellow fever to spread to new areas. Malaria has already resurfaced in Spain and doctors in the south of England have been warned by the Department of Health (DoH) to look out for malaria cases from local mosquitoes. Malaria is now the biggest killer of humans on the planet disappearing countries. Global warming is expected to lead to a rise in sea levels of between 15 and 95 cm over the next century. Many islands and low lying coastal areas will be affected by rising sea levels and some island nations could disappear altogether.³¹

5. Environmental Refugees and Tourism

Global warming could lead to the displacement of millions of people. Rising sea levels, floods and drought could make former land inhabitable. Changing weather patterns could effect food crops and accelerate water shortages. According to a Red Cross (RC) report in 1999 for the first time environmental refugees out of numbered those displaced by war. Effect on tourism - Ironically one of the industry most at risk from climate change is tourism. Many tourist's destinations depend on the natural environment for their appeal to tourists. A recent study commissioned by World Wide Fund for Nature (WWF) found many popular British tourist destinations would be threatened as a result of global warming. Low lying island nations like the Maldives could be submerged by rising sea levels. Popular tourist destinations such as Greece and Turkey could become unbearable as average summer temperatures rise. Popular skiing destinations like Austria and Scotland could suffer from a shortage of snow.³²

6. Local Impact of Aircraft Emissions

Aircraft emissions can also have a significant effect at ground level. Air and ground traffic at major airports can lead to pollution levels as high as city center. A recent study of Gatwick airport predicts that NOx emissions from cars could decrease by 75% by 2000 due largely to cleaner vehicles, but aircraft emissions of NOx are expected to double by 2008. As a result the National Air Quality (NAQ) standards for NO₂ may be exceeded in nearby towns. It is important that adequate air quality monitoring is carried out at major airports to ensure NAQ standards are achieved.³³

A report undertaken for the Health Council of the Netherlands (HCON) reveals airports have a negative impact on public health. The Health Council (HC) has called for public health impact assessments of airports that would assess the cumulative way people are exposed to hazards including air pollution, noise and safety from airport operations. Need for an environmentally sustainable airports policy "...an unquestioning attitude toward future growth in air travel, and an acceptance that the projected demand for additional facilities and service must be met, are incompatible with the aims of sustainable development.

The IPCC, published a detailed study of the impact of aircraft pollution on our atmosphere. The report's findings support the following:

- (a) Aircraft release more than 600 million tons of the world's major greenhouse gas CO₂ into the atmosphere each year;
- (b) Aircraft cause about 3.5% of global warming from all human activities;

²⁹.Ibid.

³⁰.Ibid.

³¹.Ibid

³².Ibid.

³³.Ibid.

- (c) Aircraft greenhouse emissions will continue to rise and could contribute up to 15% of global warming from all human activities within 50 years;
- (d) Nitrogen oxides(NOx) and water vapor have a more significant effect on the climate when emitted at altitude than at ground level. Hence any strategy to reduce aircraft emissions will need to consider other greenhouse gases and not just CO2 alone;
- (e) An increase in supersonic aircraft flying could further damage the ozone layer as aircraft emissions of NOx deplete ozone concentrations at high altitudes, where these aircraft would typically fly;
- (f) Aircraft vapor trails or contrails, often visible from the ground, can lead to the formation of cirrus clouds. Both contrails and cirrus clouds warm the earth's surface magnifying the global warming effect of aviation.

7. Air Travelers

The impacts on the global atmosphere from air travel will be concentrated over Europe and the USA where 70-80% of all flights occur. Hence the regional climatic impacts of aircraft emissions over these areas are likely to be greater than predicted by the IPCC. Most significantly the climate scientists concluded that improvements in aircraft, engine technology and in air traffic management will not offset the projected growth in aircraft emissions. For that reason, need to slow the growth in air travel to reduce the growth in aircraft greenhouse gas emissions.

The policy of airport, does not enough to focused largely on airport capacity and ignoring the impact of air travel. It would consider the environmental and social impacts of flying, especially regarding slowing the growth in air travel to reduce the growth in aircraft green-house gas emission. It is vital that the new airport policy specifically address how harmful green-house gasses from aircraft will be reduced and that adequate resources are put into encouraging alternatives to flying such as high speed rail.³⁴

8. The Role of Tax to Reduce GHG

The demand for air transport might not be growing at the present rate if airlines and their customers had to face the costs of the damage they are causing to the environment. The European aviation sector receives about 30 billion Euro of subsidies annually, both directly through payments for expansions and surface access and indirectly through exemptions on aviation fuel tax and value added tax (VAT). Currently airlines pay no duty or VAT on aviation fuel, no VAT on airlines tickets and no VAT on new aircraft. Duty free sales, a tax payer subsidy, also provide up to 50% of airport revenue although all EU flights are now exempt from duty free sales. In the UK airlines would have to pay at least 5 billion pound sterling a year if they were taxed at the same rate as motorists. In the UK, airports can also benefit from direct subsidies for airport expansions or investment in airport related infrastructure such as the expansion or construction of surface access roads. Partly as a result of these hidden subsidies air tickets are 42% cheaper. There is a role for a tax if businesses of all sizes and from all sectors are to contribute to improved energy efficiency.

The emissions levy has advantages to reduce GHG, for that reason an aviation tax or emissions levy is necessary as airlines should pay for the pollution they cause just like other mode of transport operators; encourage the development of more efficient and less polluting aircraft; encourage the development of more efficient and less polluting aircraft; be consistent with the UK obligations to reduce greenhouse gas emissions and much easier to implement then emissions trading permits.³⁵

Chapter Three :

Legal Ground of Climate Change

This chapter provides Indonesian Constitution of 1945, Act No. 6 Year 1994, Act No. 23 Year 1997, Act No. 17 Year 2004, Act No. 1 Year 2009, Act No. 32 Year 2009 and Presidential Regulation No. 46 Year 2008 as follows:

1. Indonesian Constitutional Law of 1945

With regards to environmental sustainability, Indonesian Constitution Law of 1945 provides that a good and healthy environmental shall be come the fundamental right to every citizen of Indonesia, it is the reason the national economic development shall be organized based on the principles of sustainable and environmentally-friendly development. The environmental quality that is currently declining and has threatened the survival of human life and other living things and there is a need of protection and environmental management on serious and consistent basis by all the stakeholders.

