IUCN WORLD CONSERVATION CONGRESS Jeju 2012

Greenhouse gas Emissions ASSESSMENT REPORT

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Background

This report identifies the greenhouse gas (GHG) emissions arising from the International Union for Conservation of Nature (IUCN) Congress held in Jeju, Korea from the 6th to the 15th September, 2012.

Greenhouse Gas Emissions Assessment Summary

KEITI estimates total GHG emissions generated for the duration of the IUCN Congress was **6,847 tons CO_2 eq**. The breakdown of emissions by source is as follows.

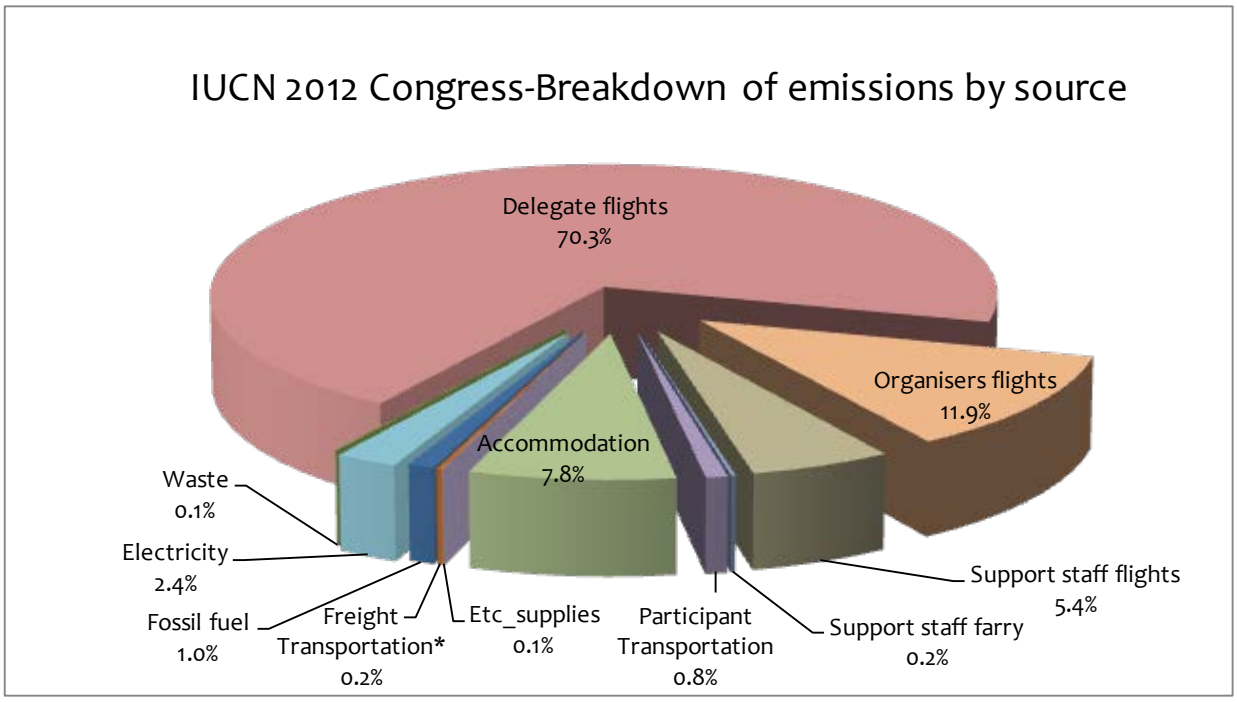

Figure 1. IUCN 2012 Congress-Breakdown of Emissions by Source

Emissions from flights by delegates were **4,811 tons CO_2eq** which accounted for 70.3% of the total emissions associated with the event.

GHG Assessment Boundary and Methods

The GHG emissions assessment boundary of the International Convention Center (ICC) Jeju includes journeys by all delegates between the 6th and the 15th September 2012 as well as GHG emissions associated with the use of all relevant facilities and supplies. Data sources and references including the WBCSD GHG protocol guidelines, IPCC guidelines, GHG-Energy target management guidelines[1] of the Framework Act on Low Carbon Green Growth[2], and the

[1] ***GHG-energy target management guidelines*** The guideline is a set of rules for enforcement of the GHG-energy target management policy which is one of the policies included in the Framework Act on Low Carbon Green Growth. The guideline includes scope of implementation, rules on target setting, GHG assessment and verification,

National Life Cycle Inventory database[3] were employed for the assessment.
The Boundary for GHG emissions assessment includes use of fossil fuels, electricity consumption, waste generation, journeys by delegates, use of accommodations, use of transport within the event venue, emissions associated with freight transport and use of supplies.

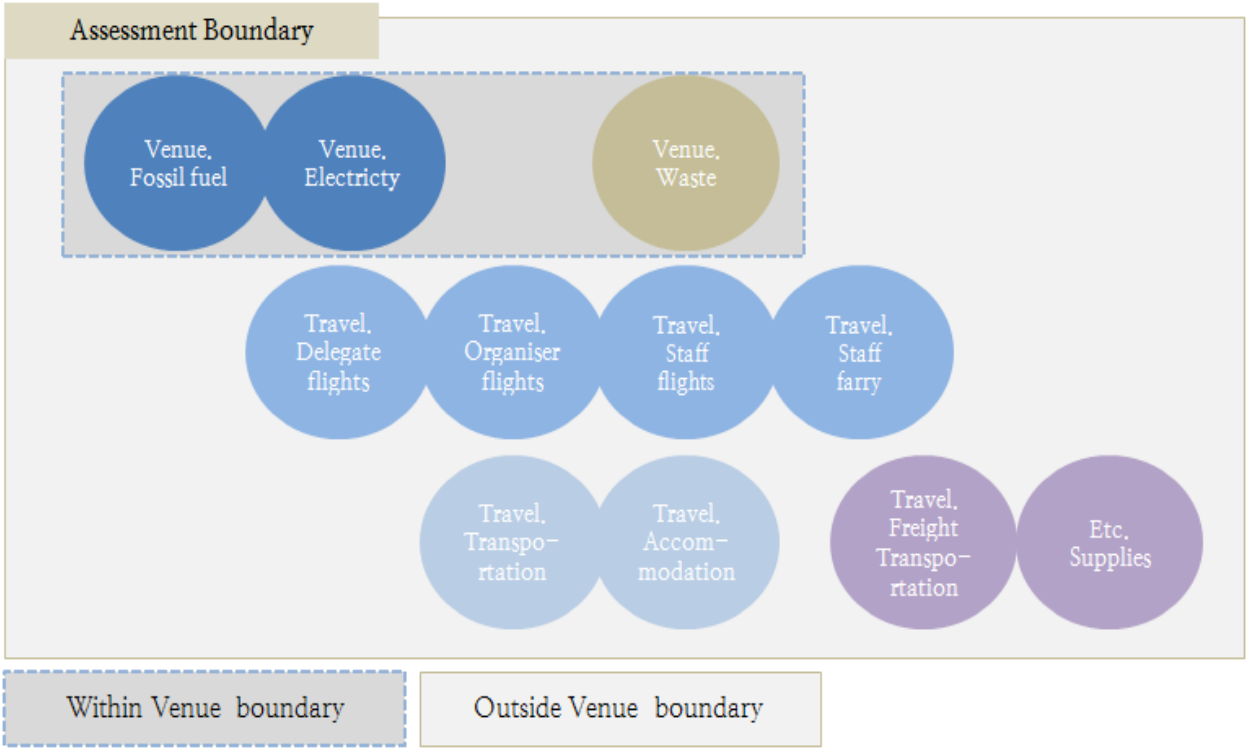

Figure 2. Assessment boundary of IUCN WCC Jeju 2012

Recommendations

Emissions assessment boundaries and sources must be defined clearly in order to set a clear GHG emissions assessment standard for IUCN congress events.
IUCN should create GHG emissions assessment guidelines and calculation methods in order to lay down the accountable assessment of GHG emissions associated with each IUCN Congress session.

IUCN should establish an activity data monitoring system and set the data management standards of the host country in order to ensure accuracy and reliability of GHG emissions assessment.
IUCN should take measures to reduce GHG emissions associated with the journeys of delegates by encouraging delegations to utilize alternative modes of transport which can lead to reductions in transport-related GHG emissions.

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management of the verification agency and etc.

[2] ***Framework Act on Low Carbon Green Growth*** Enacted in January 2010, it was designed to promote low carbon green growth of Korea's national economy with green technologies and green industries as the main drivers for achieving optimal balance of economic growth and environmental preservation.

[3] ***National Life cycle Inventory Database Network*** The database network is an on-line based system which collects and manages life cycle assessment data from raw materials, transport, industrial processes and waste management

IUCN should encourage increased use of alternative energy for electricity, cooling and heating of event facilities in order to reduce fossil fuel use and GHG emissions associated with the IUCN Congress event.

About IUCN WCC

Introduction to IUCN WCC

Figure 3. IUCN WCC Jeju 2012

The International Union for Conservation of Nature (IUCN) is a non-profit organization which has a permanent status as a UN observer. The IUCN began when its first congress meeting was held at Fontainebleau, France in 1948 to establish a new environmental institution. It now stands as one of the most authoritative body for the protection of nature. The name World Conservation Union was adopted for use in 1990 along with the IUCN.

The IUCN meeting has been held alongside the World Conservation Congress since 1996, and it serves as an international forum for discussing global environmental issues.

The fifth IUCN World Conservation Congress was held in Jeju, Republic of Korea. It was the first congress to be held in Northeast Asia and the event lasted for ten days from the 6th to the 15th September. Held at the International Convention Center (ICC) Jeju, the event was attended by **7,913 participants[4] from 156 countries**.

Significance of IUCN WCC

A wide variety of issues and policies relevant to the conservation of the global environment are discussed during the congress. Discussion between representatives of NGOs and governments on various environmental issues are conducted for the adoption of detailed resolutions at the end of each congress meeting. The participating NGO and governmental experts share information and experiences to produce a resolution that provides practical solutions on conservation and development issues. The resulting resolutions influence the shape of international environmental treaties, conventions and laws of respective bodies.

Objective of the Emissions Assessment

GHG emissions associated with IUCN WCC event are carefully calculated in order to monitor

[4] This figure includes 4895 Congress delegates, 364 organizers and 2654 special guests, support staff and volunteers.

the impact of IUCN WCC on climate change and to identify measures to achieve sustained reductions at future events.

GHG Emissions Assessment Method

GHG emissions associated with the IUCN WCC Jeju 2012 were calculated using ISO 14064, WBCSD/WRI GHG protocols and IPCC guidelines as reference. The assessment procedure employed for GHG emissions assessment at the event is as follows.

