

eral cooperative relationships with foreign countries such as Kenya, Ghana, Egypt, Thailand, etc.⁵¹

One of the important projects of the IRSA is the application of remote sensing in atmosphere. The IRSA established an Air Quality Remote Sensing Monitoring System to monitor air in Beijing, which started its work before the 2008 Olympic Games. After the Wenchuan Earthquake in 2008, the IRSA used remote sensing technology to monitor and assess building damage and collapse; to detect landslides, landslide lakes, and dams; and to assess transportation destruction in the Earthquake areas.⁵²

The Remote Sensing Technology Application Research Center of China Institute of Water Resources and Hydropower Research (IWHR)⁵³ was founded in 1980. The IWHR has established a remote sensing data sharing system which collects multi-sources remote sensing data and distributes them in China. The processed remote sensing data are widely applied to flood control and drought resistance.⁵⁴ For example, IWHR completed the research projects involving the flood monitoring, evaluation, control, and command system in Jiangxi province. In the field of water resources and ecology, the IWHR's main research projects include remote sensing monitoring and evaluation of the ecological effects on water diversion in arid and semi-arid areas; the dynamic remote sensing monitoring and evaluation of international rivers, reservoirs, and estuarine sediment; the remote sensing survey of soil erosion; the remote sensing survey and planning of the effective irrigation area; and south-to-north water transfer project.

⁵¹ *Id.*

⁵² Institute of Remote Sensing Applications, <http://english.bic.cas.cn/NE/200910/P020091027369863507783.pdf> (last visited Feb. 4, 2011).

⁵³ China Institute of Water Resources and Hydropower Research, <http://www.iwhr.com/english/newsview.asp?NewsID=16197> (last visited Jan. 7, 2011).

⁵⁴ Zhang Xiao-hong & Li Mao-tang, *Application of Remote Sensing Data Sharing System to Flood Control and Drought Resistance*, 39 (7) WATER RESOURCES & HYDROPOWER ENGINEERING 72-74 (2008) [hereinafter *Application of Remote Sensing Data Sharing System*].

*B. Applications of Remote Sensing Data in Environmental
Survey and Protection*

As Principles X and XI of the Remote Sensing Principles stress the role of remote sensing in promoting “the protection of the Earth's natural environment” and “the protection of mankind from natural disasters,”⁵⁵ remote sensing data and products are frequently used in the monitoring and the protection of environment.

HY-1A observed China's territorial sea a total of 1211 times during 2005-2007 and acquired a large number of ocean color remote sensing images. The processed data and information have been used in the development of marine resources, ocean management, disaster warning, environmental forecasting, and marine scientific research.

In the coastal zone management, fifty-two maps of China's three major estuary (Yellow River Estuary, Yangtze River Estuary, and Pearl River Estuary) regions were made by using *HY-1A* data in 2003.⁵⁶ The use of *HY-1A* data in combination with other relevant information played an important role in the monitoring and early warning of marine red tide. Remote sensing data indicated that the red tide occurred in the Bohai Sea, Yellow Sea, and East China Sea twenty-four times in 2002 – 2004. Twenty monitoring bulletins were issued for China's marine disaster prevention and environmental protection.⁵⁷

Ice in Bohai Sea and Yellow Sea for about three months every winter has great impact on sea transportation and offshore activities. *HY-1A* data has been used in the real-time monitoring of the sea ice. The information received was widely distributed, via China Central Television and other media, to the public and professional users.⁵⁸

As CRESDA vigorously promotes the application of satellite data, users of *CBERS* data are very active, especially after the announcement of the free online data distribution policy. The

⁵⁵ Remote Sensing Principles, *supra* note 5, at princ. X & XI.

⁵⁶ Sun Zhihui, *supra* note 11, at 8

⁵⁷ *Id.*

⁵⁸ *Id.*

average monthly volume of distribution is near 10 thousand scenes. The Ministry of Land and Resources, National Commission for Disaster Reduction, and the Ministry of Environmental Protection are the three main users of *CBERS* data and environmental satellite data. The Ministry of Land and Resources used more than 10 thousand scenes of the *CBERS-2B* high-resolution data in the second national land resources survey project. Using *Huanjing* satellite data in the daily work of the National Commission for Disaster Reduction and the Ministry of Environmental Protection has achieved remarkable results. Other users, such as the Resource Information Institute of China Academy of Forestry, Institute of Geology of China Seismological Bureau, Surveying and Mapping Bureau of Jiangsu Province, etc. have downloaded more than 10,000 scenes each.⁵⁹

China has a natural wetland area of 308,000 square kilometers as of 2000, including natural lakes, marsh, shallow water along the coast, and inter-tidal shoals, which are mainly located in Tibet and Inner Mongolia Autonomous Regions as well as Qinghai and Heilongjiang provinces. Scientists from Chinese Academy of Sciences (CAS) made the first satellite map of China's wetland areas, in order to monitor and manage the areas better. "The map, which took scientists two years to complete, comprises 600 scenes of satellite images with each scene covering an area of 34,225 square kilometers."⁶⁰ The map shows a 50,800 square kilometer decrease compared with the data collected ten years ago. "The Chinese government earmarked 16.5 billion yuan . . . to protect and restore wetlands during the 11th five-year plan period (2006-2010)."⁶¹ Also, *CBERS* data were used in the research projects of desertification in Gulang area, soil salinization, and water quality in Taihu Lake.⁶²

⁵⁹ See China Centre for Resources Satellite Data and Application (CRESDA), 我国陆地卫星数据分发突破百万景 [Distribution of CBERS Data over One Million Scenes], CRESDA, Aug. 3, 2009, <http://www.cresda.com/n16/n1100/n1310/8716.html>. (last visited Jan. 7, 2011).

⁶⁰ *Scientists make first satellite map for China's wetlands*, PEOPLE'S DAILY ONLINE, Feb. 19, 2009, <http://english.peopledaily.com.cn/90001/90776/90881/6596132.html>.

⁶¹ *Id.*

⁶² Song Yuejun et al, *Application Status of China Brazil Earth Resources Satellite*, 28 (6) WORLD SCI-TECH RES. & DEV. 63 (Dec. 2006) (on file with author).

C. Applications in the Disaster Monitoring

The satellite data have been used in the monitoring of Huaihe River flood and waterlogging disasters, the freezing rain in Southern regions and snow disaster, Heilongjiang forest fires, and Australia bushfires.⁶³ In early 2008, China's Southern regions suffered from a rare freezing rain and snow disasters. From January 29 to February 22, CRESDA monitored a total area of 220 million square kilometers, and identified snow coverage of an area of 850,000 square kilometers in Southern China. The monitoring results greatly assisted the disaster relief work.

After the Wenchuan earthquake on 12 May 2009, CRESDA launched an emergency response mechanism to quickly arrange a satellite imagery program. It obtained images of the earthquake disaster area on 13 May. *CBERS* imaging of the disaster areas was then arranged every day. A total of twenty-three earthquake monitoring operations had been conducted and timely disaster monitoring reports had been provided to the higher authorities and national disaster mitigation department.⁶⁴

Using *CBERS-2B* data to monitor ice flood barrier bursts exit door location, barrier bursts, the submerged area of flood, etc., the Yellow River Conservancy Commission Information Center has been enabled to track, monitor, and assess the disaster, which provided a scientific basis for the Yellow River Flood Control Department to entirely control the flood situation, the reservoirs, and to timely deploy the work for flood prevention.⁶⁵

D. Applications in Regional and Urban Planning

The information about land and natural resources and environment received and analyzed from remote sensing data was provided to local authorities as a basic reference for further

⁶³ *Id.*

⁶⁴ 中巴地球资源卫星应用成就与展望 [Achievement and Prospect of *CBERS* Data Application], 3S NEWS, Dec. 15, 2009, available at http://news.3snews.net/industry/20091215/1585_3.shtml.