³⁴.*Ibid.*

³⁵.*Ibid.*

In relation with the global is increasing to result a climate change that is exacerbating the environmental degradation, therefore it is necessary to conduct protection and management of environment. In order to ensure the legal certainty and the protection of the right of every person to earn a good and healthy living environment as part of the overall protection of the ecosystem, it shall be necessary to issue an Act to enhance public welfares and achieve happiness of life based on the Pancasila, and implement environmentally sustainability development guided by an integrated and comprehensive national policy which take into consideration the needs of present as well as future generation.³⁶

2. Act No.6 Year 1994

Taking into account that global warming is a real threat to human welfare , Indonesia strongly supports the objective of the United Nations Framework Convention on Climate Change (UNFCCC) to prevent the anthropogenic gas concentration in the atmosphere exceeding a level that would endanger the existence of life on earth. For that reason, on 5 June 1992, Indonesia signed the UNFCC. For the purpose to implement the UNFCCC, the President of the ROI issued Act No.6 Year 1994,³⁷ which stipulates the right and obligation of the ROI. One of the obligations is to communicate actions taken to mitigate climate change. It is the reason, the Minister of Environmental and Forestry (MOEF) established the National Committee on Climate Change (NCCC).

3. Act Number 23 Year 1997

Act No.23 Year 1997,³⁸ regulates environmental provisions. It provides, among others, general provision; basis, objectives and target; community, rights, obligation and the role; the authority of environmental management; preservation of environmental functions; environmental compliance requirement; environmental disputes settlement; investigation; criminal provision, transitional provisions and closing provisions.

With regard to climate change, found in Article 9 Act 23 of 1997. It provides that the government of the ROI determines national policies on environmental management. Such determination of policies, shall take into consideration of religious values, culture and traditional and living norms of the community, whilst the performing environmental management shall integrated manner by the government institution in accordance with their respective field of task and responsibility, the public and other agents of development and taking into consideration of the integrated planning. In addition, environmental management shall be performed in an integrated manner with spatial management, protection of non-biological natural resources, protection of artificial resources, conservation of biological natural resources and their ecosystems, cultural preservation, biodiversity and climate change (*emphasis added*) as well. For the implementation of such planning of the environmental is coordinated by the Ministry of Environment and Forestry (MOEF) of the ROI.

4. Act No. 17 Year 2004

On 13 July 2004, Indonesia ratified the UNFCCC and come into force on 3 December 2005, consequently, Indonesia has right and obligation to comply UNFCCC. It stipulates the right and obligation of the ROI. One of the obligations is to communicate actions taken to mitigate climate change.³⁹

5. Act No.1 Year 2009

Act No. 1 Year 2009,⁴⁰ consists of 466 Articles and 24 Chapters such general provisions, foundation/bases and objective, scope of law validity, sovereignty over airspace, supervisons, aircraft design and production, registration and nationality of aircraft, aircraft airworthiness and operation, international interest in aircraft object, air transportation, airport, flight navigation, aviation safety, aviation security, search and rescue of aircraft, aircraft accident investigation, empowerment of aviation industry and technology development, aviation information system, human resoruces, public participation, criminal investigation, criminals provisions,transitional provisions and closing provision.

³⁶ Article 33; See also Dr Gunawan Djajaputra, Dr Ahmad Redi, and Dr.K.Martono.,*infra* note 46 at 2

³⁷ .Act No.6 Year 1994, *supra* note 8. See also Dr Gunawan Djajaputra, Dr Ahmad Redi, and Dr.K.Martono., *infra* note 46 at 3.

³⁸ .Act No.23 Year 1997 *supra* note 9.

³⁹ http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (down load on 1 November 2016)

⁴⁰ .Act No.1 Year 2009, *supra* note 13.

With regard to environmental found in Article 260. It provides that the airport business entity or airport operation unit shall be obligated to maintain noise threshold limit and environmental contamination at eh airport and surrounding areas in accordd with threshold limit and standard quality determined by the government. In order to maintain the noise threshold limit and environmental contamination, the airport business entity or airport operation unit may limit the time and frequency or decline aircraft operation. In addition, in order to maintain the noise threshold and environmental contamination the airport business entity or airport operation unit shall be obligated to implement environmental management and monitoring.

6. Act No.32 Year 2009

Act No.32 Year 2009,⁴¹ amended Act No.23 Year 1997,⁴² and it provides, among others, general provision; principle, objective and scope; planning; utilization; control; maintenance; management of hazardous and toxic; substance and wastes; information system; duties and authorities of the government and local government; rights, responsibilities and prohibition; role of people; monitoring and administrative sanction; settlement of environmental disputes; investigation and evidence; criminal indictment; transition and closing provision.

7. Presidential Regulation No. 46 Year 2008.

Presidential Regulation No.46 Year 2008,⁴³ regulates the establishment of the National Council for Climate Change (NCCC), member's and task of NCCC, and working units as follows.

a. Establishment of the National Council for Climate Change (NCCC)

The Presidential Regulation No. 46 Year 2008 regulates the establishment of the NCCC. In the consideration of the NCCC provides that the excessive increase in GHG emission let the global climate change,⁴⁴ which degrades the environment and harms of life, whilst the geographic position of Indonesia as an archipelagic State is prone to climate change that should be controlled on the principle that all are responsible in accordance with each country's social, economic and technological capacities. Based on the above-mentioned consideration, the President of the ROI established a NCCC to improve the coordination of control over the climate change and to strengthen the position of Indonesia in international forums on climate change.

b. Member's and Task of NCCC

The member of NCCC are ministry of environment, finance, home affairs, foreign affairs, energy and mineral resources, forestry, agriculture, industry, public works, national development planning/head of Bappenas, marine affairs and fisheries, transportation and health. The task of NCCC are, among others to formulate national policies, strategies, programs and activities to control climate change; to coordinate activities in controlling climate change including the activities of adaptation, mitigation, transfer of technology and funding; to formulate mechanism and procedure for carbon trade; to monitor and evaluating the implementation of policies on control of climate change; to strengthen the position of Indonesia and to encourage developed countries to be more responsible for controlling climate change.

c. Working Units

In carrying out its task, the NCCC will be assisted by some working units composed of adaptation working unit, mitigation working unit, transfer-of-technology working unit, funding working unit, post-Kyoto 2012 working unit and forestry and land use conservation working unit. If deemed necessary, the executive director may establish working unit other than the above-mentioned units. In addition, the membership of the working units shall be represented by relevant government agencies and experts.