Table 1. Emissions assessment methods employed for assessment of IUCN WCC Jeju 2012

Procedure	IUCN WCC GHG emissions assessment methods		
Standards setting	ISO 14064 standard	WRI/WBCSD GHG Protocol	IPCC Guideline
Boundary setting and identification of emissions sources	Scope 1	Scope 2	Scope 3
Data collection	Defining assumptions	Activity data collection	Emission factor verification
Data collection and analysis	Data analysis	Data verification	QA/QC
Emissions calculation and reporting	Emissions calculation framework	Reporting of analysis data	Preparation of emissions report

Glossary of jargon of climate change and emissions calculations are included in Appendix I of the report. Detailed information including base data, assumptions and emission factors are included in Appendix II.

GHG Emissions Assessment Standard

KEITI employed internationally recognized standards and guidelines for assessment of GHG emissions as reference for assessment of GHG emissions associated with the IUCN WCC Jeju 2012 event. For example, the WRI/WBCSD GHG protocol was employed to classify different types of emissions into one of the three scopes. In addition, the IPCC Guideline served as a

reference for GHG emissions calculations, activity data types, emission factors and assessment methods.

The monitoring structure establishment and data collection methods defined in the ISO 14064, the International Standard for GHG Emissions and Verification was employed as well. Table 2, below, provides an overview of standards and guidelines used for the assessment of GHG emissions associated with IUCN WCC Jeju 2012.

Table 2. Standards and references employed for the GHG emissions assessment

Section	WCC Emissions Standards employed	
ISO 14064 (International Standards for GHG Emissions and Verification)	Overview	· Principles and requirements of organizations (companies) on GHG emissions inventory design, preparation, management and reporting · Rules and guidelines for monitoring reporting within the scope of project · Principles and requirements for validity review of project and verification of GHG inventory
	Adopted	· Monitoring and data collection methods by GHG emission sources
WRI/WBCSD GHG Protocol (Definitions and guidelines)	Overview	· Guidelines on assessment and reporting of GHG Inventory for corporations developed by the World Resource Institute and World Business Council for Sustainable Development · GHG emission assessment guidelines by scope
	Adopted	· Classification of emissions by scope and boundary conditions
IPCC Guideline (Overview of calculation methods)	Overview	· Technical details on emissions assessment including calculation methods by source, activity data types, emission factors and so on · Reporting format and national GHG inventory assessment methods
	Adopted	· Emissions calculation method by source, activity data type and emission factor

GHG Emissions Assessment Scope

Setting a clear assessment boundary is crucial for improving reliability of GHG emissions assessment results. The WBCSD/WRI Greenhouse Gas Protocol sets boundaries that are consistent with the assessment boundaries used for financial reporting purposes. When reporting on third party companies, clearly defined concepts of ‘control’ and ‘equity share’ should be used when apportioning emissions

The emissions assessment boundaries are defined in line with IUCN’s guidelines and that of the Republic of Korea. All activities by relevant participants and their associated GHG producing

activities are outlined, and classified within these boundaries.

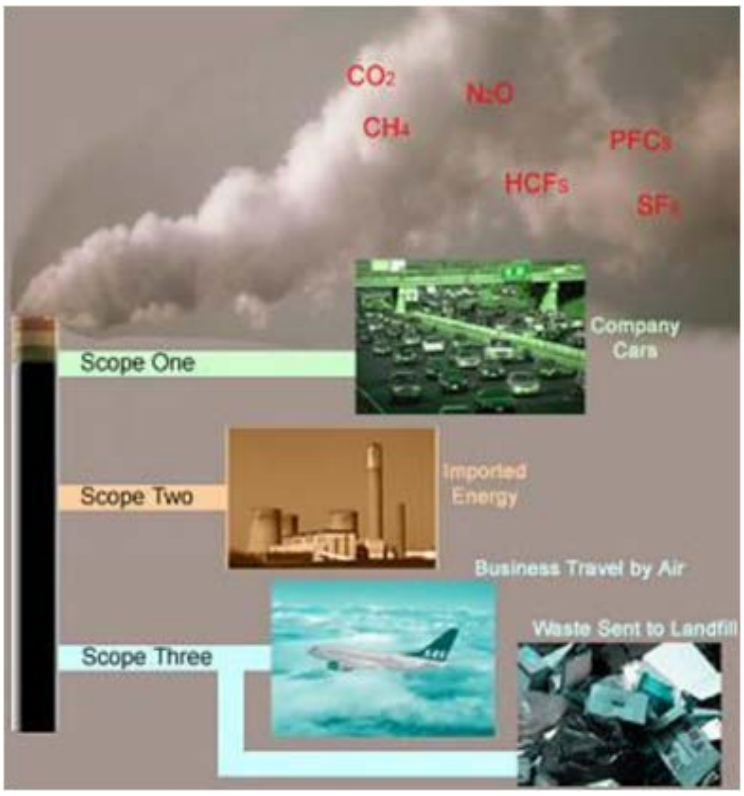

Figure 4. The three scopes of the WBCSD/WRI Protocol

WBCSD/WRI protocol provides a three scope reporting framework which is illustrated in Figure 4.

Scope 1 covers direct GHG emissions from fossil fuel consumption within the assessment boundary.

Scope 2 includes net indirect emissions from energy imports and exports, particularly imported and exported electricity and steam.

Scope 3 includes other indirect GHG emissions such as delegate travel, product transport by third parties, outsourcing of core activities and off-site waste disposal/management activities.

All activities that lead to generation of GHG emission are included in the boundary and are classified into different scopes by emission type.

The WBCSD/WRI Protocol recommends that Scopes 1 and 2 are reported as a minimum. However, the majority of GHG emissions arise from scope 3 sources (including delegate travel, accommodation, transport of freight and supplies). For a comprehensive assessment of total climate change impact, relevant Scope 3 activities were included in the assessment.

Figure 5. Jeju International Convention Center

The ICC Jeju (Figure 5), which as the main venue of the IUCN WCC Jeju 2012 served as the physical boundary of the event.

The GHG emissions assessment of the IUCN WCC Jeju 2012 is based on calculations of six Kyoto greenhouse gases. The six Kyoto greenhouse gases are CO_2, CH_4, N_2O, SF_6, PFCs and HFCs and emission factors for each greenhouse gas is expressed in global warming potential (GWP) as units of CO_2-equivalent(CO_2-eq). Greenhouse gases with high GWP can lead to relatively high impact on global warming with a relatively low volume of emissions.

Table 3. The global warming potential of Kyoto gases

Greenhouse gas	GWP*	* The GWP is an index that compares the relative potential (to CO_2) of the 6 greenhouse gases contribution to global warming(Source: IPCC, 2007)
Carbon Dioxide (CO_2)	1	
Methane (CH_4)	25	
Nitrous oxide (N_2O)	298	
Sulfur hexafluoride (SF_6)	22,800	
Perfluorocarbons (PFCs)	4,800-9,200	
Hydro fluorocarbons (HFCs)	12-12,000	

IUCN WCC Jeju 2012 Emission Sources

Activities included with the IUCN WCC Jeju 2012 GHG emissions assessment boundary are

energy consumption and waste disposal at the venue, flight travel and accommodation associated with delegates, organizers and support staff, transport by cars and all deliveries made.

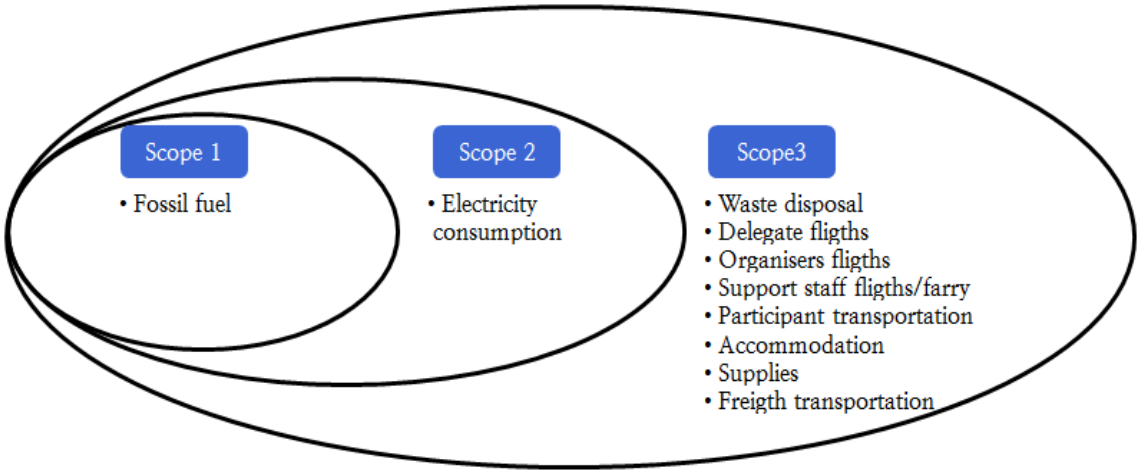

Figure 6. IUCN WCC 2012 Jeju GHG Emission Sources classified reporting scopes

Table 4. GHG Emission sources by WBCSD/WRI Protocol Scope

Source of emissions	WBCSD/WRI Protocol Scope		
	Scope 1	Scope 2	Scope 3
Venue-Fossil fuel	O		
Venue-Electricity		O	
Venue-Waste			O
Travel-Delegate flights			O
Travel-Organizers flights			O
Travel-Support staff flights			O
Travel-Support staff ferry			O
Travel-Participant Transportation			O
Travel-Accommodation			O
Deliveries-Freight Transportation			O
Etc-Supplies			O

Activities that led to generation of GHG emissions during the IUCN WCC Jeju 2012 is illustrated in Figure 7.