⁶⁵ *Id.*

regional or urban planning. It is reported that such information was used for the Yellow River estuary regional planning and sustainable development monitoring and Liaodong regional planning. The authorities of Hunan Province conducted remote-sensing surveys on the urban environment, pollution, and urban expansion in the three cities of Changsha, Zhuzhou, and Xiangtan.

Multi-source remote sensing data was used to study urban heat island status in Beijing and Nanjing. The result showed that there existed obvious urban heat island effect in these cities, and the causes were identified.⁶⁶ These remote sensing data-based researches assist the authorities in urban planning.

It is also reported that remote sensing data helped the selection of Qinghai-Tibet railway route, was applied to the south-to-north water transfer project, and served the Three Gorges Dam project and the 2008 Olympics in the construction of Olympic venues and neighboring transportation facilities.⁶⁷

IV. NATIONAL LAW GOVERNING REMOTE SENSING ACTIVITIES

China has neither enacted a comprehensive national space law nor a remote sensing law. Nevertheless, as a Contracting Party to the Outer Space Treaty,⁶⁸ China has an obligation to abide by its provisions. The U.N. Remote Sensing Principles also provide guidelines for carrying out remote sensing activities.⁶⁹ Besides, the “Interim Measures on the Administration of Licensing the Project of Launching Space Objects” and the “Measures for the Administration of Registration of Objects Launching into Outer Space,” promulgated in 2001 and 2002 respectively, are applicable to the civil space remote sensing activities carried out by a person, natural or judicial, or an organization within the territory of

⁶⁶ See Peng Zhong, *Research on Urban Heat Island in Beijing Based on Multi-source Remote Sensing Data*, 37 (22) J. ANHUI AGRIC. SCI. 10527-29 (2009). Wang Guiling et al., *An Assessment of Urban Heat Island Effect Using Remote Sensing Data*, 30 (3) J. NANJING INST. OF METEOROLOGY 298-304 (Jun. 2007).

⁶⁷ CRESDA, <http://www.cresda.com/n16/n1175/n41408/index.html> (last visited Feb. 4, 2011).

⁶⁸ Outer Space Treaty, *supra* note 4.

⁶⁹ Remote Sensing Principles, *supra* note 5.

China.⁷⁰ Under the licensing regulation, a space remote sensing operator has to obtain a permit or license from COSTIND prior to the launch of the remote sensing satellites.⁷¹ The remote sensing activities shall be supervised and inspected by COSTIND and the authorized officials.⁷² The COSTIND is empowered to cease the illegal space activities if the operators undertake unauthorized space activities.⁷³ Further, the COSTIND shall impose administrative penalties in accordance with relevant domestic laws if a space activity violates the regulation and national interests.⁷⁴ These provisions are similar to those in many national space or remote sensing legislations. For example, the Canadian Act Governing the Operation of Remote Sensing Space Systems establishes a licensing system for the operation of remote sensing satellite systems.⁷⁵ In the U.S., the Land Remote Sensing Policy Act of 1992 authorizes the Secretary of Commerce to license private sector parties to operate private space systems.⁷⁶ German remote sensing law provides in a slightly different way that only “the operation of a high-grade earth remote sensing system requires an operator license.”⁷⁷

However, the two Chinese space regulations are not sufficient to cover all aspects of remote sensing activities, especially in terms of dissemination of satellite data. As mentioned before, there is a provisional policy for the dissemination of *CBERS* domestic-made data. Authorities in charge of different matters made policies for dissemination of different satellite data. What China needs to do is to establish a

⁷⁰ Interim Measures on the Administration of Licensing the Project of Launching Space Objects, Nov. 21, 2002 (P.R.C.), at arts. 2 & 3, available at 33 J. OF SPACE L. 442 (2007).

⁷¹ *Id.* at art. 6, pp.443-444.

⁷² *Id.* at art. 23, p.447.

⁷³ *Id.* at art 25, p.447.

⁷⁴ *Id.* at art. 24, p.447.

⁷⁵ See Bill C-25: An Act Governing the Operation of Remote Sensing Space Systems (Can.), clauses 5-16 [hereinafter Bill C-25].

⁷⁶ See Land Remote Sensing Policy, 15 U.S.C. §§5601-5672, §5621.

⁷⁷ Act to Give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote Sensing data, Nov. 23, 2007, Part 2, §3, available at 34 (1) J. SPACE L. 115, 119 (2008) [hereinafter Protection against the Security Risk].

general data policy for dissemination of all kinds of remote sensing satellite data. China may benefit from the legislative experiences of foreign countries. The future national law regarding the general remote sensing data policy may include that, *inter alia*, the China Government should maintain a comprehensive archive of all Chinese remote sensing data for historical, scientific, and technical purposes just like the U.S. law has provided.⁷⁸ Private sectors should be encouraged to develop commercial market for remote sensing data and products.⁷⁹ However, remote sensing data and information about weather that concerns everyone's daily life should not be commercialized.⁸⁰ The same should apply to the remote sensing data and information about disasters as they concern disaster prevention and disaster relief, which may affect thousands of human lives and a large amount of properties. Distribution of remote sensing data should be based on the principle of non-discrimination. Considering the special features of remote sensing activities which most likely involve national interests, security and foreign affairs, the government's requests for remote sensing data or products in urgent circumstances should be given priority.⁸¹ Sensitive data may cause harm to national interests or foreign relations. Sensitivity of remote sensing data should be checked and distribution of sensitive remote sensing data and information should require a permit from competent authorities.⁸² So far, most of the China-made remote sensing data have been distributed free of charge. But to ensure the sustainable development of remote sensing technology, even un-enhanced data could be distributed at a reasonable cost.⁸³

⁷⁸ See Land Remote Sensing Policy, *supra* note 76, §5601 (16) & §5652 (a).

⁷⁹ *Id.* §5601 (14).

⁸⁰ *Id.* §5671.

⁸¹ See Bill C-25, *supra* note 75, clause 15; Protection against the Security Risk, *supra* note 77, at Part 4, § 21.

⁸² See Protection against the Security Risk, *supra* note 77, at Part 3, § 19.

⁸³ Under the U.S. law, unenhanced data are available to all users at the cost of fulfilling user requests. See Land Remote Sensing Policy, *supra* note 76, §5615(a) (1); Ray Harris, *Current Status and Recent Developments in UK and European Remote Sensing Law and Policy*, 34 (1) J. SPACE L. 33, 36 (2008).

CONCLUSION

In conclusion, China carries out remote sensing activities in accordance with international law and the Outer Space Treaty. The Remote Sensing Principles are also followed by China, although the Principles are not binding. Seeking self-development on the one hand, China commits herself “to develop a cooperative win-win relationship”⁸⁴ with all countries on the other. China not only distributes most of the remote sensing data and products free of charge to meet social welfare demands at home, but also helps developing countries in Africa and Southern Asia in “the establishment and operation of data collecting and storage stations and processing and interpretation facilities” to “maximize the availability of benefits from remote sensing activities.”⁸⁵ Currently, China's remote-sensing products are developing from experimental application types to operational service types. The users at home and abroad will be able to greatly accelerate the wide applications of China-made remote sensing satellite data in environmental protection, urban planning, and disaster prevention. Under the above circumstances, there is a need for China to optimize current national laws to ensure the sustainable and orderly development of the remote sensing technology, to promote widespread dissemination of satellite data, and to encourage the applications of satellite data in various areas.