Chapter Four

National Climate Change Related to Aviation

This chapter provides the impact of global warming; **action to reduce global climate change**; climate change (forest fires) related to aviation; action to reduce climate change such as policy approach, socialization and coordination of a national action plan, eco friendly airport, alternative fuel for aircraft operation,

⁴¹ .Act No.32 Year 2009, *supra* note 10.

⁴² .Act No.23 Year 1997, *supra* note 9.

⁴³ .Presidential Regulation No.46 Year 2008 *supra* note 11.

⁴⁴ .Climate Change is a change in the average condition of a climate and/or various climates from time to time as a result of human activities .

sustainable air transport and aviation alternative fuels, emission trading scheme, establishment of national committee on climate change and aviation biofuels and renewable energy at the airport.

1. The impact of Global Warming

The impact of global warming is already evident in Indonesia and it will likely worsen due to further human-induced climate change. The review from the global conservation organization, climate change in Indonesia affects for human and nature. Highlights that annual rainfall in Indonesia is ready down by 2 to 3%, and the seasons are changing. The combination of high population density and high levels of biodiversity, together with a staggering 80,000 kilometers of coastline and 17,500 Islands, make Indonesia one of the most vulnerable country to the impacts of climate change.

Shifting weather patterns have made it increasingly difficult for Indonesia's farmers to decide when to plant crops and erratic droughts and rainfall has led to crop failures. A recent study by a local research institute provides that Indonesia had lost 300,000 tons of crop production every year between 1997-2000, three times annual loss in the previous decade. Climate change in Indonesia means millions of fishermen are also facing harsher weather conditions while dwindling fish stocks affect their income.

As rainfall decreases during critical times of the year translates into higher drought risk, consequently a decrease in crop yield, economic instability and drastically more undernourished people. This will undo Indonesia's progress against poverty and food insecurity. World Wide Forest (WWF)'s review shows that increased rainfall during wet time of the year may lead to high flood risk, such as the Garut, West Bandung District, Bandung cities, (West Java), Sampang district (East Java), Sayung Village, Demak District (Central Java), Flores Timur's, flood and others provinces that killed people and displaced nearly half a million people, with economic losses of US\$ 450 million.

Climate change impacts are noticeable throughout the Asia-Pacific region. More frequent and severe waves, floods, extreme weather events and prolonged droughts will continue to lead to increased injury, illness and death. Continued warming temperatures will also increase the number malaria and dengue fever cases and lead to an increase in other infection as a result of poor nutrition due to food production disruption. The Indonesian government has taken its role seriously and lead the way in the fight against national and global climate change. In addition, Indonesia has to take up the challenge of climate change, putting climate adaptation in the development agenda, promoting sustainable land use, as well as demanding support from industrialized nations. Indonesia is already a significant emitter of GHG emission due to deforestation and land-use change estimated at 2 million hectares per year and accounts for 85% of the country's annual GHG emissions. It is also a serious coal producer and use in the region.

2. Action to Reduce Global Climate Change

With regards to global climate change, the ROI has taken to reduce climate change such as membership of UNFCCC, commitment of Indonesia, environmental measure project (EMP), cooperation with IATA as follows.

a. Membership of UNFCCC

On 1 August 1994, Indonesia ratified UNFCCC,⁴⁵ consequently Indonesia is a Party of the UNFCCC which imply that Indonesia is bound to the right and obligations, stipulated in the convention. One of the obligation is to communicate actions taken to mitigate. It is realized that the global warming is a real threat to human welfare in many ways.

b. Commitment of Indonesia

Indonesia commits to support ICAO's suggestion for States to develop and provide to ICAO, an Aviation Plan to detail initiative to be undertaken to manage aviation's impact on climate change as well as to provide annual updates on traffic data and fuel usage. Indonesia will investigate the viability of alternative means of transport such as rail and buses as alternatives to flight. However, alternative forms of transport come with high infrastructure costs, availability of land for acquisition, practical limitations of being an archipelago and expectations from the community. For Indonesia, the continual increasing use of aviation for domestic travel is a reality with no real short-term alternative.⁴⁶

⁴⁵ Act No.6 Year 1994, *supra* note 8

⁴⁶ Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *The Civil Aviation, Climate Change Reduction and Legal Aspects of Forest Fires in Indonesia*. Vol.9(7) IOSR-JAC 11(July 2016).

Indonesia also announced that by 2020 will reduce GHG emission by 26% from Business as Usual (BU) and by 41% if supported.⁴⁷ Transport is the main sector where growth in GHG emission is forecasted over the next 10 years. Currently transport emits only 3% of all GHG emission but consumes 52% of all oil. The domestic aviation sector continues to grow and be responsible for an increasing amount of GHG emission. This growth has both environmental and economic impacts that need to be managed. Indonesia, as an archipelago nation of 17,000 Islands relies on transportation for economic, social and others. Management of aviation's impact on climate change must be conducted in any way that balances the needs of Indonesian people for a safe, regular and efficient transport services and the responsibilities we all have in protecting Indonesia environment for today.⁴⁸

c. Environmental Measure Project (EMP)

The MOC jointly with ICAO's Technical Co-operation Bureau (ICAO-TCB) to undertake launching a large-scale environmental measure project (EMP). The purpose of EMP project such as master plan for Indonesian legislative improvements on emission, green flights and green airports operation program more efficient airspace, design utilization performance based on navigation guidelines, advice on appropriate market based measures; initiative relating to alternative fuels; and the development of a comprehensive emissions inventory.⁴⁹

d. Cooperation with IATA.