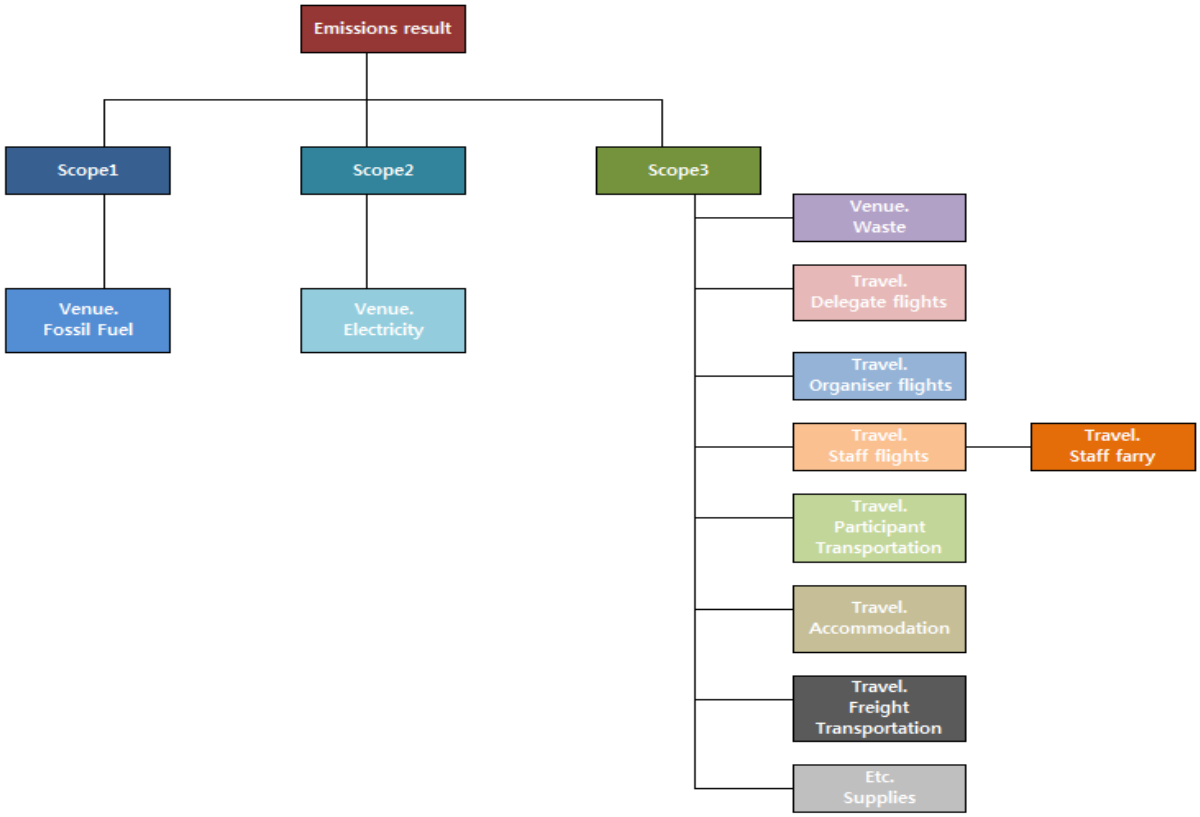

Figure 7. Emission Sources of IUCN WCC Jeju 2012

Activity Data Collection and Assumptions

The Korea Environmental Industry and Technology Institute (KEITI) led the collection of data and GHG emissions assessments associated with the IUCN WCC Jeju 2012. The time scope of data collection was between the 6th and the 15th September 2012 in line with the duration of the event.

The WCC Jeju 2012 Congress was systematically managed by the congress management committee, PCO (Professional Conference Organizers) and the ICC Jeju. A source by source data monitoring structure was established for more accurate and reliable GHG emissions assessment with less reliance on assumptions.

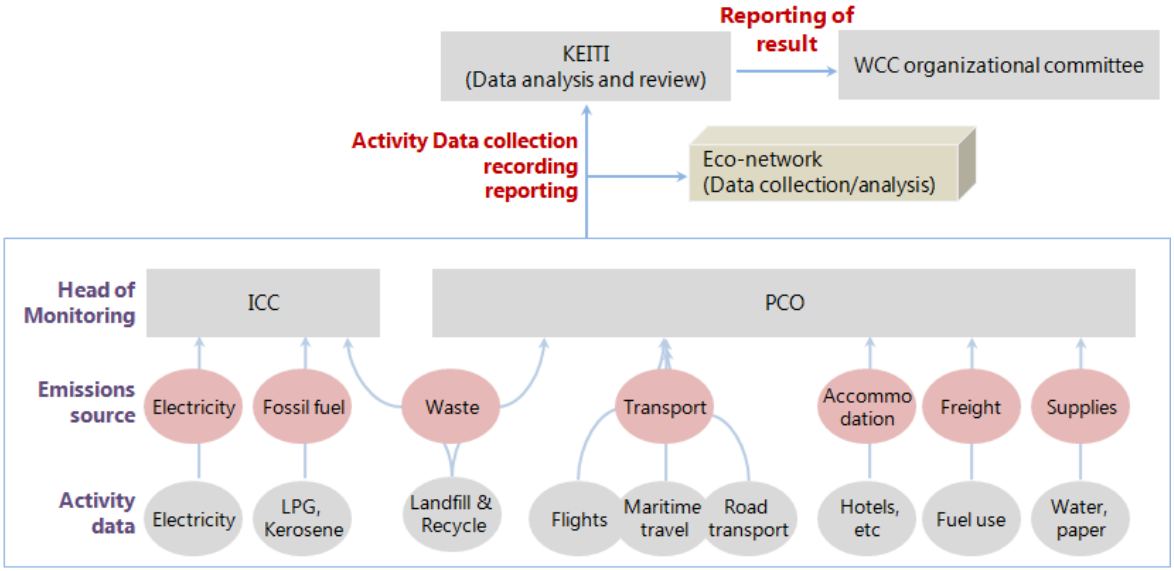

Figure 8. Activity Data Monitoring Structure

List of data collected and collection methods set by the source-by-source monitoring structure is illustrated in Table 5 as follows.

Table 5. Data collection methods employed for GHG emissions assessment

Source of emissions	Activity data	Collection method
Venue-Fossil fuel	Amount of fossil fuel used	Daily fossil fuel consumption data collected
Venue-Electricity	Amount of electricity used	Daily electricity consumption data collected
Venue-Waste	Amount of waste generated	Daily waste processing data collected
Travel-Delegate flights	Number of participants, flight origins	On-site registration data collected
Travel-Organizers flights	Number of participants, flight origins	On-site registration data collected
Travel-Support staff flights	Number of participants, flight origins	On-site registration and non-registration data collected
Travel-Support staff ferry	Number of participants, ferry origins	On-site registration data collected
Travel-Participant Transportation	Amount of fossil fuel used	Daily fuel consumption per vehicle employed for the event collected
Travel-Accommodation	Number of nights stayed	Relevant data was collected using the participant accommodation use management system
Deliveries-Freight Transportation	Amount of fossil fuel used	Daily fuel consumption per vehicles employed for the event collected
Etc-Supplies	Supplies used during the event	Data on amount of tap water and paper used collected

Assumption set and employed where relevant emission factors and activity data necessary for Assumption set and employed where relevant emission factors and activity data necessary for calculation of GHG emissions are missing.

A. Travel-flights

KEITI has assumed that all flight origins are the capital or major city or nearest international airport of each country and the Jeju International Airport is the final destination. The same assumption was applied for domestic flights. All flight distances are sourced from Air Routing International[5]. Average distance travelled by delegates from the identical home country was applied for delegates that did not submit information on flight origin.

B. Travel-Maritime

The nearest major port was assumed as a departure point for domestic participants who reported on travel by ferries to Jeju port. The Korea Hydrographic and Oceanographic Administration database on maritime travel distance was employed for calculation of distance travelled for participants who travelled by ferry.

C. Transport

Consumption of fuel for freight transport employed by WCC Organization Committee and PCO for the IUCN WCC Jeju 2012 event was collected for calculation of associated GHG emissions.

D. Supplies

Data for calculation of emissions associated with the use of supplies during the IUCN WCC Jeju 2012 was collected. Scope was limited to water and paper use for lack of relevant life-cycle assessment data in the National Life cycle inventory database of the Republic of Korea.

Activity Data and Emission Factors – QA/QC

Ensuring the highest data reliability and application of appropriate emission conversion factors is one of the most important requirements in calculation of emissions inventory data, which has to meet the high standards required by the international treaty/convention on climate change. In fact, the IPCC report emphasizes the importance of Quality Assurance / Quality Control in preparation of the emissions report. Econetwork, a consulting company which specializes in GHG emissions assessment was commissioned to conduct QA/QC of the IUCN WCC Jeju 2012 Greenhouse Emissions Data report.

1) Multiple reviews of activity data and emission conversion factors for the highest reliability and accuracy

2) Emissions data assessment for errors and omissions

Quality control (QC) measures employed include data collection, calculation, and use of standardized procedures. A number of quality control tools were employed for checking integrity of emission calculations, measurement methods, assumptions as well as top-tier quality control measures including emission sources, activities, emission conversion factors and methodologies

[5] ***Air routing flight information program*** http://www.airrouting.com/content/TimeDistanceForm.aspx

for assessment.

GHG Emissions Calculation

Both domestic and international protocols and guidelines were used as technical reference for calculation of emissions from various sources including emission conversion factors. The reference documents include guidelines for the GHG-energy target management policy included in the Framework Act on Low Carbon Green Growth of Korea, the National LCI database, IPCC guidelines and DEFRA guidelines. IPCC recommends use of country-specific emission conversion factors to ensure high reliability of GHG emissions reporting. KEITI followed the IPCC guidelines faithfully and employed country-specific emission conversion factors wherever possible. The emissions calculation formula and emission conversion factors employed are summarized in the Table 6.

Table 6. Emission calculation formula and conversion factors

Source of emissions	Emission calculation formula	Reference for emission conversion factor
Venue-Fossil fuel	Amount of fuel used x net calorific value x emission conversion factor	Framework Act on Low Carbon Green Growth, IPCC guideline (2007)
Venue-Electricity	Electricity consumption x emission conversion factor	Framework Act on Low Carbon Green Growth of Korea
Venue-Waste	Volume of waste generated x emission conversion factor	National LCI database
Source of emissions	Emission calculation formula	Reference for emission conversion factor
Travel-Delegate flights	Distance travelled x emission conversion factor	Defra 2012. Guidelines to Defra
Travel-Organizers flights		
Travel-Support staff flights		
Travel-Support staff ferry		
Travel-Participant Transportation	Amount of fuel used x net calorific value x emission conversion factor	Framework Act on Low Carbon Green Growth, IPCC guideline (2007)
Travel-Accommodation	Nights stayed x emission conversion factor	Defra 2012. Guidelines to Defra.
Deliveries-Freight Transportation	Amount of fuel used x net calorific value x emission conversion factor	Framework Act on Low Carbon Green Growth, IPCC guideline (2007)
Etc-Supplies	Amount of supplies used x emission conversion factor	National LCI database

Greenhouse Gas Emissions Assessment Result

Greenhouse Gas Emissions Assessment Summary

The total GHG emissions generated associated with the IUCN WCC Jeju 2012 are **6,847 tons-CO_2-eq**. Breakdown of emissions data is illustrated in Table 7.