⁸⁴ Ambassador Tan, Head of the Chinese Delegation, General Statement at the 47th Session of Legal Sub-Committee, COPUOS (Apr. 2, 2008), available at <http://www.chinesemission-vienna.at/eng/fyywj/t420204.htm>.

⁸⁵ Remote Sensing Principles, *supra* note 5, at princ. VI.

LEGAL ASPECTS OF REDUCING GREENHOUSE GASES EMITTED BY AIRCRAFT REGISTERED IN KOREA: A RIPPLE EFFECT OF EU INITIATIVES

*Won-hwa Park**

I. INCREASING AIRCRAFT EMISSIONS THREATENING GLOBAL WARMING

An alarming increase of the global warming gases (GHG) threatening human environment was noticed by the international community in the 1980s and was the motive for both the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to set up in 1988 the Inter-governmental Panel on Climate Change (IPCC) to study the phenomena scientifically. Further concern was materialized by the conclusion of the United Nations Framework Convention on the Climate Change (UNFCCC)¹ which was opened for signature during the First Earth Summit in 1992 in Rio de Janeiro, Brazil.

Based on the UNFCCC, the international community started negotiations to formulate binding international rules to stabilize GHG in the air, resulting in the increase of global mean temperature of no more than 2°C² from the pre-industrial level. In order to do so, the concentrations in the atmosphere of GHG, including the critical carbon oxide (CO₂) calculated in

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¹ United Nations Framework Convention on Climate Change, May 9, 1982, S. Treaty Doc No. 102-38 (1992), 1771 U.N.T.S. 107 [hereinafter UNFCCC].

² “Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, SUMMARY FOR POLICYMAKERS, IPCC FOURTH ASSESSMENT REPORT 11, (Apr. 6, 2007) (hereinafter IMPACTS, ADAPTATION AND VULNERABILITY).

CO₂-equivalent have to be stabilized to 450 ppmv,³ after peaking from 2010 - 2015⁴ because of their long term effect. With this goal to realize, the global CO₂ emissions in 2050 have to be reduced by 80% over the 2000 level, while “[t]he atmospheric concentration of carbon dioxide increased from a pre-industrial value of about 280 ppmv to 379 ppmv in 2005.”⁵

The emissions of the GHGs, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC_s), perfluorocarbons (PFC_s), sulphur hexafluoride (SF₆) “have grown since pre-industrial times, with an increase of 70% between 1970 and 2004 from 28.7 to 49 gigatonnes of carbon dioxide equivalents.”⁶ As a consequence, global average temperature has increased by 0.74°C for the last 100 years (1906 to 2005) with the global average sea level rising “at an average rate of 1.8 mm per year over 1961 to 2003,” mostly due to anthropogenic activities.⁷

Looking at GHG emissions by sector in 2004, the international transport sector occupied 13.1% with energy supply being the largest source.⁸ Aviation CO₂ emissions alone were responsible for approximately 2.4% of the global GHG emissions in 1990 “but the share is projected to rise up to 10% [in 2050] in a business-as-usual scenario⁹ of global emissions,”¹⁰ according to the 1999 International Panel on Climate Change (IPCC) Special Report on Aviation and the Global Atmosphere produced at the

³ Parts per million by volume.

⁴ IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note 2, at 15.

⁵ INTER GOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, SUMMARY FOR POLICYMAKERS, IPCC FOURTH ASSESSMENT REPORT 2 (Feb. 2007) [hereinafter THE PHYSICAL SCIENCE BASIS].

⁶ CO₂ emissions have grown by about 80% and represented 77% of total anthropogenic GHG emissions in 2004. INTER GOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS, IPCC FOURTH REPORT 3, (May 2007) [hereinafter MITIGATION OF CLIMATE CHANGE].

⁷ THE PHYSICAL SCIENCE BASIS, *supra* note 5, at 5.

⁸ MITIGATION OF CLIMATE CHANGE, *supra* note 6, at 29.

⁹ Assuming 5% yearly growth compounded. INTER GOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT: AVIATION AND THE GLOBAL ATMOSPHERE, SUMMARY FOR POLICYMAKERS 6, 10 (1999) [hereinafter AVIATION AND THE GLOBAL ATMOSPHERE].

¹⁰ JAKOB GRAICHEN & BERND GUGELE, ETC/ACC TECHNICAL PAPER 2006/3 European Topic Center on Air and Climate Change 5, (Dec. 2006).

request of International Civil Aviation Organization (ICAO).¹¹ While the share of aviation is relatively small, i.e. 11.2% of the total GHG emissions of the transport sector in 2005,¹² “the impact of aviation on climate change is [believed] to be [contributing] two to four times higher” to global warming than the radiative forcing of its CO₂ emissions alone.¹³ This is because aircraft emissions of nitrogen oxides (NO_x) at high altitudes trigger the generation of ozone (O₃) which is “particularly effective in forming GHG ozone when emitted at cruise altitudes.”¹⁴

CO₂ emissions from international aviation alone are 1.9% compared with 2.7% from international shipping in the total CO₂ emissions in 2005.¹⁵

Applying IPCC 2006 Guidelines,¹⁶ estimates of Korean CO₂ emissions in the transportation sector, including aviation, has increased at yearly average to 5.7% from 1990 to 2005. This is higher than the 4.9% average increase rate of the total CO₂ emissions.¹⁷ The estimated yearly increase rate of emissions of the three gases, CO₂, sulphur dioxide (SO₂), and NO_x, from aviation in the period 1992 to 2006 can be broken down to 3.9% for domestic operations which stands in stark contrast to 12.9% for international operations.¹⁸

It is noteworthy that emissions of these gases from international flights for Korean airliners in 2006 occupies 92.2% in contrast to 7.8% for domestic flights, a corollary to a small territory with a lot of outward activities.¹⁹

¹¹ AVIATION AND THE GLOBAL ATMOSPHERE, *supra* note 9; JAKOB GRAICHEN & BERND GUGELE, *supra* note 10, at 5.

¹² *Id.*; Int'l Maritime Org., *Prevention of Air Pollution from Ships*, at 181, IMO Doc. MEPC 59/INF.10 (Apr. 9, 2009) [hereinafter *Prevention of Air Pollution*].

¹³ JAKOB GRAICHEN & BERND GUGELE, *supra* note 10, at 5; *see also*, MITIGATION OF CLIMATE CHANGE, *supra* note 6, at 49. However, another study suggests that the “total aviation-induced radiative forcing . . . is . . . twice that from CO₂.” ICAO, *ICAO Environment Report 2007*, at 123 (2007).

¹⁴ MITIGATION OF CLIMATE CHANGE, *supra* note 6, at 49.

¹⁵ *Prevention of Air Pollution*, *supra* note 12, at 181.

¹⁶ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES, adopted (2006), *available at* <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

¹⁷ MJ KIM & MJ AHN, ESTIMATES AND MANAGEMENT MEASURES OF GREEN HOUSE GASES IN AVIATION 55, Research Paper No. 2008-6 (Korea Transport Institute, 2008).

¹⁸ *Id.* at 66.

¹⁹ *Id.* at 65.