The ROI has closely cooperated with the IATA through participating in capacity building activities and technical assessments. In this connection, IATA have presented several joint working papers. In addition, the DGAC of the MOC has established cooperation with aircraft manufacturers such as the Airbus industry which is already giving technical support to Indonesia in implementing operational improvement and in the field of sustainable alternative fuel (SAF). Indonesia considers cooperation with other global partners a key support for the successful achievement of its State Action Plan (SAP) and significant progress has been achieved, thank to that cooperation.

3. Climate Change (Forest Fire) Related to Aviation

Forest Fires related to haze, flight delay, the huge cost of economy, billions of dollars' worth of damages and losses, impact of Indonesia's forest fires, flight cancellation, state emergency, foreign assistance such as Canada, Malaysia, Singapore and Russia as follows.

a. Haze as Result of Forest Fires

On 8 September 2015, Indonesia is again plagued by a traditional haze caused by forest fires in Palangkaraya. The thick haze resulted in the cancellation of various commercial flights at the local airports such as in Jambi and Palangkaraya. Each year forest fires damage the environment on the resource and forest-rich islands of Sumatra and Kalimantan as farmers clear plantation and forest lands. Illegal slash and burn practice is common on these islands and form a recurring problem, particularly in the dry season. The El Nino weather phenomenon could cause an extended dry season in Indonesia, implying a higher risk of forest fires in Southeast Asia's largest economy. Aircraft water bombing on operations had to be cancelled due to limited visibility. On land, fire-fighting operations are being carried out in Jambi. The teams are having difficulty to find water sources to combat the fire. The Jambi Health Agency (JHA) has already distributed 22,400 face masks to local residents who live nearby affected regions for health protection.

b. Flight Delayed

Thousands of forest fires caused by slash-and-burn farming have suffocated vast expanses of Southeast Asia caused disrupt commercial flight and cancellation of various commercial flights at the local airports. At Juanda International Airport in Surabaya, flights have been disrupted due to forest fires. Hundreds of passengers stranded overnight due to Lion Air delays. In addition, flight were delayed overnight for passengers to Lombok International Airport in Lombok, West Nusa Tenggara (NTT) etc.

c. The Huge Cost of Economy

Open burning in plantations and forest fires in Sumatra and Kalimantan have generated thick clouds of smog across the Straits of Malacca to Malaysia, disrupting flights in the two countries. The haze disrupted

⁴⁷.The 38th General Assembly Session .

⁴⁸.*Ibid.*

⁴⁹.*Ibid.*

operation, at least, at 16 airports and closed 13. Ten of the closed airports are in Kalimantan, the other three are in Sumatra, Aceh and Riau provinces. With exception of Sultan Iskandar Muda International Airport (SIMIA) in Aceh, they all service domestic flights. Several hours or cancelled flights at Medan's Kuala Namu International Airport (MKNIA), Hang Nadim International Airport (HNIA) in Batam and Pekanbaru's Sultan Syarif Kasim II International Airports (PSSKIA), the smog reduced visibility to between 50 meters and 100 meters at the 13 closed airports. The airports will be opened right away after approval issued the DGAC.

The haze imposes huge cost on the affected airlines, airports and the economies of the country involved. It happens when owners of oil palm plantations and timber contractors carry out open burning of the discards of their harvest. The lack of fire-suppression systems in the forests and plantations and the sheer size of the areas compound the problem. Poor accessibility is another factor.

d. Billions of Dollars' Worth of Damages and Losses

Indonesia's forest fires and haze crisis in 2015 has been described by many in the international community as an environmental disaster. Since August 2015, large parts of the country's forests and land area have burned out of control, impacts the health, education and livelihoods of millions of Indonesians living in the areas with the worst burning. This has also resulted in billions of dollars' worth of damages and losses. Forest fires become a problem every year during the annual dry season, when fires are lit to clear and/or prepare land for agriculture. The smoke from the forest fires creates massive haze across Indonesia. Fires occur throughout Indonesia and on all type of soils, but fires on peat-lands are of particular concern as they cause up to 90% of the haze, releasing three to six time more particulate matter than fires on other types of soil. Peat-lands are concentrated in lowland areas of Sumatra, Kalimantan and Papua, where the worst impacts of the fires and haze have been felt.

e. Impacts of Indonesia's Forest Fires

Forest Fires and resulting haze have caused Indonesian and neighboring countries significant economic, social and environmental costs as follows:

1). Economic Costs

Early estimates of the total economic costs of the forest fires of 2015 in Indonesia alone exceed US \$16 billion. This estimate includes losses to agriculture, forestry, transport, trade, industry, tourism, and other sectors. Some of these costs are direct damage and losses to crops, forests, houses and infrastructure, as well as the cost of responding to the fires. Many of the economic losses result from the disruption of air, land and sea transportation due to the haze. These damages and losses are expected to have serious impact on the economic growth rate of affected provinces and the government's efforts to reduce poverty in the hardest-hit regions, such as Central Kalimantan.

2). Social Costs and Human Suffering

Air quality during high burning periods in villages near the fires regularly exceed the maximum level of 1000 on the international Pollutant Standard Index (PSI). The toxic smoke causes widespread respiratory, eye, and skin ailments and is especially hazardous for the very young and the elderly; the toxic air they breathe include carbon dioxide, cyanide, and ammonium. The long-term health impacts are not yet known but are expected to be highly significant. Businesses and schools close due to the haze, crippling many low-income families and prompting them to fall back into poverty. In 2015, approximately 5 million students have been impacted by school closures.