Table 7. Breakdown of emissions by source (WBCSD/WRI Protocol)

Source of emissions		WBCSD Scope	Equivalent emissions		Proportion of total
			CO_2 (t)	C(t)	
Venue	Fossil fuel	Scope 1	68.77	18.76	1.0%
Sub-total			68.77	18.76	1.0%
Venue	Electricity	Scope 2	162.88	44.42	2.4%
Sub-total			162.88	44.42	2.4%
Venue	Waste	Scope 3	4.18	1.14	0.1%
Travel	Delegate flights		4,810.56	1,311.97	70.3%
	Organizers flights		811.76	100.61	11.9%
	Support staff flights		368.91	3.09	5.4%
	Support staff ferry		11.33	3.09	0.2%
	Participant Transportation		57.28	15.62	0.8%
	Accommodation		535.66	146.09	7.8%
Deliveries	Freight Transportation		11.38	3.10	0.2%
Etc	Supplies		3.82	1.04	0.1%
Sub-total			6,610.70	1,802.92	96.6%
Total			**6,846.53**	**1,867.23**	**100.0%**

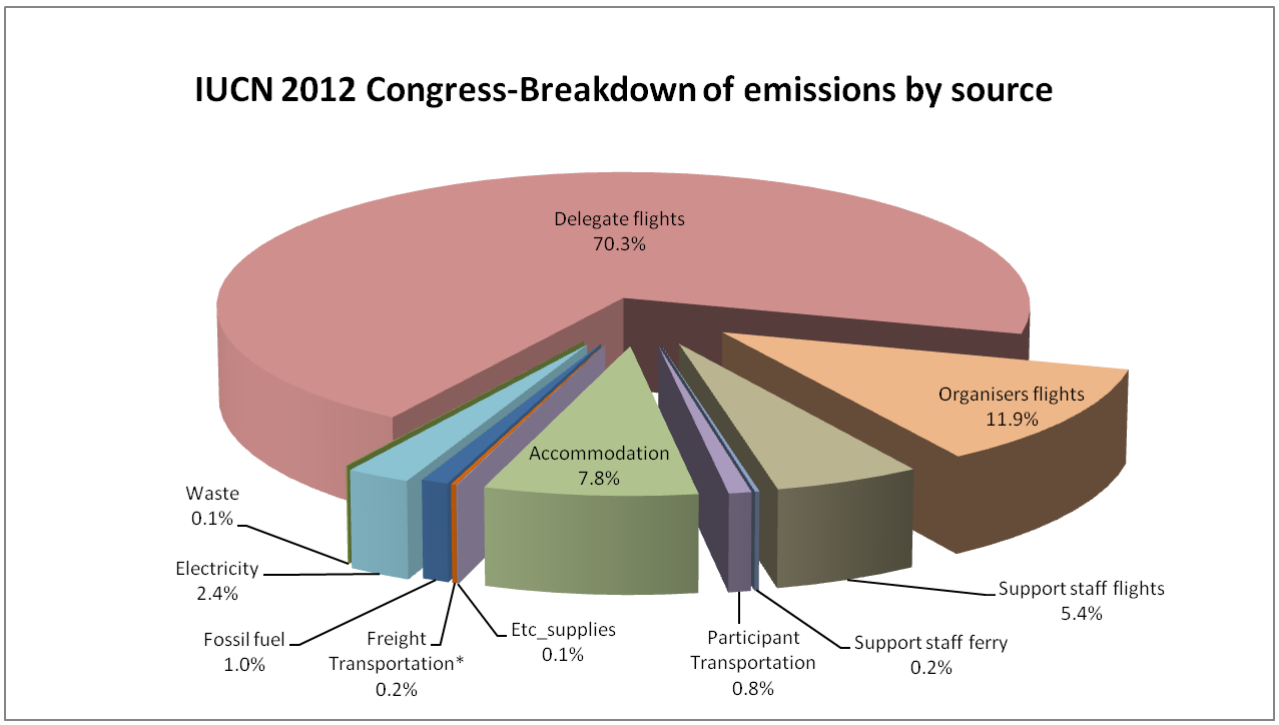

Figure 9. Breakdown of emissions by general activity

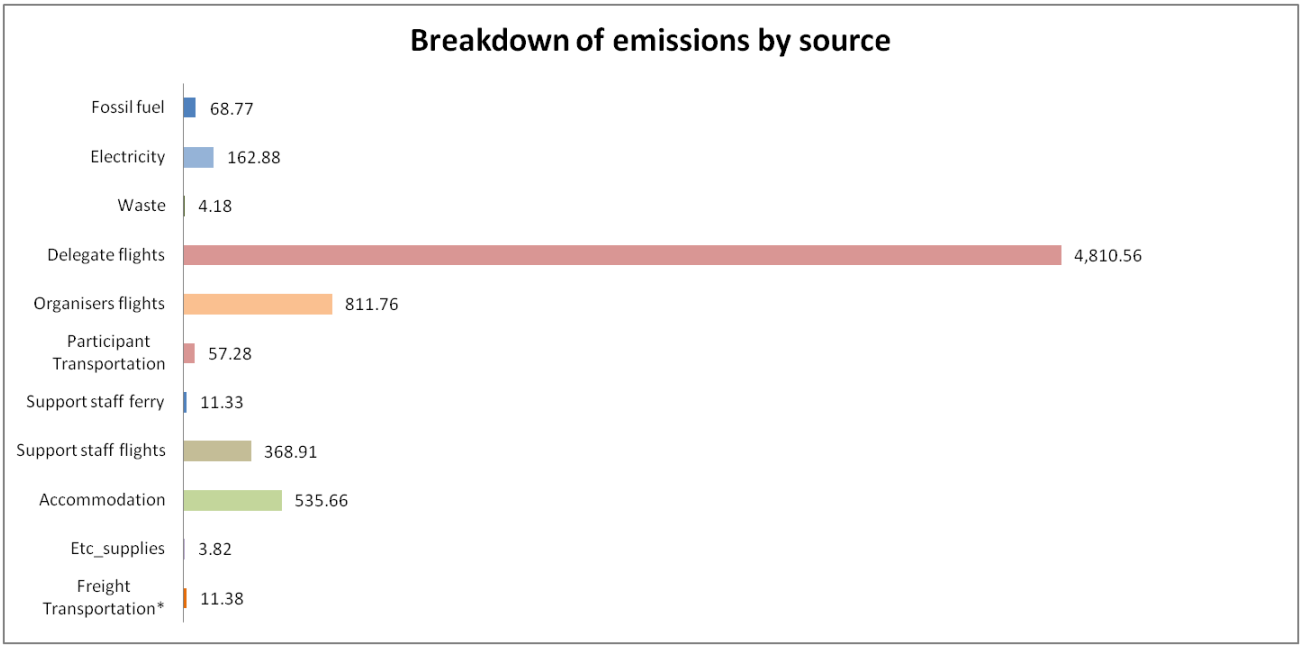

Figure 10. Breakdown of emissions by source

The emissions assessment results indicated that Scope 3 emissions accounted for 96.6% of the total emission associated with the IUCN WCC Jeju 2012 event at 6,615 tons CO_2-eq. In terms of activity types, delegate flights accounted for 70.3% of total emission at 4,811 tons CO_2-eq, making it the single highest source of GHG emissions. Organizer flights accounted for 11.9% of total emissions and were identified as the second largest source at 812 tons CO_2-eq. Accommodation for delegates and support staff flights were identified as the third and fourth largest sources of GHG emissions.

Use of energy for operation of the event venue takes significant portion of the Scope 1 and Scope

2 emissions. For example, emission associated with use electricity at the event venue was 163 tons CO_2-eq, which accounted for 2.4% of energy. GHG emissions associated with fossil fuel use for the operation of the event venue accounted for 1.0% of total emissions at 69 tons CO_2-eq.

Emissions associated with the use of supplies (water, paper) were the smallest source of GHG emissions at 3.8 tons CO_2-eq, accounting for 0.056% of emissions. Waste disposal and recycling was the second smallest source of GHG emissions at 4.2 tons CO_2-eq which is 0.06% of total emission.

Detailed information on GHG emissions calculation data is included in Appendix II of the report.

A total of 7,913 delegates from 156 countries participated in the IUCN WCC Jeju 2012. Since total GHG emissions associated with the event was **6,847 tons CO_2-eq**, and **emissions per delegate was 0.87 tons CO_2-eq**.

Table 8. Breakdown of emissions per delegate

Source of emissions	No. of delegates	ton CO_2-eq.	Emissions per delegate (tCO_2-eq/person)
Emissions per delegate	7,913	6,847	0.87

Since IUCN WCC is an international event, with a high proportion of emissions resulting from flights taken by delegates, it is difficult to compare GHG emissions from this event to previous events.

Regardless, the IUCN congress should use emissions data contained in this report to achieve reductions in GHG emissions at the next congress meeting where possible.

It requires 6,847 tons CO_2-eq of international carbon offsets (i.e. CERs) to make the IUCN WCC Jeju 2012 event carbon neutral.

Recommendations

Emissions assessment boundaries and sources must be defined clearly in order to set a clear

GHG emissions assessment standard for IUCN congress events.

IUCN should create GHG emissions assessment guidelines and calculation methods in order to lay down a continuous assessment of GHG emissions associated with each IUCN Congress session.

IUCN should establish an activity data monitoring system and set the data management standards of the host country in order to ensure accuracy and reliability of GHG emissions assessment.

IUCN should take measures to reduce GHG emissions associated with the journeys of delegates by encouraging delegations to utilize alternative modes of transport which can lead to reductions in transport-related GHG emissions.

IUCN should encourage increased use of alternative energy for electricity, cooling and heating of event facilities in order to reduce fossil fuel use and GHG emissions associated with the IUCN Congress event.

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Appendix I. Glossary

- **Carbon Dioxide Equivalent (CO_2-eq).** The universal unit of measurement used to indicate the global warming potential (GWP) of each of the 6 Kyoto greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.

- **Climate change.** A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability over comparable time periods (Source: United Nations Framework Convention on Climate Change).

- **Control.** The ability of a company to direct the operating policies of a facility or organization. Usually, if the company owns more than 50% of the voting interests, this implies control. The holder of the operating licence often exerts control, however, holding the operating licence is not a sufficient criteria for being able to direct the operating policies of a facility or organization. In practice, the actual exercise of dominant influence itself is enough to satisfy the definition of control without requiring any formal power or ability through which it arises.

- **Direct emissions.** Emissions that are produced by organization-owned equipment or emissions from organization-owned premises, such as carbon dioxide from electricity generators, gas boilers and vehicles, or methane from landfill sites.

- **Equity share.** The percentage of economic interest in/benefit derived from an organization.

- **Global warming.** The continuous gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns (see also Climate Change).