II. INTERNATIONAL REGIME GOVERNING GHG EMISSIONS BY AIRCRAFT

1. *Universal*

In order to implement the Climate Change Convention,²⁰ its parties started the negotiations to devise quantified emissions reduction soon after the entry into force of the Convention in 1994. The negotiations, which lasted for two and a half years, resulted in the Kyoto Protocol²¹ in 1997. The Kyoto Protocol introduced binding requirements for emissions reduction of the six global warming gases for developed countries (all of which are member States of OECD) as listed in Annex I of the Climate Change Convention (1992). Also included in the countries to be subject to the binding regime were economies in transition (EIT), i.e. East European countries. In total, there are thirty-nine countries, to include the USA. All these countries, except the USA, who bolted, are obliged to reduce the above mentioned six GHGs at an average of at least by 5% under 1990 levels, during the five years implementation period, from 2008 to 2012.²² In this newly devised regime with an enormous impact on the political, economic, and social behaviors of human lives, flexibility was integrated to reflect the different situations of each dutiful country on the one hand and to bring about maximum efficiency to achieve the objectives of the Protocol on the other hand.

Six GHG emissions are subject to reduction regardless of where they are made or where they come from as long as their source derives from human activities. They include emissions from aviation and shipping as long as they are produced in domestic operations. However, international bunker fuels (i.e. fuels burned for international operations of aircraft and ships) were excluded from application because of methodological difficulties at the time in calculating which emissions were attributable to which country for operations crossing many different

²⁰ UNFCCC, *supra* note 1.

²¹ The Kyoto Protocol to the Convention on Climate Change, adopted in Kyoto, Dec. 11, 1997, 2303 U.N.T.S. 148 [hereinafter Kyoto Protocol].

²² *Id.* at art. 3.1.

countries and the high seas. The Kyoto Protocol obliged Annex I countries to “pursue limitation and reduction of GHG emissions . . . from aviation and marine bunker fuels, working through the ICAO and International Maritime Organization (IMO), respectively.”²³

As discussed below, both international organizations were understandably slow in trying to devise mechanisms entrusted to them by the Kyoto Protocol, which had no determinable date of enforcement. This was due to a boycott by the United States, the biggest emitter of GHG in the world.²⁴ It was only in the year 2005 that, with the ratification of the Russian Federation, the Kyoto Protocol could finally come into force.²⁵

2. Regional

The European Union (EU) is the front runner in assessing, analyzing, sharing, educating, policing, and enacting all sorts of environmental issues that humans must address to save the Earth environment. The first UN Conference on Human Environment was held in Stockholm, Sweden in 1972 and the UN Environment Program (UNEP) established thereafter to deal with the increasingly important environmental issues in the United Nations.

Witnessing no meaningful ICAO action in accordance with Article 2.2 of the Kyoto Protocol and considering that aviation is the source of the fastest growing GHG emissions, with interna-

²³ *Id.* at art. 2.2.

²⁴ Under Article 25 of the Kyoto Protocol there is a “double trigger” requirement for its entry into force. Specifically, the ratification or accession of fifty-five States Parties, and incorporating States included in the Annex I list of countries, which account in total for at least 55% of the total CO₂ emissions in 1990. The Kyoto Conference prepared a report on CO₂ emissions of each of the Annex I countries, and calculated the total emissions in 1990 of all Annex I countries to be 13.7 gigatonnes, 36.1% of which was for the USA as the biggest CO₂ emitter in the world. Hence, the US’ announcement in 2001 that it was abandoning the Kyoto Protocol, after signing it on 12 Nov. 1998, doomed the future of the Protocol.

²⁵ Despite ratification of most Western countries, a boycott by the US could not easily meet the 55% CO₂ emissions requirement attributable to the Annex I countries. After a period of uncertainty, the requirement was met when Russia, the second biggest CO₂ emitter in 1990 with 17.4%, ratified the Kyoto Protocol in late 2004.

tional aviation taking the lion share,²⁶ the EU became anxious. The EU warned that if no action was taken within ICAO by 2002 it would undertake specific actions to reduce greenhouse gas emissions from aviation on their own.²⁷ In fact the EU enacted Directive²⁸ 2008/101/EC of the European Parliament and of the Council of 19 November 2008, which amended Directive 2003/87/EC to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community.²⁹ To provide the above Directive with necessary details for implementation, the EU Commission adopted Decision 2009/339/EC on Monitoring and Reporting Guidelines for Emissions and Tonne-kilometre Data from Aviation Activities.³⁰

The binding force of EU Directive 2008/101/EC, which applies to all aircraft flying to and from the EU from 1 January 2012 onward, has had an enormous impact. Nearly 4,000 airlines operating within, to, and from the EU are currently preparing to meet it while some airlines are contesting the legality of the Directive, which is discussed further below.

²⁶ “Approximately 20% of CO₂ emissions from aviation are due to domestic aviation, another 20% due to flights between EU Member States, and 60% due to flights leaving EU.” JAKOB GRAICHEN & BERND GUGELE, *supra* note 10, at 14; “Combined future bunker emissions from aviation and maritime sectors are projected to grow . . . from about 800 Mt CO₂ in 2000 to about 1,350 Mt by 2020 and nearly 3,000 Mt in 2050, . . . which is equivalent to an increase by about 70% in 2020 and 275% in 2050 compared to 2000. Aviation sector is responsible for most of this growth.” JASPER FABER ET AL., AVIATION AND MARITIME TRANSPORT IN A POST 2012 CLIMATE POLICY REGIME 126, 47, (CE Delft Report, Dec. 2006).

²⁷ Decision 1600/2002/EC, art. 5.2.(iii), 2002 O.J. (L.242) 7.

²⁸ A Directive is one of three forms of legislation in the EU, the other two being Regulation and Decision. A Directive is binding on the EU Member States as to the result to be achieved but leaves them the choice of the form and method they adopt to realize the European Community (EC) objectives within the framework of their internal legal order. A Regulation is a general measure that is binding in all its parts. A Regulation is directly applicable, which means that it creates law which takes immediate effect in all the Member States in the same way as a national instrument, without further action on the part of the national authorities. A Decision is the instrument by which the EC institutions give a ruling on a particular matter. By means of a Decision, the EU can require a Member State or a citizen of the EU to take or refrain from taking a particular action, or confer rights or impose obligations on a Member State of EU or its citizen. EUR-Lex, *Process and Players*, http://eur-lex.europa.eu/en/droit_communaire/droit_communaire.htm#1.3 (last visited Jan. 24, 2011).

²⁹ Council Directive 2008/101/EC, 2008 O.J. (L8) 3.

³⁰ Commission Decision 2009/339/EC 2009 O.J. (L103) 10.

3. ICAO Provisions

Annex 16 to the Convention on International Civil Aviation³¹ (Chicago Convention) addresses Environmental Protection by governing Aircraft Engine Emissions.³² However, the described engine emissions are concerned with smoke and three gases for certification purposes. They are unburned hydrocarbons (HC), carbon monoxide (CO), and NO_x. It has nothing to do with the six GHGs including the core CO₂ controlled by the Kyoto Protocol.

ICAO slowed the introduction of the new regime to reduce engine emissions when it adopted a resolution³³ at its 36th Assembly held in September 2007. It “[u]rges Contracting States not to [apply] an emissions trading system on other Contracting States’ aircraft operators except on the basis of mutual agreement between and among those States.”³⁴ Obviously, it intended to discourage the EU’s introduction of unilateral legislation in this regard as it did in the past regarding aircraft noise restriction.