3). Environmental Costs

With regards to environmental cost, in 2015, more than 2.6 million hectares of forest, peat, and other land have burned. Burned peat areas can be restored, but short-term impact include the loss of timber and non-timber forest products, and the loss of habitat for pollinators, wildlife, and grazing lands. While not yet fully analyzed, the costs related to biodiversity may exceed US \$295 million for 2015. The long-term impact on wildlife and biodiversity is also not fully known, but thousands of hectares of habitat for orangutans and other endangered species have been destroyed. In October 2015, daily emissions from Indonesia's fires in exceeded the emissions from the entire US economy – that is more than 15.95 million tons of CO2 emissions per day. If Indonesia could stop the fires it would meet its stated target to reduce GHG emissions by 29% by the year 2030.

f. Flight Cancellation

Haze resulting from forest fires on Indonesia's Sumatra Island is disrupting flights at a number of local airports. At least six airlines canceled flights from Sultan Thaha Airport in Jambi, after all flights there were cancelled, no flights were operating morning at Sultan Syarif Kasim II Airport in Riau province. The haze,

caused by farmers who burn forests to clear their land for agriculture, is an annual occurrence that sends haze wafting northward to Singapore and Malaysia. The booth governments have complained to Indonesia, and Singaporean legislators passed a law allowing regulators to prosecute companies involved in illegal forest burning.

The haze can send air quality in Singapore and Malaysia into hazardous territory, defined as a reading above 100 on the three-hour Pollutant Standards Index (PSI) reading in Singapore was 86, down from 121 Monday evening and far below the record of 401 set in June 2013. Flights were operating as normal from Singapore's Changi and Seletar airports. Visibility in the morning was as little as 300 meters at Sultan Mahmud Badaruddin II airport in Palembang in the southern part of Sumatra, and was 500 meters in Riau. Air carriers such as Garuda Indonesia, Sriwijaya Air, Lion Air and Citilink have cancelled all flights to and from Jambi. The fires are exacerbated by the local dry season. Indonesian authorities warned last week that haze will be worse than in previous years, the Bernama news agency reported. Indonesian President Joko Widodo visited Sumatra to survey the government's response to the problem. Malaysia's natural resources minister is due to visit soon to discuss possible solutions with his Indonesian counterpart.

g. State Emergency

Across the region Indonesia's haze crisis has been causing the schools in neighboring such as Singapore, Malaysia have been shut down, flights have grounded, events cancelled and Indonesian products boycotted, as millions try to avoid the intense smoke and six Indonesian provinces have declared a state of emergency. As the Indonesian Council of Ulema has held mass prayers for rain.

h. Foreign Assistance

The administration of President Joko Widodo has deployed 30 aircraft and 22,000 troops to fight the fires on the ground, as well as stationed several warships off Kalimantan, on standby to evacuate victims if required. Malaysia, Singapore, Australia and Japan have also sent assistance, however, environmentalists have warned that the measures, a few helicopters, water bombers and face masks, are far from sufficient. With regards to aircraft bomber, the Russian Beriev BE-200 water bomber drops its payload over a fire in Ogan Komering Ilir, South Sumatra.

At least three of the ten ASEAN Countries have seriously affected by the haze as a result of forest fires form Indonesia such as Indonesia, Malaysia and Singapore. It has been reported that an Indonesian forest fires had generated around 600 million tons of GHG emission, an amount described as "roughly equivalent to Germany's entire annual out-put. The 2015 haze crisis could become the worst one recorded in the region, possibly outstripping the 1997 crisis.⁵⁰ For the purpose to fight the haze as a result of forest fires from Indonesia, several States such as Australia, Canada, Malaysia, Singapore and Russia send aircraft's bombing water as follows:

1). Australia

On 12 October 2015, Australia's L-100 Hercules aircraft arrive at Sumatra. Such aircraft operates for five days in South Sumatra as it will be needed to fight fires in New South Wales.⁵¹ On 15 October 2015, a Lockheed L 100-30 Hercules aircraft of the Australian government landed in Sultan Mahmud Badaruddin II Airport in Palembang during preparations before being deployed to extinguish forest fires.⁵²

2). Canada

Canada sent Canadian-made CL-215 which smaller than Russian-made aircraft, Beriev Be-200s still packs a punch in terms of its flight range. Indonesia believes these bombers can be game-change in its fight against forest fires raging in Kalimantan and Sumatra and had initially wanted Singapore and Malaysia's help to acquire them. These amphibious aircraft can fly then land on a river, take or sea to scoop up a very large amount of water and then take-off again to douse fires over an area of between 1 ha to 1.6 ha. So, with just one-strike fires are gone.⁵³ Those aircraft have a solid track record in fire-fighting operation across the Europe and North America.

⁵⁰.Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *supra* note 37 at 9-10.

⁵¹.Sutopo Purwo Nugroho, BNPB spokesman; See Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *The Civil Aviation, Climate Change Reduction and Legal Aspects of Forest Fires in Indonesia*. Vol.9(7) IOSR-JAC 11(July 2016).

⁵².Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *supra* note 37 at 11.

⁵³. *Ibid.* .

3). Malaysia

After the meeting with Indonesian President Jokowi in Jakarta, Malaysian Prime Minister Najib Razak consider the haze a serious issue as it's burden to Malaysians and Indonesian, then Malaysia prepared to increase their assistance in dousing the fires. Malaysia dispatches one Bombardier amphibious aircraft, one Hercules C-130 aircraft and a survey helicopter. The Bombardier amphibious aircraft uses a "water bombing" technique capable of putting out a fire the size of a football field. For the next five days, the Bombing CL 415 from Malaysia's Maritime Enforcement Agency (MMEA) operated seven hours a day to put out the fires burning up large swathes of forest in South Sumatra, whilst the Dauphin Helicopter will as a fire spotter.⁵⁴

Another C-130 from Malaysia's Air Force ferrying logistics to South Sumatra where the 25-member team be stationed for a week. The week-long operation is expected to cost the Malaysian government up to 1.7 million ringgit or more than US\$ 400,000.⁵⁵ In relation to operate an aircraft bombing water, the South Sumatra governor Alex Noerdin apologized for the haze crisis in the area, acknowledging that he is most responsible for the haze situation,⁵⁶ however, Mr Alex Noerdin said that a change in wind directions contributed to the crisis, as smoke is also blown from Kalimantan to South Sumatra. The authorities in South Sumatra have done all they can to put out the fires, with help from the army, police and the National Disaster Management Agency (NDMA). All parties involved should work together to extinguish the fires.⁵⁷

4). Singapore

Since 2005 Singapore consistently offered to Indonesia to send aircraft's bombing water to fight the forest fires, however, previously Indonesia rejected the offered by stating that Indonesia had enough resources to deal with the crisis.⁵⁸ In October 2015, the Indonesian National Board for Disaster Management (BNPB) request help from Singapore to secure bigger aerial fire-fighting aircraft for Indonesia. Singapore's Ministry of Foreign Affairs (SMFA) response the request then was offering Singapore's assistance package included a Singapore Civil Defense Force (SCDF), fire fighting's assistance team, a C-130 aircraft for cloud-seeding and Chinook Helicopter equipped with a water bucket for aerial fire-fighting.⁵⁹ Officials are adding to 25,000 personnel that Indonesia has deployed to little effect. In Palangkaraya and Sumatra were still experiencing a very high PSI, aircraft operation, fire-fighting helicopters were unable to water-bomb certain areas due to very low visibility.