- **Global Warming Potential (GWP).** The GWP is an index that compares the relative potential (to CO_2) of the 6 greenhouse gases to contribute to global warming i.e. the additional heat/energy which is retained in the Earth's ecosystem through the release of this gas into the atmosphere. The additional heat/energy impact of all other greenhouse gases are compared with the impacts of carbon dioxide (CO_2) and referred to in terms of a CO_2 equivalent (CO_2-eq) e.g. Carbon dioxide has been designated a GWP of 1, Methane has a GWP of 25.

- **Greenhouse gases.** The current IPCC inventory includes six major greenhouse gases. These are Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydro fluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6).

- **IPCC.** The Intergovernmental Panel on Climate Change. A special intergovernmental body established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) to provide assessments of the results of climate change research to policy makers. The Greenhouse Gas Inventory Guidelines are being developed under the auspices of the IPCC and will be recommended for use by parties to the Framework Convention on Climate Change.

- **Indirect emissions.** Emissions that are a consequence of the activities of the reporting company but occur from sources owned or controlled by another organization or individual. They include all outsourced power generation (e.g. electricity, hot water), outsourced services (e.g. waste disposal, business travel, transport of company-owned goods) and outsourced manufacturing processes. Indirect emissions also cover the activities of franchised companies and the emissions associated with downstream and/or upstream manufacture, transport and disposal of products used by the organization, referred to as product life-cycle emissions.

- **Kyoto Protocol.** The Kyoto Protocol originated at the 3rd Conference of the Parties (COP) to the United Nations Convention on Climate Change held in Kyoto, Japan in December 1997.

It specifies the level of emission reductions, deadlines and methodologies that signatory countries (i.e. countries who have signed the Kyoto Protocol) are to achieve.

Appendix II. Emissions Calculations & Estimates

GHG Emissions Assessment

Venue	Fossil Fuel
	Electricity
	Waste
Travel	Delegate Flights
	Organiser Flights
	Support Staff Flight
	Support Staff Ferry
	PP Transportation
	Accommodation
	Deliveries
Etc.	Supplies

A. Venue - Fossil Fuel

A.1 Kerosene

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	341	0.841	0.00012	0.00001	0.846	0.231
7th Sept	336	0.829	0.00012	0.00001	0.834	0.227
8th Sept	312	0.769	0.00011	0.00001	0.774	0.211
9th Sept	288	0.710	0.00010	0.00001	0.714	0.195
10th Sept	308	0.760	0.00011	0.00001	0.764	0.208
11th Sept	309	0.762	0.00011	0.00001	0.767	0.209
12th Sept	279	0.688	0.00010	0.00001	0.692	0.189
13th Sept	216	0.533	0.00007	0.00000	0.536	0.146
14th Sept	210	0.518	0.00007	0.00000	0.521	0.142
15th Sept	244	0.602	0.00008	0.00001	0.605	0.165
Total	2,843	71,900	10	0.6	7.053	1.924

A.2 Liquid Propane Gas(LPG)

Date	Amount used (m^3)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	23	0.085	0.000007	0.000000	0.085	0.023
7th Sept	29	0.105	0.000008	0.000000	0.105	0.029
8th Sept	22	0.079	0.000006	0.000000	0.079	0.021
9th Sept	22	0.079	0.000006	0.000000	0.079	0.022
10th Sept	28	0.102	0.000008	0.000000	0.102	0.028
11th Sept	21	0.075	0.000006	0.000000	0.075	0.020
12th Sept	23	0.085	0.000007	0.000000	0.086	0.023
13th Sept	16	0.058	0.000005	0.000000	0.058	0.016
14th Sept	19	0.068	0.000005	0.000000	0.068	0.019
15th Sept	14	0.051	0.000004	0.000000	0.051	0.014
Total	216	0.786	0.000062	0.000001	0.788	0.215

A.3 Diesel

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	1,350	3.531	0.000477	0.000029	3.552	0.969
7th Sept	2,630	6.879	0.000928	0.000056	6.919	1.887
8th Sept	2,320	6.068	0.000819	0.000049	6.104	1.665
9th Sept	2,570	6.722	0.000907	0.000054	6.761	1.844
10th Sept	2,560	6.696	0.000904	0.000054	6.735	1.837
11th Sept	2,640	6.906	0.000932	0.000056	6.945	1.894
12th Sept	2,670	6.984	0.000943	0.000057	7.024	1.916
13th Sept	1,930	5.048	0.000681	0.000041	5.078	1.385
14th Sept	2,620	6.853	0.000925	0.000055	6.893	1.880
15th Sept	1,870	4.891	0.000660	0.000040	4.920	1.342
Total	2,3160	60.580	0.008175	0.000491	60.931	16.618

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- Net calorific value: Energy to calorific value conversion table in the enforcement regulation of energy bill (Section 3, Article 5)
- CO_2, CH_4, N_2O emission factor : 2006 IPCC guideline volume 2 Energy (CH_4, N_2O emission factor for commercial and public sector)

Fuel type	Unit	Net calorific value (MJ)	Emission Factor		
			CO_2($kgCO_2$/TJ)	CH_4($kgCH_4$/TJ)	N_2O(kgN_2O/TJ)
Kerosene	ℓ	34.3	71,900	10	0.6
LPG	m^3	57.7	63,100	5	0.1
Disel	ℓ	35.3	74,100	10	0.6

- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

B. Venue - Electricity

Date	Amount used (MWh)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	43.826	20.39	0.00024	0.00012	20.434	5.573
7th Sept	38.385	17.86	0.00021	0.00010	17.897	4.881
8th Sept	44.057	20.50	0.00024	0.00012	20.541	5.602
9th Sept	34.731	16.16	0.00019	0.00009	16.193	4.416
10th Sept	35.696	16.61	0.00019	0.00010	16.643	4.539
11th Sept	32.685	15.21	0.00018	0.00009	15.239	4.156
12th Sept	34.188	15.91	0.00018	0.00009	15.940	4.347
13th Sept	28.226	13.13	0.00015	0.00008	13.160	3.589
14th Sept	29.973	13.95	0.00016	0.00008	13.975	3.811
15th Sept	27.591	12.84	0.00015	0.00007	12.864	3.508
Total	349.358	162.56	0.00189	0.00094	162.885	44.423

- Event Duration : 6^{th} - 15^{th} September 2012
- Date collection by ICC Jeju
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Assumptions

- CO_2, CH_4, N_2O emission factor: Framework act on Low Carbon Green Growth, Guideline on GHG & Energy Target Management

- Global warming potential(in CO_2 equivalents) of CH_4 : 25 (IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298 (IPCC 2007)

C. Venue - Waste

Waste processing method employed	Waste generated (tons)	Emission (tCO_2-eq)	Emission (tC)
Landfilled general waste	30.860	3.796	1.035

Landfilled domestic waste	9.520	0.380	0.104
Recycled waste	182.730	-	-
Total	223.110	4.176	1.139

- Event Duration : 6th – 15th September 2012
- Date collection by ICC Jeju

Assumptions

- Waste generated from the IUCN 2012 WCC Jeju event was sorted into different groups including combustible domestic waste, general waste, waste concrete, cans, bottles, plastics and paper. The waste was incinerated, landfilled or recycled according to types. Emission factors for different types of wastes, calculated using the national life cycle assessment database, are as follows.

Type	Waste processing method	Emission Factor (tCO_2-eq/kg)
Combustible domestic waste	Incineration	0.123

General waste	Landfill	0.0399
Waste concrete, cans, bottles, plastics, paper	Recycle	0

D. Travel - Delegate Flights

D.1 Short-haul flights(<=3,700km)

Source of emission	N. passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
BANGLADESH	23	3,666	7,332	183,820	17.3	0.00009	0.00055	17.499	4.772
BHUTAN	4	3,604	7,209	31,429	3.0	0.00001	0.00009	2.992	0.816
BRUNEI DARUSSALAM	1	3,382	6,764	7,373	0.7	0.00000	0.00002	0.702	0.191
CAMBODIA	9	3,198	6,396	62,749	5.9	0.00003	0.00019	5.973	1.629
CHINA	109	1,143	2,287	271,661	25.6	0.00013	0.00081	25.861	7.053
HONG KONG	6	1,751	3,501	22,897	2.2	0.00001	0.00007	2.180	0.594

JAPAN	122	1,240	2,479	329,721	31.1	0.00016	0.00099	31.388	8.560
LAO PEOPLE'S DEMOCRATIC REPUBLIC	8	2,940	5,881	51,279	4.8	0.00002	0.00015	4.882	1.331
MONGOLIA	8	2,292	4,585	39,979	3.8	0.00002	0.00012	3.806	1.038
MYANMAR	6	3,549	7,098	46,419	4.4	0.00002	0.00014	4.419	1.205
PHILIPPINES	35	2,176	4,353	166,052	15.7	0.00008	0.00050	15.807	4.311
TAIWAN, PROVINCE OF CHINA	7	1,065	2,130	16,249	1.5	0.00001	0.00005	1.547	0.422
THAILAND	42	3,406	6,811	311,818	29.4	0.00015	0.00094	29.684	8.096
VIET NAM	18	2,450	4,901	96,155	9.1	0.00005	0.00029	9.154	2.496
Total	398	35,863	71,726	1,637,601	154.4	0.00078	0.00491	155.893	42.516

D.2 Long-haul flights(>3,700km)

Source of emission	N. passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
ALBANIA	2	8,843	17,687	38,557	4.2	0.00002	0.00013	4.200	1.145
ALGERIA	4	10,264	20,529	89,506	9.7	0.00004	0.00031	9.749	2.659
ARGENTINA	15	19,539	39,078	638,921	68.9	0.00030	0.00218	69.592	18.980
ARMENIA	5	7,095	14,191	77,339	8.3	0.00004	0.00026	8.424	2.297
AUSTRALIA	66	7,681	15,363	1,105,203	119.2	0.00053	0.00378	120.380	32.831
AUSTRIA	4	8,606	17,212	75,044	8.1	0.00004	0.00026	8.174	2.229
AZERBAIJAN	3	6,919	13,839	45,253	4.9	0.00002	0.00015	4.929	1.344
BAHAMAS	1	13,049	26,098	28,447	3.1	0.00001	0.00010	3.098	0.845
BAHRAIN	1	7,210	14,420	15,718	1.7	0.00001	0.00005	1.712	0.467