The Member States of the European Community and 15 other European States placed a reservation on this Resolution and “reserve[d] the right under the Chicago Convention to enact and apply market-based measures . . . on a non-discriminatory basis to all [aircraft] operators of all States providing services to, from or within their territory.”³⁵

³¹ Convention on International Civil Aviation, Dec. 7, 1944, 61 Stat. 1180, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

³² *Id.* at Annex 16, Environmental Protection [hereinafter Annex 16].

³³ ICAO, *Consolidated statement of continuing ICAO policies and practices related to environmental protection*, Assemb. Res. A36-22 (2007) compiled in *Assembly Resolutions in Force*, at I-54, ICAO Doc 9902 (Sept. 28, 2007).

³⁴ *Id.* at Appendix L, I-72.

³⁵ ICAO, *Extracts of Minutes of the Ninth Plenary Meeting of the 36th Assembly Meeting*, at 5, ICAO Doc. A36-MIN.p/9, (Feb. 2, 2008).

III. KOREA CAUGHT IN-BETWEEN ESTABLISHING AN INTERNATIONAL REGIME

1. Adhesion to the Organization for Economic Co-operation and Development in 1996

The Republic of Korea (ROK) joined the so-called “rich countries’ club,” the OECD, in 1996 as its 29th member and second Asian member. At the time, the Kyoto Protocol negotiations were in progress. Although Korea was not one of the Annex I countries of the Climate Change Convention, it was under pressure to join the list because it was becoming an OECD Member State. Despite the ROK’s fast growing GHG emissions, its national interests dictated that it avoid joining the Annex I countries upon which obligatory reduction of GHG was to be imposed.³⁶

As to CO₂ emissions by country, Korea ranked ninth, ahead of Italy, which was the fifth largest emitter, ahead of the United Kingdom, for international bunker fuels in only 2006.³⁷ Although Article 2.2 of the Kyoto Protocol does not elaborate on the emissions from aviation and maritime bunker fuels, the international community distinguished emissions from bunker fuels for aviation and shipping engaged in international opera-

³⁶ Negotiations for Korea to officially apply for OECD membership took more than a year.

It joined in December 1996. Two critical issues were: first, its laws prohibiting labor from establishing multi-unions, and second, its participation in the ongoing negotiations of the Kyoto Protocol. The ROK could join the OECD by promising to allow multi-union activities and by participating in the negotiations of the Kyoto Protocol as an OECD member. But the written agreement between the OECD and ROK regarding the Kyoto Protocol gives rise to different interpretations depending on the angle perceived. Despite continuous pressures from Western countries to honor its ambiguous pledge, Korea did not join the Annex I countries and was un-cooperative in the final days of the 1997 Kyoto Conference. Mexico is another OECD member that avoided Annex I.

³⁷ In 2006, the ten big CO₂ emitters (excluding land use change and forestry but including international bunkers) were, in order: China, USA, Russia, India, Japan, Germany, UK, Canada, Korea, and Italy. In 2006, regarding international bunkers the five biggest emitters were USA, Singapore, the Netherlands, UAE, and Korea. Carbon Dioxide Information Analysis Center, *Top 20 Emitting Countries by Total Fossil-Fuel CO₂ Emissions for 2007*, http://cdiac.ornl.gov/trends/emis/tre_tp20.html (last visited Jan. 25, 2011).

tions from those for domestic operations and included only the latter in national total emissions of the countries bound by the Kyoto Protocol for obligatory reduction.³⁸ Because of methodological problems of which emissions to be attributed to which country for international bunker fuels, the matter was entrusted to the Annex I parties to work through with the relevant international organizations, i.e. ICAO and IMO respectively.³⁹

Since Korea was a country with certain important emissions, even though it could avoid Annex I list, it has been, after the conclusion of the Kyoto Protocol, under continuous pressure from Western countries, other than the United States, to accept its responsibility as a member of the OECD and commensurate with its sizable emissions. In this context, the Korean government has been inclined to undertake certain measures with the post-Kyoto process.

2. A Change of Attitude by the New Government

A new government led by President Lee Myung-bak was installed in February 2008, and caused the Korean government to change its reserved attitude. It began to take different approaches towards recognizing its responsibility on major international issues where international cooperation is essential to the success and the benefit of all. Korea often shunned its duties, including moral ones. This was because of its weak history of getting involved in international efforts involving universal values that were deemed to be taken only by the advanced countries. Korea needed more time to adjust to the new international political, economic, and social environment, wherein it had to fulfill its role as an advanced emerging power with rapid and continuing political and economic achievements.

³⁸ Conference of the Parties to the Framework Convention on Climate Change, *Decision 21/ CP.3, adopted in Kyoto Conference together with the Kyoto Protocol in 1997, compiled in Report of the Conference of the Parties on Its Third Session, Held at Kyoto from 1 To 11 December 1997, Addendum, Part Two: Action Taken by the Conference of the Parties at its Third Session*, 27, 31, U.N. Doc. FCCC/CP/1997/7/Add.1 (Mar. 25, 1998).

³⁹ Kyoto Protocol, *supra* note 21, at art. 2.2.

Mr. Lee's election and vision was timely. He began to put his philosophy into government policies. *Low Carbon, Green Growth* was high on his agenda and he began to apply it to internal and external government policies. The government's declaration in 2009⁴⁰ to voluntarily reduce GHG by 30%, compared to the business-as-usual in Korea scenario by 2020, was a remarkable gesture for Korea. It was intended to enable Korea to join the ranks of advanced countries.

To implement these policies, the Framework Act on Low Carbon, Green Growth⁴¹ was enacted, followed by the Presidential Decree.⁴²

IV. EU INITIATIVES ON AIRCRAFT EMISSIONS

1. The Weakening Role of the International Civil Aviation Organization

As mentioned above, ICAO was a victim of inertia⁴³ when the Warsaw System⁴⁴ on international transportation was crumbling. This was particularly true as regards the action taken by the International Air Transport Association (IATA),⁴⁵ together some of its member airlines, in modernizing the com-

⁴⁰ Thirty percent reduction of GHG was an essential element of the Green Growth National Strategy and Five-year Plan which was announced on 6 Jul. 2009 by the Korean government, available at http://www.unep.org/PDF/PressReleases/201004_UNEP_NATIONAL_STRATEGY.pdf (last visited Jan. 21, 2011).

⁴¹ Framework Act on Low Carbon, Green Growth, Act No. 9931 (Jan. 31, 2010), available at <http://www.moleg.go.kr/FileDownload.mo?flSeq=30719>.

⁴² Enforcement Decree of the Framework Act on Low Carbon, Green Growth, Presidential Decree No. 22124 (Apr. 13, 2010), available at <http://www.moleg.go.kr/FileDownload.mo?flSeq=30708>.

⁴³ PAUL DEMPSEY & MICHAEL MILDE, INTERNATIONAL AIR CARRIER LIABILITY: THE MONTREAL CONVENTION OF 1999 36-43 (2005).

⁴⁴ A series of treaties starting with the Convention for the Unification of Certain Rules Relating to International Transportation by Air, Oct. 12, 1929, 49 Stat. 3000; 137 L.N.T.S. 11 [hereinafter Warsaw Convention] and supplementary and amending protocols thereto to govern on the compensation for delay, death or wounding of passengers and for the damage, delay, loss, or destruction of luggage or cargo, all caused by the accident of aircraft are called the Warsaw System or Warsaw Regime.