5). Russia

Russia is also sending two amphibious water-bombing planes to help Indonesia to fight forest fires that have spread a "haze" over neighboring countries such as Singapore, Malaysia and the Philippines as well. According to the National Disaster Mitigation Agency (NDMA), the Russian-made aircraft the Beriev Be-200s were scheduled to arrive in Palembang. The planes can scoop 12,000 liters of water from rivers, lakes or the sea and dump it over the fire. Russia is taking over from Malaysia and Australia, which have ended their five-day missions. Russian-made Beriev-200s water bombers were involved one of them had arrived on 21 October 2015. The Russian-made Beriev Be-200s carry out up to 37,200 kg of water and fly up to 3,850 km without refueling⁶⁰

⁵⁴. *Ibid.*

⁵⁵ . Hishammuddin Hussein, Malaysian Defense Minister (MDM) at the Subang Military air base

⁵⁶. Detiknews.com reported.

⁵⁷. Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *supra* note 37 at 11.

⁵⁸ .Siti Nurbaya Bakar, Indonesian Environmental and Forestry Minister;
See https://en.wikipedia.org/wiki/2015_Southeast_Asian_haze.2015 Southeast ASEAN haze From Wikipedia, the free encyclopedia

⁵⁹ .Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *supra* note 37 at 10.

⁶⁰ .Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., *supra* note 37 at 10.

4. Action to Reduce Climate Change

With regards to domestic climate change, the ROI has taken to reduce climate change such as policy approach, socialization and coordination of a National Action Plan, eco-friendly airport, alternative fuel for aircraft operation (FAO), sustainable air transport and aviation alternative fuels, the emission trading scheme, establishment of National Committee on climate change (NCCC), aviation biofuel and renewable energy at the airports and violation of climate change regulations as follows.

a. Policy Approach

The policy approach to climate change is to reduce the GHG effect. In addition, policy approach to climate change also based on Act No.6 Year 1994,⁶¹ Act No. 17 Year 2004,⁶² and Act No.32 Year 2009.⁶³ After Indonesia have ratified of all conventions, the MOE has the obligation to identify GHG to formulate the policy on climate change.⁶⁴

b. Socialization and Coordination of a National Action Plan (NAP)

To implement the above-mentioned policy approach, Indonesia conducted a seminar on aviation and climate change to commence the socialization and coordination of a NAP. The speaker of the seminar from ICAO, IATA, airlines business entities, government and academician. It provided information on what Indonesia can do to help and participate in reducing aviation emissions. As result of such seminar, the regulators, airline's business entities, service providers, research agencies, academician and regional partners work together to determine an appropriate action plan that minimizes aviation's impact on climate change. A draft of NAP has been established to help in the discussion and to raise a common understanding into the possible initiative that are available. The draft of NAP uses the basket of measures to provide in the final report of the Group on International Aviation and climate change (GIACC) and covers aircraft modernization; improve engine technology; introduction of most efficient flight routes and flight paths; coordination of ground based on infrastructure projects to better use available aircraft technology; operational efficiencies; eco-airports and market-based measures.⁶⁵

c. Eco-friendly Airport.

In addition, for the purpose to implement the above-mentioned policy on climate change, the ROI issued a Presidential Decree No.61 Year 2011,⁶⁶ and Ministerial Decree No.KP 201 year 2013. It provides for GHG emission reduction and obligation for the energy and transport sector is 26% cumulative up to the year 2020, and 41% with contribution of international air transport. In addition, Indonesia has put in place new regulations concerning eco-friendly airport which are mandatory to be implemented in all Indonesian's airports with reference to the NAP to reduce emission. Airports operator are encourage to use renewable sources of energy such as solar cells and has also required more effective and efficient air traffic management (ATM) measure. Among these are operational measures such a reducing the taxi and holding time and the use of PBN which will in return decrease gaseous emissions.⁶⁷

d. Alternative Fuel for Aircraft Operation (FAO)

The DGAC of the MOC, actively participate and contribute to the global initiative of mitigation of climate change and reduction of GHG emission by 26% accumulative up to the year 2020 with its own activities

⁶¹ .Act No.6 Year 1994, *supra* note 8.

⁶² .Act *Concerning Ratification of Kyoto Protocol to the United Nations Framework Convention on Climate Change* (Act.No.17 year 2004). State Gazette of the Republic of Indonesia No.72, Supplement State Gazette of the Republic of Indonesia No.4403 .

⁶³.Act No.32 Year 2009, *supra* note 10.

⁶⁴.Gunawan Djajaputra, Hari Purwadi and Martono K.,*Indonesian Civil Aviation Act of 2009 : Aviation Safety, Security and Climate Change*. Vol. 6(1) www.ijbmi.org 11 (January 2017).

⁶⁵ .Gunawan Djajaputra, Hari Purwadi and Martono K.,*Indonesian Civil Aviation Act of 2009 : Aviation Safety, Security and Climate Change*. Vol. 6(1) www.ijbmi.org 11 (January 2017).

⁶⁶ . Presidential Decree *Concerning National Action Plan to Reduce GHG (Ran-GRK)* (Pres.Decree No.61 Year 2011).