BELGIUM	14	9,050	18,100	276,206	29.8	0.00013	0.00094	30.085	8.205
BELIZE	4	13,262	26,524	115,643	12.5	0.00006	0.00040	12.596	3.435
BENIN	2	12,668	25,335	55,231	6.0	0.00003	0.00019	6.016	1.641
BOLIVIA, PLURINATIONAL STATE OF	9	18,025	36,049	353,644	38.2	0.00017	0.00121	38.519	10.505
BOTSWANA	5	12,409	24,819	135,263	14.6	0.00006	0.00046	14.733	4.018
BRAZIL	25	17,972	35,945	979,500	105.7	0.00047	0.00335	106.688	29.097
BULGARIA	2	8,234	16,467	35,899	3.9	0.00002	0.00012	3.910	1.066
BURKINA FASO	9	12,839	25,678	251,900	27.2	0.00012	0.00086	27.437	7.483
BURUNDI	4	10,882	21,764	94,892	10.2	0.00005	0.00032	10.336	2.819
CAMEROON	16	12,204	24,408	425,675	45.9	0.00020	0.00146	46.365	12.645
CANADA	75	10,993	21,986	1,797,390	193.9	0.00086	0.00615	195.773	53.393
CHILE	4	18,422	36,844	160,638	17.3	0.00008	0.00055	17.497	4.772
COLOMBIA	28	15,254	30,509	931,131	100.5	0.00044	0.00318	101.420	27.660
COMOROS	1	10,095	20,191	22,008	2.4	0.00001	0.00008	2.397	0.654
CONGO	9	12,241	24,482	240,168	25.9	0.00011	0.00082	26.159	7.134
CONGO, DEMOCRATIC REPUBLIC OF THE	5	12,231	24,462	133,318	14.4	0.00006	0.00046	14.521	3.960
COOK ISLANDS	3	9,881	19,763	64,624	7.0	0.00003	0.00022	7.039	1.920
COSTA RICA	22	14,204	28,408	681,213	73.5	0.00032	0.00233	74.198	20.236
CROATIA	1	8,979	17,958	19,574	2.1	0.00001	0.00007	2.132	0.581
CUBA	2	13,046	26,092	56,881	6.1	0.00003	0.00019	6.195	1.690
CZECH REPUBLIC	6	8,675	17,351	113,473	12.2	0.00005	0.00039	12.360	3.371
DENMARK	5	8,316	16,632	90,645	9.8	0.00004	0.00031	9.873	2.693
DOMINICAN REPUBLIC	5	13,980	27,961	152,387	16.4	0.00007	0.00052	16.598	4.527
ECUADOR	22	15,490	30,979	742,884	80.1	0.00035	0.00254	80.916	22.068
EGYPT	3	8,656	17,313	56,613	6.1	0.00003	0.00019	6.166	1.682
EL SALVADOR	7	13,594	27,188	207,441	22.4	0.00010	0.00071	22.595	6.162

ESTONIA	3	7,476	14,951	48,890	5.3	0.00002	0.00017	5.325	1.452
ETHIOPIA	5	9,256	18,511	100,886	10.9	0.00005	0.00034	10.989	2.997
FIJI	13	7,943	15,886	225,101	24.3	0.00011	0.00077	24.518	6.687
FINLAND	11	7,423	14,845	177,997	19.2	0.00008	0.00061	19.388	5.288
FRANCE	56	9,318	18,637	1,137,590	122.7	0.00054	0.00389	123.907	33.793
GABON	7	12,468	24,936	190,265	20.5	0.00009	0.00065	20.724	5.652
GEORGIA	6	6,987	13,975	91,395	9.9	0.00004	0.00031	9.955	2.715
GERMANY	38	8,495	16,989	703,684	75.9	0.00034	0.00241	76.646	20.903
GHANA	2	12,934	25,869	56,394	6.1	0.00003	0.00019	6.142	1.675
GREECE	3	8,766	17,532	57,331	6.2	0.00003	0.00020	6.245	1.703
GRENADA	2	14,892	29,783	64,928	7.0	0.00003	0.00022	7.072	1.929
GUATEMALA	18	13,229	26,458	519,108	56.0	0.00025	0.00178	56.542	15.420
GUINEA-BISSAU	5	13,586	27,172	148,087	16.0	0.00007	0.00051	16.130	4.399
GUYANA	3	15,548	31,096	101,683	11.0	0.00005	0.00035	11.075	3.021
HONDURAS	7	13,648	27,296	208,272	22.5	0.00010	0.00071	22.685	6.187
HUNGARY	6	8,486	16,972	110,994	12.0	0.00005	0.00038	12.090	3.297
ICELAND	1	8,860	17,721	19,316	2.1	0.00001	0.00007	2.104	0.574
INDIA	49	4,702	9,404	502,277	54.2	0.00024	0.00172	54.708	14.920
INDONESIA	43	4,860	9,721	455,620	49.2	0.00022	0.00156	49.626	13.534
IRAN, ISLAMIC REPUBLIC OF	4	6,721	13,441	58,604	6.3	0.00003	0.00020	6.383	1.741
IRAQ	3	7,424	14,848	48,554	5.2	0.00002	0.00017	5.289	1.442
IRELAND	2	9,353	18,706	40,780	4.4	0.00002	0.00014	4.442	1.211
ISRAEL	7	8,245	16,490	125,815	13.6	0.00006	0.00043	13.704	3.737
ITALY	15	9,309	18,618	304,405	32.8	0.00014	0.00104	33.156	9.043
JAMAICA	2	12,726	25,452	55,485	6.0	0.00003	0.00019	6.044	1.648
JORDAN	13	8,189	16,378	232,075	25.0	0.00011	0.00079	25.278	6.894
KAZAKHSTAN	2	4,386	8,772	19,123	2.1	0.00001	0.00007	2.083	0.568
KENYA	29	10,054	20,107	635,588	68.6	0.00030	0.00217	69.229	18.881
KIRIBATI	1	6,019	12,038	13,122	1.4	0.00001	0.00004	1.429	0.390
KUWAIT	7	7,301	14,601	111,409	12.0	0.00005	0.00038	12.135	3.309

KYRGYZSTAN	2	4,596	9,193	20,040	2.2	0.00001	0.00007	2.183	0.595
LEBANON	9	8,116	16,231	159,231	17.2	0.00008	0.00054	17.344	4.730
LIBERIA	2	13,691	27,383	59,695	6.4	0.00003	0.00020	6.502	1.773
LITHUANIA	1	7,753	15,506	16,902	1.8	0.00001	0.00006	1.841	0.502
LUXEMBOURG	1	9,081	18,163	19,797	2.1	0.00001	0.00007	2.156	0.588
MADAGASCAR	7	10,176	20,353	155,293	16.8	0.00007	0.00053	16.915	4.613
MALAWI	5	11,095	22,190	120,937	13.0	0.00006	0.00041	13.173	3.593
MALAYSIA	14	4,273	8,545	130,403	14.1	0.00006	0.00045	14.204	3.874
MALDIVES	1	6,364	12,728	13,873	1.5	0.00001	0.00005	1.511	0.412
MALI	5	12,997	25,995	141,670	15.3	0.00007	0.00048	15.431	4.208
MAURITANIA	6	13,048	26,096	170,667	18.4	0.00008	0.00058	18.589	5.070
MAURITIUS	3	9,425	18,850	61,639	6.7	0.00003	0.00021	6.714	1.831
MEXICO	29	12,418	24,837	785,092	84.7	0.00037	0.00268	85.513	23.322
MICRONESIA, FEDERATED STATES OF	3	4,392	8,785	28,727	3.1	0.00001	0.00010	3.129	0.853
MOLDOVA, REPUBLIC OF	1	7,894	15,788	17,209	1.9	0.00001	0.00006	1.874	0.511
MONACO	2	9,479	18,958	41,328	4.5	0.00002	0.00014	4.501	1.228
MONTENEGRO	1	8,814	17,627	19,214	2.1	0.00001	0.00007	2.093	0.571
MOROCCO	10	10,784	21,567	235,081	25.4	0.00011	0.00080	25.605	6.983
MOZAMBIQUE	9	11,894	23,788	233,356	25.2	0.00011	0.00080	25.417	6.932
NAMIBIA	6	13,069	26,137	170,938	18.4	0.00008	0.00058	18.619	5.078
NAURU	2	5,663	11,327	24,693	2.7	0.00001	0.00008	2.690	0.734
NEPAL	26	3,971	7,942	225,079	24.3	0.00011	0.00077	24.516	6.686
NETHERLANDS	29	8,948	17,896	565,703	61.0	0.00027	0.00193	61.617	16.805
NETHERLANDS ANTILLES	1	14,718	29,436	32,085	3.5	0.00002	0.00011	3.495	0.953
NEW ZEALAND	20	9,651	19,302	420,776	45.4	0.00020	0.00144	45.831	12.499
NICARAGUA	9	13,888	27,776	272,484	29.4	0.00013	0.00093	29.679	8.094
NIGER	4	11,434	22,869	99,707	10.8	0.00005	0.00034	10.860	2.962

NIGERIA	2	12,068	24,136	52,616	5.7	0.00003	0.00018	5.731	1.563
NORWAY	9	8,076	16,153	158,461	17.1	0.00008	0.00054	17.260	4.707
OMAN	11	6,649	13,299	159,452	17.2	0.00008	0.00055	17.368	4.737
PAKISTAN	21	4,900	9,799	224,310	24.2	0.00011	0.00077	24.432	6.663
PALAU	2	4,392	8,785	19,151	2.1	0.00001	0.00007	2.086	0.569
PANAMA	10	14,561	29,122	317,427	34.2	0.00015	0.00109	34.574	9.429
PAPUA NEW GUINEA	5	5,236	10,472	57,071	6.2	0.00003	0.00020	6.216	1.695
PARAGUAY	4	19,012	38,024	165,784	17.9	0.00008	0.00057	18.057	4.925
PERU	17	16,638	33,276	616,604	66.5	0.00029	0.00211	67.161	18.317
POLAND	4	8,091	16,182	70,554	7.6	0.00003	0.00024	7.685	2.096
PORTUGAL	1	10,789	21,579	23,521	2.5	0.00001	0.00008	2.562	0.699
PUERTO RICO	2	14,105	28,210	61,498	6.6	0.00003	0.00021	6.698	1.827
QATAR	5	7,177	14,354	78,228	8.4	0.00004	0.00027	8.521	2.324
ROMANIA	2	8,220	16,440	35,839	3.9	0.00002	0.00012	3.904	1.065
RUSSIAN FEDERATION	20	6,942	13,883	302,651	32.7	0.00014	0.00103	32.965	8.990
RWANDA	3	10,724	21,448	70,136	7.6	0.00003	0.00024	7.639	2.083
SAINT LUCIA	1	14,685	29,370	32,013	3.5	0.00002	0.00011	3.487	0.951
SAMOA	3	8,361	16,722	54,682	5.9	0.00003	0.00019	5.956	1.624
SAUDI ARABIA	13	7,627	15,254	216,146	23.3	0.00010	0.00074	23.543	6.421
SENEGAL	12	13,446	26,892	351,743	37.9	0.00017	0.00120	38.312	10.449
SERBIA	3	8,586	17,172	56,152	6.1	0.00003	0.00019	6.116	1.668
SEYCHELLES	3	8,555	17,110	55,948	6.0	0.00003	0.00019	6.094	1.662
SIERRA LEONE	2	13,701	27,403	59,738	6.4	0.00003	0.00020	6.507	1.775
SINGAPORE	11	4,264	8,528	102,248	11.0	0.00005	0.00035	11.137	3.037
SLOVENIA	1	8,861	17,721	19,316	2.1	0.00001	0.00007	2.104	0.574
SOLOMON ISLANDS	1	5,933	11,866	12,934	1.4	0.00001	0.00004	1.409	0.384
SOUTH AFRICA	43	12,285	24,570	1,151,613	124.2	0.00055	0.00394	125.435	34.209
SPAIN	16	10,347	20,695	360,916	38.9	0.00017	0.00123	39.311	10.721
SRI LANKA	11	5,605	11,210	134,409	14.5	0.00006	0.00046	14.640	3.993
SWAZILAND	2	12,037	24,074	52,481	5.7	0.00002	0.00018	5.716	1.559