⁴⁵ International Air Transport Association incorporated in Canada in 1944 as a trade organization for its member airlines also played its role as a trust in deciding the rate and condition of international air flights around the world. Since the liberalization act of the United States in 1978, *de facto* regulatory role in price fixing has substantially diminished.

pensation system. Although ICAO was instrumental in concluding the Convention for the Unification of Certain Rules for International Carriage by Air⁴⁶ (Montreal Convention), it was a last minute attempt made in dereliction of its duty to have acted sooner.

The same passive attitudes of ICAO can be seen with regards to reducing aircraft engine emissions. It was only after the EU finalized the 2006 legislation⁴⁷ to include aviation activities in the greenhouse gas emissions allowance scheme within the European Community that ICAO reacted. It adopted Assembly Resolution A36-22 in 2007. The Resolution also established the Group on International Aviation on Climate Change (GIACC) to deal with the emissions issue. Based on its deliberations, ICAO held the October 2009 High-Level Meeting just ahead of the critical 15th Conference of the Climate Change Convention in Copenhagen, Denmark. There was a high expectation that a possible Post-Kyoto regime would be concluded in Copenhagen to govern beyond 2012.

The Copenhagen Conference was a failure, as were ICAO's actions which failed to focus strongly and early. There were no binding decisions, only aspirational goals or recommendations taken by ICAO. Therefore, ICAO member States are only bound by regional or national measures, if any, as long as they are not discriminatory in nature.

It is also interesting to note the actions of the International Maritime Organization (IMO), which is the other inter-governmental organization with whom the UNFCCC Annex I Parties have to work, in order to set up an emission limitation and reduction regime for marine bunker fuels. Unlike ICAO, IMO addressed the matter early and seriously. Considering the progress achieved in recent sessions⁴⁸ of the Marine Environ-

⁴⁶ Convention for the Unification of Certain Rules for International Carriage by Air, May 28, 1999, S. Treaty Doc. No. 106-45, 2242 U.N.T.S. 309.

⁴⁷ Commission Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, EU COM (2006) 818 Final (Dec. 20, 2006).

⁴⁸ *Prevention of Air Pollution*, *supra* note 12; Int'l Maritime Org., *UN Climate Change Conference 2009*, IMO Doc MEPC 60/INF.9 (Jan. 15, 2010).

ment Protection Committee (MEPC), one of the major committees of the IMO, it is likely that the binding regime for international maritime bunker emissions will be introduced within two years while there is no such attempt being made by ICAO for emissions reduction from international aviation bunker fuels. It is true that the United States is by far the largest aviation country to bolt out⁴⁹ of the Kyoto Protocol, and it was not interested in setting up a reduction regime for emissions from aviation bunker fuels.⁵⁰ The United States, whilst a modest maritime power in international shipping,⁵¹ does not play a dominant role, thus it may follow the majority view in the deliberations of the IMO. However this does not explain everything. Considering how the Kyoto Protocol entered into force without the United States, it is reasonable to also consider ICAO's past behavior of initially doing nothing and rushing in later in breach of its own rules to catch up with initiatives taken by many civil airlines to modernize the Warsaw System. Similar mistakes may be made again.

2. *EU initiatives*

Differing from its COM (2006) 818 Final version whereby the EU aircraft operators were subject to the cap and trade of engine emissions one year ahead of the aircraft operators outside EU, Directive 2008/101/EC obliges both intra-community/international EU aircraft operators to be subject to the same

⁴⁹ Total tonne/km of the scheduled air traffic of USA in 2008, the most recent available year for statistics, was 156,644, the largest in the world, occupying about 18% of the world total and is equivalent to combined air traffic from the second to eighth country's air traffic. Aviation Information Portal System, 주요통계지표, <http://www.airportal.co.kr/knowledge/statistics/KiPop01.html> (last visited Jan. 26, 2011).

⁵⁰ The reason is not to restrain the air industry of the United States. With this reasoning for the whole industries, the Bush administration abandoned the Kyoto Protocol in 2001.

⁵¹ "Based on total deadweight tonnage controlled by parent companies located in countries," the USA is the sixth largest shipping power in the world occupying 3.84% of the total controlled fleets, while Greece is the first, with 16.81%. IMO MARITIME KNOWLEDGE CENTRE, INTERNATIONAL SHIPPING AND WORLD TRADE FACTS AND FIGURES 14 (Oct. 2009), p. 14, available at http://www.imo.org/includes/blastDataOnly.asp/data_id%3D28127/InternationalShippingandWorldTradefactsandfiguresoct2009rev1_tmp65768b41.pdf.

rules at the same time. Major points of the Directive 2008/101/EC are:

- Integration of aircraft emissions into the existing emissions trading system (ETS) of the EU;
- Application to both EU and non-EU carriers operating from or to EU from 1 January 2012;
- Cap and trade for aircraft operators;
- Cap of allowed total emissions limited to 97% of annual average of historical emissions from 2004, 2005, 2006 for the calendar year 2012, and 95% from 2013 and onward;
- Share of each airlines' emissions in 2010 will be the basis of distribution of the total allowable emissions already decided as above;
- Actual emissions for non-EU operators in 2010 is revenue-tonne-km (RTK) based on flight legs between any point of EU and beyond it;
- Designation of Administering Member State responsible for administering EU scheme of emissions reduction in respect of aircraft operator for its own aircraft and foreign aircraft operator with the greatest estimated attributed aviation emissions from flights performed.⁵²

For newly entering aircraft after the monitoring year, i.e. 2010, and for operating aircraft whose tonne-km data increases by an average of more than 18% annually, 3% of the total quantity of allowances is set aside from the year 2013.⁵³ However big the increase of the operating aircraft operator may be, its increase from the special reserve is limited to 1,000,000 allowances.⁵⁴ "Any unallocated allowances in the special reserve shall be auctioned by member States."⁵⁵

For 2012, the first year of implementation, the reference year is 2010 and each aircraft operator applies for an allocation of allowances to be allocated free of charge to the Administering Member State by March 2011 and for subsequent years at least

⁵² EU Directive 2003/87/EC amended by 2008/101/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community. Council Directive 2003/87/EC, at art. 18a1.(a)-(b), 2003 O.J. (L 275) 32.

⁵³ *Id.* at art. 3.f.1.

⁵⁴ *Id.* at art. 3.f.2.

⁵⁵ *Id.* at art. 3.f.8.

twenty-one months beforehand.⁵⁶ At least eighteen months before the start of the period to which the application relates or for 2012 by the end of June 2011, member States submit applications to the European Commission, which fifteen months before the start of each period, or for 2012 by September 2011, shall calculate and adopt a decision setting out total quantity of allowances, the number of allowances to be auctioned, and the number of allowances in the special reserve.⁵⁷

As to auctions as an element of flexibility in securing the objectives of the Kyoto Protocol and the EU ETS, they are also allowed here. For the period from 1 January to 31 December 2012, “15% of allowances shall be auctioned,” so it shall be for the calendar year 2013 and beyond while the percentage may be increased from 2013.⁵⁸ Considering the stipulation of the Directive that review of the functioning of this Directive shall be undertaken by 1 December 2014,⁵⁹ the EU seems to have foreseen that the Copenhagen Conference would not have introduced aircraft emissions in the binding regime even if it were successful. The excess emissions penalty shall be EUR 100 for each tonne of carbon dioxide emitted for which the aircraft operator has not surrendered allowances without relieving the operator from the obligation of surrendering the allowances of excess emissions in the following calendar year.⁶⁰

It is not by accident that the European Union introduced the binding rules above. The European Commission has conducted time-consuming analysis and assessment of the harmful effects of the CO₂ emissions of the aircraft and prepared its Communication⁶¹ with following conclusions:⁶²

⁵⁶ *Id.* at art. 3.e.1.