⁶⁷ .Gunawan Djajaputra, Hari Purwadi and Martono K.,*supra* note 67 at 12.

on the basis of 2005 GHG emission. These measure are considered with reference to the ICAO global policy and its guidelines. In this regard, Indonesia very much appreciate the ongoing of the ICAO Council to forge a consensus among ICAO's States including a basket of measures and related action. This ongoing work is encouraging and Indonesia is prepared to fully support the emerging path towards consensus outline by the ICAO-Council. Indonesia has initiated policy, strategy and implementation measure on alternative FAO such as domestic and/or international flight, for the period of 2016-2020.⁶⁸

The DGAC of the MOC, has taken several policy to implement measures in line with the ICAO's global policy and its guidance to contribute the global initiative of mitigation of climate change and reduce GHG emission by accumulative up to the year 2020 with its own activities on the basis of 2005 GHG emission. Regarding the global initiatives of mitigation of climate change and reduction of GHG emission, Indonesia is fully prepared to support the emerging path towards consensus outlined by the ICAO-Council.⁶⁹

e. Sustainable Air Transport and Aviation Alternative Fuels

In the framework to implement the above-mentioned policy, on 23 October 2015, the ROI has signed Memorandum of Understanding (MOU) with the United States of America (USA) regarding on Sustainable Air Transportation and Aviation Alternative (SATAAF). This MOU build on effort to protect the environment, reduce GHG emission worldwide and Indonesia's nation and the broader global community with more sustainable energy resources. It builds on mutual interest and challenges for the USA and the ROI partnership, including the environment. Such MOU's primary focus areas are research and development alternative aviation fuel; energy conservational protection and sustainable aviation growth; critical information and personnel exchange; strengthened capacity-building; and the sharing of best practices, with reference to the agenda item 17 of the 38th General Assembly Meeting conducted in Montreal on 2013 regarding environmental protection.⁷⁰

f. The Emission Trading Scheme

The clean development mechanism (CDM) is one of the mechanism under the Kyoto Protocol which will expire in 2020. Based on the Presidential Regulation No.6 Year 2011, Indonesia specifies various activities which may directly or indirectly reduce GHG effect in agriculture, energy, transportation, forestry, peat-land area, industrial areas, and waste management, as well as ho to monitor and report GHG emissions. In this regard, Indonesia has implemented the CDM which generate emission credits through projects that reduce GHG emission in various sectors. In addition, the government of the ROI also has a program called the Reducing Emission for Deforestation and Forest Degradation Plus (REDD+) to gain momentum in Indonesia, particularly after the ROI sign a letter of intent with Norway in 2010. In 2015, Presidential regulation No.15 Year 2015 was issued, after BP REDD+ and the National Council on Climate Change (NCCC) is integrated into the and Forestry.⁷¹

Various CDM-related regulation have been issued for the relevant sectors, such as energy, power generation and forestry. For example, Ministry of Forestry Regulations (MFR) No.P 14/Menhut-II/2004 governs the procedures for a forestation within the framework of the CDM. MOE Decree No.206 year 2005 set up a National Commission on the Clean Development Mechanism (NCCDM) whose main role is to approve proposed CDM projects if they meet the national sustainable development criteria and to monitor and evaluate the progress of each project.⁷²

g. Establishment of National Committee on Climate Change (NCCC).

The main sources of CO₂ emission in Indonesia are energy and forestry sectors. These two sectors contributed for almost 98% of the total CO₂ emission. The CO₂ emission from forestry sector was resulted mainly from biomass burning during forest and grass-land conversion activities. To achieve its commitment to global effort to cope with climate change, Indonesia established the National Committee Climate Change (NCCC). Its consists of representatives from various government agencies, non-government organization, academician, and business communities to combat global warming. The NCCC has identified three principles as the foundation for Indonesia in developing national response strategy to address climate change. For the purpose of formulating and broader policy, the NCCC collects several data such as energy, transportation,

⁶⁸.*Ibid.*

⁶⁹.*Ibid*

⁷⁰.*Ibid.*

⁷¹.*Ibid.*

⁷².*Ibid.*

agriculture, forestry, public health, coastal resources and waste which contribute significantly GHG emission in Indonesia.⁷³

To achieve the goal to prevent the GHG emission steps have been taken to gradual removed of energy market distortions, such as fuel and electricity; promote use and development of renewable energy through incentive such as breaks for investors on the technology; encouraging research; encouraging public adoption of energy conservation and efficiency, by adopting techniques such as public campaigns, at the same time using economic incentives to further promote energy efficiency products and energy conservation practices; promote clean and efficient energy use for industry and commercial sectors. Various technologies, for example, clean production, is available to help the industry and commercial sectors become more efficient. Such technologies have been promoted by the government; restructure the price for various energy sources according to the emission and externalities that the energy source emits.⁷⁴

In addition, step have been taken promote use of public transportation by increasing the capacity and comfort of the public transportation system and a shift in the transportation policy towards use of electric trains and road; air traffic control for regularly congested areas which will allow road uses to realize the value of that public goods; control vehicle emission and promote use of clean fuels through providing incentives for car users who would like to convert their cars to enable them to utilize better and cleaner of fuel.⁷⁵

h. Aviation Biofuels and Renewable Energy at the Airport

In December 2013, the DGAC of the MOC and Directorate of Renewable Energy and Energy Conservation (EBTKEC) signed a MOU to pursue the use of aviation biofuels and renewable energy at airports. Based on the Ministry of Energy and Mineral Resources (MEMR) Decree No.25 Year 2013, the use of bio-jet fuel has been mandated on a national level. This requires 2% bio jet fuel blending in 2016, 3% by 2020, and 5% by 2025. Due to national circumstances, the Task Force (TF) identified that the 2016 goal will not be achieved. However, Indonesia oil producer has shown their commitment to start production by late 2018, with a production capacity of 257,000 kl/year.