SWEDEN	21	7,800	15,600	357,094	38.5	0.00017	0.00122	38.895	10.608
SWITZERLAND	64	9,117	18,234	1,272,018	137.2	0.00061	0.00435	138.549	37.786
SYRIAN ARAB REPUBLIC	1	8,055	16,109	17,559	1.9	0.00001	0.00006	1.913	0.522
TAJIKISTAN	1	5,143	10,286	11,211	1.2	0.00001	0.00004	1.221	0.333
TANZANIA, UNITED REPUBLIC OF	5	10,182	20,363	110,979	12.0	0.00005	0.00038	12.088	3.297
TONGA	1	8,661	17,323	18,882	2.0	0.00001	0.00006	2.057	0.561
TRINIDAD AND TOBAGO	2	15,001	30,003	65,406	7.1	0.00003	0.00022	7.124	1.943
TUNISIA	9	9,800	19,600	192,273	20.7	0.00009	0.00066	20.943	5.712
TURKEY	11	8,232	16,464	197,398	21.3	0.00009	0.00067	21.501	5.864
UGANDA	7	10,388	20,775	158,514	17.1	0.00008	0.00054	17.265	4.709
UKRAINE	3	7,589	15,178	49,632	5.4	0.00002	0.00017	5.406	1.474
UNITED ARAB EMIRATES	5	6,868	13,735	74,858	8.1	0.00004	0.00026	8.154	2.224
UNITED KINGDOM	109	9,265	18,529	2,201,447	237.5	0.00105	0.00753	239.784	65.396
UNITED STATES	354	11,612	23,223	8,960,912	966.8	0.00427	0.03064	976.030	266.190
URUGUAY	2	19,745	39,490	86,087	9.3	0.00004	0.00029	9.377	2.557
VANUATU	2	7,200	14,400	31,392	3.4	0.00001	0.00011	3.419	0.933
VENEZUELA, BOLIVARIAN REPUBLIC OF	4	14,919	29,839	130,098	14.0	0.00006	0.00044	14.170	3.865
ZAMBIA	3	11,673	23,345	76,340	8.2	0.00004	0.00026	8.315	2.268
ZIMBABWE	5	11,581	23,161	126,228	13.6	0.00006	0.00043	13.749	3.750
Total	1,809	1,431,750	2,863,500	40,326,590	4,350.8	0.01920	0.13789	4,392.407	1,197.929

D.3 Domestic flights

Source of emission	N. passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
Gimpo (Seoul)	1,604	450	899	1,572,160	259.6	0.0075	0.0083	262.261	71.526
Jeju	1,061	-	-	-	-	-	-	-	-
Total	2,665	450	899	1,572,160	259.6	0.0075	0.0083	262.261	71.526

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- KEITI assumes that all flight origins will be from the capital or major city of the country of departure.
- KEITI assumes that all flight destinations are Jeju International Airport.
- Average distance of travel was applied for delegates and reception guest whose origin of departure were not identifiable.
- All flight distance data is from Air Routing International (http://www.airrouting.com/)
- Emission factor of Defra 2012 was applied for calculation of emission associated with air travel.

Type	Emission Factor		
	CO_2 ($kgCO_2$/pass.km)	CH_4(gCH_4/pass.km)	N_2O(gN_2O/pass.km)
short-haul flights (<=3,700km)	0.0943	0.0005	0.0030

long-haul flights (>3,700km)	0.1079	0.0005	0.0034
Domestic flights	0.1651	0.0048	0.0053

- Uplift factor(to take into account circling off aircraft and non-direct fligth paths) : 109%(Defra 2012)
- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

E. Travel - Organizer Flights

E.1 Short-haul flights(<=3,700km)

Source of emission	N. passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
BANGLADESH	2	3,666	7,332	15,984	1.5	0.0000076	0.0000480	1.522	0.415
CHINA	2	1,143	2,287	4,985	0.5	0.0000024	0.0000150	0.475	0.129
JAPAN	2	1,240	2,479	5,405	0.5	0.0000026	0.0000162	0.515	0.140
LAO PEOPLE'S DEMOCRATIC REPUBLIC	2	2,940	5,881	12,820	1.2	0.0000061	0.0000385	1.220	0.333
THAILAND	20	3,406	6,811	148,485	14.0	0.0000707	0.0004455	14.135	3.855
VIET NAM	3	2,450	4,901	16,026	1.5	0.0000076	0.0000481	1.526	0.416
Total	31	14,846	29,691	203,705	19.2	0.000097	0.000611	19.392	5.289

E.2 Long-haul flights(>3,700km)

Source of emission	N. passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
AUSTRALIA	1	7,681	15,363	16,745	1.8	0.0000080	0.0000573	1.824	0.497
BELGIUM	3	9,050	18,100	59,187	6.4	0.0000282	0.0002024	6.447	1.758
BRAZIL	2	17,972	35,945	78,360	8.5	0.0000373	0.0002679	8.535	2.328
BURKINA FASO	19	12,839	25,678	531,788	57.4	0.0002532	0.0018184	57.923	15.797
CAMEROON	12	12,204	24,408	319,256	34.4	0.0001520	0.0010916	34.774	9.484
CANADA	1	10,993	21,986	23,965	2.6	0.0000114	0.0000819	2.610	0.712
COLOMBIA	1	15,254	30,509	33,255	3.6	0.0000158	0.0001137	3.622	0.988
CONGO, DEMOCRATIC REPUBLIC OF THE	2	12,231	24,462	53,327	5.8	0.0000254	0.0001823	5.808	1.584
COSTA RICA	19	14,204	28,408	588,320	63.5	0.0002802	0.0020117	64.080	17.476
ECUADOR	12	15,490	30,979	405,210	43.7	0.0001930	0.0013856	44.136	12.037
FIJI	16	7,943	15,886	277,048	29.9	0.0001319	0.0009473	30.176	8.230
GEORGIA	3	6,987	13,975	45,697	4.9	0.0000218	0.0001563	4.977	1.357
GERMANY	10	8,495	16,989	185,180	20.0	0.0000882	0.0006332	20.170	5.501
GHANA	2	12,934	25,869	56,394	6.1	0.0000269	0.0001928	6.142	1.675
GUATEMALA	1	13,229	26,458	28,839	3.1	0.0000137	0.0000986	3.141	0.857
GUINEA-BISSAU	2	13,586	27,172	59,235	6.4	0.0000282	0.0002025	6.452	1.760
HONDURAS	1	13,648	27,296	29,753	3.2	0.0000142	0.0001017	3.241	0.884
HUNGARY	1	8,486	16,972	18,499	2.0	0.0000088	0.0000633	2.015	0.550

INDIA	5	4,702	9,404	51,253	5.5	0.0000244	0.0001753	5.582	1.522
JORDAN	10	8,189	16,378	178,519	19.3	0.0000850	0.0006104	19.444	5.303
KENYA	12	10,054	20,107	263,002	28.4	0.0001252	0.0008993	28.646	7.813
MALAYSIA	1	4,273	8,545	9,314	1.0	0.0000044	0.0000318	1.015	0.277
MALI	1	12,997	25,995	28,334	3.1	0.0000135	0.0000969	3.086	0.842
MAURITANIA	4	13,048	26,096	113,778	12.3	0.0000542	0.0003890	12.393	3.380
NEPAL	3	3,971	7,942	25,971	2.8	0.0000124	0.0000888	2.829	0.771
NIGERIA	1	12,068	24,136	26,308	2.8	0.0000125	0.0000900	2.866	0.782
PAKISTAN	16	4,900	9,799	170,903	18.4	0.0000814	0.0005844	18.615	5.077
SENEGAL	6	13,446	26,892	175,871	19.0	0.0000837	0.0006014	19.156	5.224
SERBIA	5	8,586	17,172	93,587	10.1	0.0000446	0.0003200	10.194	2.780
SOUTH AFRICA	2	12,285	24,570	53,563	5.8	0.0000255	0.0001832	5.834	1.591
SPAIN	7	10,347	20,695	157,901	17.0	0.0000752	0.0005399	17.199	4.691
SRI LANKA	1	5,605	11,210	12,219	1.3	0.0000058	0.0000418	1.331	0.363
SWITZERLAND	115	9,117	18,234	2,285,657	246.6	0.0010884	0.0078155	248.956	67.897
TANZANIA, UNITED REPUBLIC OF	1	10,182	20,363	22,196	2.4	0.0000106	0.0000759	2.418	0.659
UGANDA	3	10,388	20,775	67,935	7.3	0.0000323	0.0002323	7.399	2.018
UNITED KINGDOM	11	9,265	18,529	222,164	24.0	0.0001058	0.0007597	24.198	6.600
UNITED STATES	19	11,612	23,223	480,953	51.9	0.0002290	0.0016445	52.386	14.287
ZIMBABWE	1	11,581	23,161	25,246	2.7	0.0000120	0.0000863	2.750	0.750
Total	332	399,841	799,681	7,274,732	784.9	0.0035	0.0249	792.370	216.101

- Event Duration : 6th - 15th September 2012

- Date collection by PCO

Assumptions

- KEITI assumes that all flight origins will be from the capital or major city of the country of departure.
- KEITI assumes that all flight destinations are Jeju International Airport.
- All flight distances data is from Air Routing International (http://www.airrouting.com/)
- Emission factor of Defra 2012 was applied for calculation of emission associated with air travel.