⁵⁷ *Id.* at arts. 3.e.2, 3.e.3.

⁵⁸ *Id.* at art. 3.d.2.

⁵⁹ *Id.* at art. 30.4.

⁶⁰ *Id.* at art. 16(b)3.

⁶¹ *Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions Reducing the Climate Change Impact of Aviation*, COM(2005) 459 Final (Sept. 27, 2005).

⁶² *Id.* at 2.

- Although aircraft fuel efficiency has increased by more than 70% over the last 40 years, total amount of fuel burned increased due to even higher growth in air traffic;
- Impact of aviation on climate change is rising: while the EU's total emissions controlled under the Kyoto Protocol fell by 5.5% (-287 MtCO₂e) from 1990 to 2003, its GHG from international aviation increased by 73% (+47 MtCO₂e), corresponding to an annual growth of 4.3% per year;
- Emissions from international flights from EU airports will by 2012 have increased by 150% since 1990;
- The above growth would offset more than a quarter of the reductions required by the Community's target under the Kyoto Protocol.

The publication of the European Commission in August 2009 listed nearly 4000 aircraft operators licensed and/or responsible by each of twenty-seven Member States of the EU.⁶³ All the airlines operating to and from the European Union are busy now to prepare themselves for this newly introduced EU Directive of which implication is to reduce for each operator 30% to 40% of CO₂ in 2012, taking into account of the growth rate of air traffic from 5% to 6% in recent years.⁶⁴

3. Legality of the EU initiatives in international law

The Chicago Convention stipulates that “the contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.”⁶⁵

It allows a contracting State to establish prohibited areas of its territory for the reason of public safety provided that no dis-

⁶³ European Federation for Transport and Environment, *EU Checks aviation ETS calculations are robust*, Sept. 11, 2009, <http://www.transportenvironment.org/News/2009/9/EC-checks-aviation-ETS-calculations-are-robust/>.

⁶⁴ “The average annual passenger traffic growth rate was 5.3% between 2000 and 2007, resulting in the increased use of fuel in aircraft 8.4%.” European Federation for Transport and Environment, *Climate impact of aviation greater than IPCC report*, May 18, 2009, <http://www.transportenvironment.org/News/2009/5/Climate-impact-of-aviation-greater-than-IPCC-report/>.

⁶⁵ Chicago Convention, *supra* note 31, at art. 1.

inction is made between its aircraft and foreign aircraft engaged in the international scheduled airline services.⁶⁶

The Convention also obliges all aircraft engaged in international air navigation to follow the laws and regulations of a territorial State in which the aircraft are flying without distinction of nationality.⁶⁷

It is interesting to note the character of the International Standards or Procedures that the ICAO Council adopted in accordance with Articles 37 and 38 of the Chicago Convention. If the Standards are met, which establish the minimum level for uniform application among ICAO member countries, any contracting State or a group of States can establish a higher level of Standards for application in their territories as long as the differences between them and those of the ICAO are notified on the one hand and are applied without discrimination among States. Taking into account the diversity of Chicago Convention contracting States and the fact that uniform rules for safe and efficient operation of aircraft are still required all around the world, as well as the flexible mechanism by which a State can apply its different practices from the International Standards (as long as ICAO is notified of the differences), it must be interpreted that the Standards represent the minimum level.

On the negative side, although the Kyoto Protocol introduced binding international GHG emissions reduction for the first time in history, only those Annex I countries, OECD members and EITs are obliged to follow them. However, the EU Directive applies to all aircraft operators regardless of the status of the country the aircraft are registered with, Annex I or not, as long as they are operating to or from the EU. It is to be remembered here that the UNFCCC bringing about the Kyoto Protocol recognizes the “common but differentiated responsibility” as an important principle.⁶⁸

⁶⁶ *Id.* at art. 9(a).

⁶⁷ *Id.* at art. 11.

⁶⁸ UNFCCC, *supra* note 1, at art. 3.

More importantly, EU member States together with European Economic Area⁶⁹ and European Free Trade Association⁷⁰ members are subject to the Kyoto Protocol to reduce GHG by at least 5% in the implementation period of 2008-2012 over the 1990 level.⁷¹ A particular feature is that all those European countries have to reduce six GHGs from diverse emission sources, including emissions from domestic aircraft operation while emissions from international operation are beyond the scope of the agreement. When the EU Directive applies indiscriminately to all, Europe and non-European countries alike from the year 2012, the last year of the implementation period of the Kyoto Protocol, there comes about the unexpected premium in favor of the aircraft operators of Europe compared to non-European operators of non-Annex I countries who are not subject to any such obligation by the Kyoto Protocol. Because the European aircraft operators are anyway bound to reduce emissions by the Kyoto Protocol in the industry including domestic aircraft operation, in particular 8% reduction⁷² for members of the EU, starting a new emissions reduction regime for all aircraft operating to or from Europe from 2012, last year of the implementation period of the Kyoto Protocol, will result in less onerous burden for European carriers, to be considered a comparative edge of the European operators otherwise unavailable when the Kyoto Protocol is strictly observed.

While the non-European operators have to calculate their emissions for international flights only as the basis for allocation from 2012, European aircraft operators calculate both their international and domestic flights for the basis of allocation. Accordingly, the European aircraft operators will no longer have the disadvantage of applying the Kyoto Protocol alone in the

⁶⁹ European Economic Area (EEA), another European economic organization, consists of Norway, Iceland and Liechtenstein, which are not members of the EU. EEA Member States are sometimes bound by the EU laws based on prior basic arrangements of both parties, EU and EEA.

⁷⁰ European Free Trade Association (EFTA), a free trade grouping in Europe, is composed of Norway, Iceland, Liechtenstein, and Switzerland, all non-EU member States.

⁷¹ As shown in Annex B in accordance with art. 3(7). Kyoto Protocol, *supra* note 21.

⁷² *Id.*

year 2012. But this consequence was not one intended by the Kyoto Protocol, which clearly obliges the Annex I countries only to reduce GHG through 2012. The outcome is that European operators have drawn non-EU airlines, operating to and from the EU, to be on equal footing in reducing GHG from 2012, when legally no other States other than the Annex I countries are subject to the reduction regime, at least until 2012, under the Kyoto Protocol of universal application.

Another phenomenon that is favorable to the EU is that when intra-EU aircraft operations for European operators are considered international flights, the burden of the European operators is that much lessened because it is not subject to emissions reduction pursuant to the Kyoto Protocol. If this is the case, the EU is apparently selecting the most favorable rules in aviation, because its member States are allowed to enjoy *de facto* cabotage rights despite contrary provisions of the Chicago Convention.⁷³

Despite the above analyses, it is not clear whether international law permits certain States, here the EU, to impose restrictions on outside aircraft operators as they are prescribed in the EU Directive. As seen earlier, Article 2.2 of the Kyoto Protocol, considered to have universal application, simply entrusts Annex I countries that are Parties to the Protocol to pursue limits or reduce GHG from aviation bunker fuels working through ICAO. No agreement has been reached in this regard.