Based on the DGAC Decree No.51K/73/DJE/2014 was established Aviation and Renewable Energy Task Force (ABRETF) as one of supporting elements in executing Indonesia's NAP to reduce GHG emission from the aviation sector. ABRETF aims to reduce these emissions through utilization of sustainable alternative fuels and renewable energy. The mid-term goal is to reinforce Indonesian utilization of bio-jet fuel by 2018. Based on the MEMR Decree No.25 Year 2013, the use of bio-jet fuel has been mandated on a national level. This requires 2% bio jet fuel blending in 2016, 3% by 2020, and 5% by 2025. Due to national circumstances, the Task Force identified that the 2016 goal will not be achieved, however, Indonesia oil producer has shown their commitment to start production by late 2018, with a production capacity of 257,000 kl/year.⁷⁶

The achievement of ABRETF,⁷⁷ are establishment of Indonesian ABRETF (August 2014). 1st ABRETF workshop: "Indonesia initiatives on Energy Farming & Sustainable Aviation Biofuel and the ISPO/RSPO Standard (August 2014); establishment of the Aviation Biofuels and Renewable Energy Task force (ABRETF) (August 2014). This group consists of four Sub Task Force (STF) working on : formulation of policy, regulation and capacity building program; research and development; testing and certification; commercial, risk analysis and sustainability, ABRETF Secretariat office at Pertamina building is ready to be used (August 2014), start of ICAO-TCB support program (October 2014), kick off meeting regarding standardization of aviation biofuels (December 2014), Indonesia's national oil company and its partners completed a feasible study (January 2015) and ABRETF to collaborate with national stakeholders, held the 2nd International Green Aviation Conference (IGAC) I Denpasar, Bali (August 2015, Indonesia's DGAC and the US FAA signed an MOU to promote the use of sustainable alternative aviation fuels and additional environmental collaboration between the two countries (October 2015). It is worthwhile to note here that since

⁷³.*Ibid.*,at 13.

⁷⁴.*Ibid.*

⁷⁵.*Ibid.*

⁷⁶.*Ibid.*

⁷⁷ Partnership of ABRETF consisted MOC, MEMR, Ministry of Finance, National Development Planning Agency (NDPA), Airport Operators, Air Navigation Providers, airlines business entities such as Garuda Indonesia, Indonesia Air asia, IATA, Indonesian National Air Carriers Association (INACA), Pertamina, UOP Honeywell, APROBI, Bandung Institute of Technology, University of Indonesia (UI), Padjadjaran University (UNPAD), Ikatan Ahli Bio Energy Indonesia (IKABI).

October 2014, the ICAO Technical Cooperation Bureau (ICAO-TCB) has supported Indonesia ABRETF through the MSA Annex 5 INS13801 project.⁷⁸

BIBLIOGRAPHY

Articles

- [1]. Ahmad Sudiro and Martono K., The Development of Civil Aviation Laws and Regulations Applicable in Indonesia. Vol. 5(12) www.ijmi.org 46 (December 2016).
- [2]. Dr Gunawan Djajaputra, Dr Ahmad Redi and Dr.K.Martono., The Civil Aviation, Climate Change Reduction and Legal Aspects of Forest Fires in Indonesia. Vol.9(7) IOSR-JAC 11(July 2016).
- [3]. Gunawan Djajaputra, Hari Purwadi and Martono K., Indonesian Civil Aviation Act of 2009 : Aviation Safety, Security and Climate Change. Vol. 6(1) www.ijbmi.org 11 (January 2017).

Documents

- [4]. ICAO Doc.7300/6 concerning Convention on International Civil Aviation, signed at Chicago on 7 December 1944.
- [5]. Act Concerning Ratification of United Nations Framework Convention on Climate Change (Act No.6 Year 1994). State Gazette of the Republic of Indonesia No.42 Year 1994, Supplement State Gazette of the Republic of Indonesia No.3557 .
- [6]. Act Concerning Environmental Management (Act No.23 Year 1997. State Gazette of the Republic of Indonesia No.68 Year 1997, Supplement State Gazette of the Republic of Indonesia No. 3699 (19 September 1997).
- [7]. Act Concerning Ratification of Kyoto Protocol to the United Nations Framework Convention on Climate Change (Act.No.17 year 2004). State Gazette of the Republic of Indonesia No.72, Supplement State Gazette of the Republic of Indonesia No.4403 .
- [8]. Act Concerning Civil Aviation, Act No.1 Year 2009, State Gazette of the Republic of Indonesia, No.1 Year 2009, Supplement State Gazette No. 4956.
- [9]. Act Concerning Protection and Management of Environment, (Act No.32 Year 2009), State Gazette of the Republic of Indonesia No.140 Year 2009 (3 October 2009).
- [10]. Presidential Regulation Concerning National Council for Climate Change, (Pres.Reg.No.46 Year 2008) [4 July 2008] .
- [11]. Presidential Decree Concerning National Action Plan to Reduce GHG (Ran-GRK) (Pres.Decree No.61 Year 2011).

Others

- [12]. Daily Kompas, dated 11 February 2017, at 21
- [13]. Detiknews.com reported.
- [14]. Hishammuddin Hussein, Malaysian Defense Minister (MDM) at the Subang Military air base
- [15]. <https://aviationbenefits.org/environmental-efficiency/aviation-and-climate-change/>
- [16]. Saifulbahri Ismail @ SaifulCNA., Asia Pacific : 5 Indonesian provinces on emergency alert for forest fires amid dry season. 27 July 2017.
- [17]. Siti Nurbaya Bakar, Indonesian Environmental and Forestry Minister;
- [18]. See https://en.wikipedia.org/wiki/2011_Southeast_Asian_haze Southeast ASEAN haze From Wikipedia, the free encyclopedia
- [19]. Sutopo Purwo Nugroho, BNPB spokesman
- [20]. The 38th General Assembly Session .
- [21]. WMO Secretariat., *Climate change impacts on aviation: An interview with Herbert Puempel*;
- [22]. <https://public.wmo.int/en/resources/bulletin/climate-change-impacts-aviation-interview-herbert-puempel>
- [23]. www.aef.org.uk Friends of the Earth 26-28 Underwood St LONDON N1 7JQ Tel: 020 7490 1555 Fax: 020 7490 0881 web: www.foe.co.uk email: info@foe.co

Mella Ismelina International And National Climate Change Related To Aviation Activities In Indonesia.” International Journal of Business and Management Invention (IJBMI), vol. 6, no. 11, 2017, pp. 09-26.

⁷⁸ Gunawan Djajaputra, Hari Purwadi and Martono K., *supra* note 67 at 13.