Type	Emission Factor		
	CO_2 ($kgCO_2$/pass.km)	CH_4(gCH_4/pass.km)	N_2O(gN_2O/pass.km)
short-haul flights (<=3,700km)	0.0943	0.0005	0.0030
long-haul flights (>3,700km)	0.1079	0.0005	0.0034

- Uplift factor(to take into account circling off aircraft and non-direct fligth paths) : 109%(Defra 2012)
- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

F. Travel - Support Staff Flight

Source of emission	N.passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
Gimpo	2,124	450	899	2,081,838	343.8	0.0099135	0.0109464	347.284	94.714
Kimhae	115	291	583	73,029	12.1	0.0003478	0.0003840	12.182	3.322
Gwangju	31	181	363	12,259	2.0	0.0000584	0.0000645	2.045	0.558
Daegu	38	330	661	27,372	4.5	0.0001303	0.0001439	4.566	1.245
Ulsan	9	350	699	6,857	1.1	0.0000327	0.0000361	1.144	0.312
Sachun	1	227	455	496	0.1	0.0000024	0.0000026	0.083	0.023
Chungju	12	367	735	9,612	1.6	0.0000458	0.0000505	1.604	0.437
Jeju	226	-	-	-	-	-	-	-	-
Total	2,556	4,085	8,169	2,211,463	365.2	0.0105	0.0116	368.907	100.611

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- KEITI assumes that all flight origins will be from the capital or major city of the country of departure.
- KEITI assumes that all flight destinations are Jeju International Airport.
- All flight distance data is from Air Routing International (http://www.airrouting.com/)
- Emission factor of Defra 2012 was applied for calculation of emission associated with air travel.

Type	Emission Factor		
	CO_2 ($kgCO_2$/pass.km)	CH_4(gCH_4/pass.km)	N_2O(gN_2O/pass.km)
Domestic flights	0.1651	0.0048	0.0053

- Uplift factor(to take into account circling off aircraft and non-direct fligth paths) : 109%(Defra 2012)
- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

G. Travel - Support Staff Ferry

Source of emission	N.passengers	Distance (km)	Return Distance (km)	Total distance (pass.km)	CO_2 emitted(t)	CH_4 emitted(t)	N_2O emitted(t)	Total CO_2-eq(t)	Total C(t)
Jangheung	122	113	225	29,947	3.4	0.0011979	0.0263534	11.332	3.091

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- KEITI assumes that point of departure of all ferries is Jangheung port.
- KEITI assumes that final destination of all ferries is Jeju port.
- All distance data are from domestic maritime travel (http://www.khoa.go.kr/)
- Emission factor of Defra 2012 was applied for calculation of emission associated with maritime travel.

Type	Emission Factor		
	CO2($kgCO_2$/pass.km)	CH_4(gCH_4/pass.km)	N_2O(gN_2O/pass.km)
Ferry	0.11516	0.0019	0.0028

- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

H. Travel - Participants transportation

H.1 Diesel

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	2,647	6.924	0.00036	0.00036	7.042	1.920
7th Sept	1,948	5.095	0.00027	0.00027	5.182	1.413
8th Sept	1,948	5.095	0.00027	0.00027	5.182	1.413
9th Sept	1,948	5.095	0.00027	0.00027	5.182	1.413
10th Sept	1,948	5.095	0.00027	0.00027	5.182	1.413
11th Sept	1,948	5.095	0.00027	0.00027	5.182	1.413
12th Sept	1,961	5.129	0.00027	0.00027	5.217	1.423
13th Sept	1,158	3.029	0.00016	0.00016	3.081	0.840
14th Sept	2,159	5.647	0.00030	0.00030	5.743	1.566
15th Sept	2,109	5.517	0.00029	0.00029	5.610	1.530
Total	19,774	51.723	0.003	0.003	52.603	14.346

H.2 Liquefied Natural Gas (LNG)

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
7th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
8th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
9th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
10th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
11th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
12th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
13th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
14th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
15th Sept	65	0.00014	0.00000024	0.00000001	0.0002	0.000041
Total	650	0.00143	0.00000236	0.0000001	0.002	0.000414

H.3 Liquefied Petroleum Gas (LPG)

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions(tCO_2-eq)	Emissions (tC)
6th Sept	168	0.279	0.00027	0.000001	0.287	0.078

7th Sept	166	0.276	0.00027	0.000001	0.283	0.077
8th Sept	166	0.276	0.00027	0.000001	0.283	0.077
9th Sept	157	0.261	0.00026	0.000001	0.268	0.073
10th Sept	155	0.258	0.00025	0.000001	0.264	0.072
11th Sept	140	0.233	0.00023	0.000001	0.239	0.065
12th Sept	145	0.241	0.00024	0.000001	0.247	0.067
13th Sept	145	0.241	0.00024	0.000001	0.247	0.067
14th Sept	132	0.220	0.00022	0.000001	0.225	0.061
15th Sept	92	0.153	0.00015	0.0000005	0.157	0.043
Total	1,466	2.438	0.00240	0.00001	2.50	0.682

H.4 Gasoline

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
6th Sept	149	0.313	0.00011	0.00004	0.326	0.089
7th Sept	149	0.313	0.00011	0.00004	0.326	0.089

8th Sept	125	0.262	0.00009	0.00003	0.274	0.075
9th Sept	125	0.262	0.00009	0.00003	0.274	0.075
10th Sept	106	0.223	0.00008	0.00003	0.232	0.063
11th Sept	79	0.166	0.00006	0.00002	0.173	0.047
12th Sept	79	0.166	0.00006	0.00002	0.173	0.047
13th Sept	60	0.126	0.00005	0.00001	0.131	0.036
14th Sept	60	0.126	0.00005	0.00001	0.131	0.036
15th Sept	60	0.126	0.00005	0.00001	0.131	0.036
Total	992	2.083	0.00075	0.00024	2.173	0.593

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- CO_2, CH_4, N_2O emission factor : 2006 IPCC guideline volume 2 Energy(Mobile combustion)
- Net calorific value: Energy to calorific value conversion table in the enforcement regulation of energy bill (Section 1, Article 5)
- CO_2, CH_4, N_2O emission factor : 2006 IPCC guideline volume 2 Energy (CH_4, N_2O emission factor for commercial and public sector)

Fuel type	Unit	Net calorific	Emission Factor

		value(MJ)	CO_2(kgCO_2/TJ)	CH_4(kgCH_4/TJ)	N_2O(kgN_2O/TJ)
Diesel	ℓ	35.3	74,100	3.9	3.9
LNG	Nm^3	39.4	56,100	92	3
LPG	kg	45.6	63,100	62	0.2
Gasoline	ℓ	30.3	69,300	25	8

- LPG density : 0.578 kg/ ℓ(Korea National Oil Corporation)
- Global warming potential(in CO2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

I. Travel - Accommodation

Source of emission	Nights	$kgCO_2$-eq/room/night	Total CO_2-eq(t)	Total C(t)
Delegation	11,065	32.01	354.191	96.597
Hosting organization	4,351	32.01	139.276	37.984
Support staff	1,318	32.01	42.189	11.506
Total	16,734	32.01	535.655	146.088

- Event Duration : 6th - 15th September 2012
- Relevant data was collected using the participant accommodation use management system
- Date collection by PCO

Assumptions

- CO_2 Emissions for hotel accommodation-world : 32.01 kgCO2/room/night (derived from CIBSE 2004, Defra 2010 and IEA 2008)

J. Travel - Deliveries

J.1 Diesel

Date	Amount used (liters)	CO_2 emission(t)	CH_4 emission(t)	N_2O emission(t)	Emissions (tCO_2-eq)	Emissions (tC)
4th Sept. (Preparation date)	2,230	5.8331	0.00031	0.00031	5.932	1.618
7th Sept.	26	0.0680	0.00000	0.00000	0.069	0.019
13th Sept.	88	0.2302	0.00001	0.00001	0.234	0.064
15th Sept. (Wrap-up day)	1,935	5.0614	0.00027	0.00027	5.147	1.404
Total	4,279	11.1927	0.00059	0.00059	11.383	3.104

- Event Duration : 6^{th} - 15^{th} September 2012
- Date collection by PCO

Assumptions

- Net calorific value: Energy to calorific value conversion table in the enforcement regulation of energy bill (Section 1, Article 5)
- CO_2, CH_4, N_2O emission factor : 2006 IPCC guideline volume 2 Energy(Mobile combustion)

Fuel type	Unit	Net calorific value (MJ)	Emission Factor		
			CO_2(kgCO_2/TJ)	CH_4(kgCH_4/TJ)	N_2O(kgN_2O/TJ)
Diesel	ℓ	35.3	74,100	3.9	3.9

- Global warming potential(in CO_2 equivalents) of CH_4 : 25(IPCC 2007)
- Global warming potential(in CO_2 equivalents) of N_2O : 298(IPCC 2007)

K. Etc - Supplies

Supply	Amount generated (used)	Unit	Emission (tCO_2-eq)	Emission (tC)
A3 paper	180,000	Sheet	1.037	0.283
A4 paper	901,981	Sheet	2.598	0.708
Tap water	275,000	kg	0.182	0.050

Total	3.816	1.041

- Event Duration : 6th - 15th September 2012
- Date collection by PCO

Assumptions

- Amount of paper and water used during the event is assessed and included in the scope
- Source of emission factor: Master manual of green leader operation management of the national Life Cycle Inventory Database

Type	Emission Factor	Emission factor
A3 paper	5.76	gCO_2/sheet
A4 paper	2.88	gCO_2/sheet
Tap water	0.66	gCO_2/L

Summary : Total GHG Emissions

Total GHG Emissions by WBSCD Scope

Source of emissions		WBCSD Scope	Equivalent emissions		Proportion of total
			CO_2 (t)	C(t)	
Venue	Fossil fuel	Scope 1	68.77	18.76	1.0%
Sub-total			68.77	18.76	1.0%
Venue	Electricity	Scope 2	162.88	44.42	2.4%
Sub-total			162.88	44.42	2.4%
Venue	Waste	Scope 3	4.18	1.14	0.06%

Travel	Delegate flights		4,810.56	1,311.97	70.3%
	Organisers flights		811.76	221.39	11.9%
	Support staff flights		368.91	100.61	5.4%
	Support staff ferry		11.33	3.09	0.17%
	Participant Transportation		57.28	15.62	0.84%
	Accommodation		535.66	146.09	7.8%
	Etc_supplies		3.82	1.04	0.06%
Deliveries	Freight Transportation*		11.38	3.10	0.17%
Sub-total			6,614.87	1,804.06	96.6%
Total			6,846.53	1,867.23	100.0%

Summary : Emissions per Delegate

Emissions per Delegate

Source of emissions	No. of delegates	tonCO_2-eq	Emissions per delegate (tCO_2-eq/person)
Emissions per delegate	7,913	6,847	0.87