In December 2009, the Air Transport Association of America (ATA),⁷⁴ American Airlines, Continental Airlines, and United Airlines made a claim against the UK Secretary of State for En-

⁷³ Article 7 of the Chicago Convention obliges contracting States not to grant "on an exclusive basis" cabotage to another State. However, there are many such examples of *de facto* cabotage among their member States in the area of the European Union on its way to political integration after completing the economic one. Examples are numerous: British Airways operates Toulouse-Paris in France; The Dutch carrier Transavia operates intra-France rights through a daughter company; A Swedish carrier operates Barcelona-Madrid in Spain. Low cost carriers do the same in Europe. The EU may argue that the practices are not contrary to Article 7 of the Chicago Convention, interpreting "on an exclusive basis" in the same article to their favor. Chicago Convention, *supra* note 31, at art. 7.

⁷⁴ Founded in 1936, ATA is the oldest and largest airline trade association of the USA, representing the nation's leading airlines. See Air Transport Association, <http://www.airlines.org/pages/home.aspx> (last visited Feb. 4, 2011).

ergy and Climate Change before the Administrative Court of the UK High Court of Justice concerning the scope of application of EU Directive 2008/101/EC.⁷⁵ The principal point made by the claimants concerns the extension of the EU ETS to the airspace of third countries that are not EU States and over the high seas, as the Directive defines “aviation activities” as covering “flights which depart from or arrive in an aerodrome situated in the territory of a member State to which the EU Treaty applies.”⁷⁶ Moreover, the claimants point out that the EU ETS has been drawn up outside the framework of the ICAO that received the mandate to set up worldwide scheme from the Kyoto Protocol.⁷⁷

The English High Court recently gave the ATA and its three member airlines – American, Continental, and United – permission to take its legal challenge of the EU’s emission trading scheme to the European Court of Justice.⁷⁸

4. *Precedents of EU initiatives*

As the leading guardian of the environment in the world, the EU has the precedents of taking the initiatives earlier on another matter of environment, i.e. noise emissions.

The European Union, through its Directive 80/51/EEC, prohibited EU aircraft that do not meet the Chapter 3 noise level of Annex 16⁷⁹ from operating inside EU from the end of 1986 while

⁷⁵ Three airlines filed the lawsuit in the UK since it is the country responsible for overseeing their ETS compliance as the Administering EU Member State. The lawsuit was filed with the UK Administrative Court of the High Court of Justice instead of the European Court of Justice (ECJ) having jurisdiction over all EU Member States because private parties cannot have their case heard by the ECJ without the court of a specific EU Member State directing the case there.

⁷⁶ For a brief history of this bringing action to the court see Pablo Mendes de Leon, *ATA and others v. the UK Secretary of State for Energy and Climate Change (2009)*, 35 AIR & SPACE L., 199-200 (2010).

⁷⁷ *Id.* at 199.

⁷⁸ Lori Ranson, *US Challenge of EU’s ETS moves to the next level*, FLIGHT GLOBAL, May 27, 2010, <http://www.flightglobal.com/articles/2010/05/27/342529/us-challenge-of-eus-ets-moves-to-the-next-level.html>.

⁷⁹ One of the 18 Annexes to the Chicago Convention that provide detailed technical Standards and Recommended Practices for the uniform application of air navigation for the sake of safe and efficient operation of aircraft. Annex 16 prescribes rules and procedures on Environmental Protection, Volume I of which provides different levels of noise criteria of aircraft from Chapter 2 to Chapter 4 in the order of noise-making. Annex 16, *supra* note 32.

through its Directive 83/206/EEC⁸⁰ prohibiting non-EU aircraft from the end of 1987, with the final clauses that both Directives can be put on hold for two years. The measures evoked outrage from the majority of ICAO member States, which contested their legality and reasonableness. Hence the ICAO summoned a Special Assembly Meeting in 1990 and adopted a resolution,⁸¹ whereby it was urged for member States to phase-out gradually the noisy Chapter 2 aircraft over the period of seven years 1995 to 2002. In the meantime, both Directives were suspended.

As a further measure on noise control, the EU adopted Council Directive 89/629/EEC in 1989 to prohibit the registration of aircraft which did not meet Chapter 3 noise level requirements, as of 2 November 1990. It did not bar, however, the reconditioning of the aircraft engines to have them recertified to meet the Chapter 3 Standard. Consequently, lots of Chapter 2 aircraft were retrofitted with hush-kits⁸² to reduce the noise rather than being substituted by costly new aircraft. The EU subsequently took steps to deal with this unexpected circumvention by air carriers and adopted Council Regulation 925/1999⁸³ in 1999 to prohibit the recertificated aircraft (by hush-kitting) from flying into the EU area. This in turn upset the US government because the majority of Chapter 2 aircraft subject to the EU measures were American-made like Boeing 707, 727, DC-9. The US government made a complaint to the ICAO Council in accordance with Article 84 of the Chicago Convention in 2000.

Faced with the US' official complaint to the ICAO, the EU stepped back and suggested a one year deferment of the Regulation to allow time for American aircraft to replace the noisy engines. Nevertheless, the US government pushed the case forward. The EU submitted to the ICAO Council its Preliminary

⁸⁰ Council Directive 89/629/EEC, 1989 O.J. (L 363) 27-29.

⁸¹ ICAO, Assemb. Res. A28-3 (1990).

⁸² Hush-kitting a Boeing 737 cost about US\$1 million, about 330 pounds more in weight, and a fuel burn increase of 0.5%; this could reduce aircraft noise by seventeen decibels, enough to recertify a Chapter 2 as that of a Chapter 3. PAUL DEMPSEY, PUBLIC INTERNATIONAL AIR LAW 425 (2008).

⁸³ Council Regulation (EC) 925/1999, 1993 O.J. (L 115) 1.

Objection challenging the Council's authority to deal with the case. On 16 November 2000, for the first time in the history of ICAO, the Council made a decision. It rejected the EU position through its decision, although not on the merits, as regards to the dispute settlement referred to it. The EU softened its position and did not bring the case to the International Court of Justice (ICJ), which might have aggravated the situation. Instead, it presented its counter-memorial to the Council, which afterwards recommended negotiation between the disputing parties. With the good offices of the President of the ICAO Council, both parties settled the case in October 2001. The agreed solution was for the EU to repeal the Regulation in April 2002 and the USA withdraw its complaint from the Council.⁸⁴

V. RELEVANT LAWS AND POLICIES TO REDUCE GHG IN KOREA

1. Framework Act on Low Carbon, Green Growth

Under President Lee Myung-bak of Korea, a major policy shift was to accommodate the world-wide trend of environmentally friendly policies rather than reluctantly following them, as was done in the past. President Lee recognized the importance of coping creatively with the unprecedented challenges of our time and playing a leading role in the international arena by changing our way of thinking and proclaimed "Low Carbon, Green Growth." This green policy combined with an economic development strategy became the new vision to lead the nation's development for the next sixty years.⁸⁵

In the same vein, the Korean government announced the nation's mid-term plan for the reduction of GHG emissions outlining a 30% reduction compared to the business-as-usual by 2020. In order to support this ambitious target, the government

⁸⁴ See WON-HWA PARK, AIR LAW 95-99, 160-162 (3rd Ed., 2009).

⁸⁵ Lee Myung-bak, *Address by President Lee Myung-bak on the 63rd anniversary of national liberation and the 60th anniversary of the founding of the republic of Korea*, Aug. 15, 2006, http://english.president.go.kr/pre_activity/speeches/speeches_view.php?uno=270.