GHANA'S ACTION PLAN ON CO_2 EMISSIONS REDUCTION ACTIVITIES

SECTION 1 - CONTACT AND BACKGROUND INFORMATION

1.1 Contact Information

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1.2 GHANA CIVIL AVIATION AUTHORITY (GCAA)

1.2.1 Background

Prior to the enactment of the Civil Aviation Act 2004 (Act 678) in November 2004, GCAA operated under PNDC Law 151 of 16th May, 1986 – a promulgation that established it as an autonomous body under the Ministry of Transport and Communication. Before then it existed as a Department under the Ministry of Transport since 1953.

In accordance with Act 2004 (Act 678), which stipulated the separation of the Airports Management functions from the existing Ghana Civil Aviation Authority (GCAA), GCAA was decoupled into two entities:

i. Ghana Airports Company Limited (GACL), which is to plan, develop, manage and maintain all airports and aerodromes in the country;
ii. A new GCAA, which was to focus on its core regulatory function and also to provide air navigation services.

Pursuant to the above Civil Aviation Act 2004 (Act 678), the new Ghana Civil Aviation Authority (GCAA) was formed, which began operations as a separate entity from January 2007.

1.2.2 Functions of Ghana Civil Aviation Authority (GCAA)

The functions of Ghana Civil Aviation Authority are conferred on it by Ghana Civil Aviation Act 2004(Act 678) that replaced PNDC Law 151 of May 1986. GCAA is established as an autonomous statutory government agency responsible for the development of air transport in Ghana.

1.2.3 Functions

Strategically, the functions of GCAA can be stated as follows:

I. Licensing of air transport and provision of accommodation in aircraft;

II. Licensing of cockpit and cabin crew, flight and ground engineers, air traffic controllers and any other persons engaged in aircraft operations;

III. Licensing and certification of aerodromes and the construction, operation, maintenance and management of navigation sites;

IV. Provision of air navigation services within the Accra Flight Information Region;

V. Securing the safety of air transport, life and property;

VI. Prescribing measures to ensure airworthiness of civil aircraft;

VII. Registration and deregistration of aircraft;

VIII. Supervising aircraft operations;

IX. Advising Government on matters relating to civil aviation

The above GCAA corporate functions, should in the long run aim at:

I. Increasing stakeholder value;

II. Recovering cost as much as possible;

III. Developing opportunities for domestic and international travel and trade;

IV. Representing the country on all matters concerning civil aviation and ensure enactments of the International Civil Aviation Organization (ICAO);

V. Building public confidence in safe and secure air transport;

VI. Contributing to over-all national development agenda and serve the community in which it is located

1.4 GCAA CORPORATE STATEMENTS

1.4.1 Mission Statement

To provide safe, secure, efficient and effective Aviation Regulation and Air Navigation Services in a professional and environmentally responsible manner.

1.5 GROWTH OF AVIATION INDUSTRY

1.5.1 Aircraft Movements

Aircraft movements for the period 2011 to 2014 grew at an average of about 5.0% though it dipped in 2012 by 0.9% when compared with 2011. The average performance within this period is due to increasing demand for air travels resulting from a rebound in the global air transport industry following an increase in business confidence in both the global and local economy. This has resulted in operation of new entrants and increased flight frequency by a number of existing airlines at Kotoka International Airport (KIA). Covid-19 pandemic in Ghana is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first two cases in Ghana were confirmed on 12 March 2020, when two infected people came to Ghana, one from Norway and the other from Turkey. The statistics have inconsistently shown an increase and decrease on the outbreak. The outbreak undoubtedly impeded the country's aviation ambitions as travel restrictions had to be imposed to reduce the transmission of the virus. However, the only airlines that flew at the time of inception were cargo flights.

In Ghana, from 3 January 2020 to 15 June 2021, there have been 94,493 confirmed cases of COVID-19 with 789 deaths, reported to WHO. As of 14 June 2021, a total of 1,228,216 vaccine doses have been administered. Daily updates of the status from inception of covid-19 outbreak and mitigation measures are shared on the Ghana Health Service website.

1.5.2 Passenger Throughputs

Passenger thru put recorded an average growth of about 6.0% for the period 2011 to 2014 though 2013 registered a drop of 3.3% when compared with 2012. The low load factor 2013 is attributed to the effects of the Euro Zone crisis and its adverse impact on demand for air travels.

1.5.3 Air Freight

Air freight volumes recorded a fluctuating pattern within the period 2010 to 2014. It fell by 7.3% when compared with year 2011 and further worsened by 6.2% between 2012 and 2013. However, freight uplift for 2014 improved significantly as a result of recovery in the Euro zone economies.

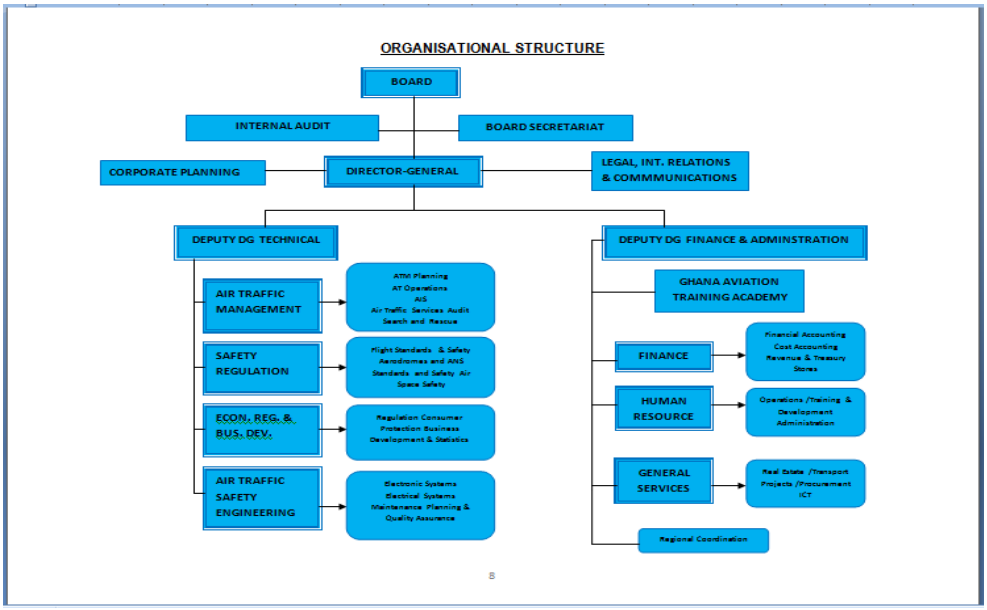
However in this backdrop of formulating an action plan to reduce the CO_2 emission level of the country more emphasis is placed on the international air operators segment on producing CO_2 at international level and on all the other three segments (Aerodrome Operators, Air Navigation Service Providers and allied industries) on their involvement to reduce CO_2 emission level.

1.5.3 Ghana Airports

Aircraft movements for the period 2011 to 2014 grew at an average of about 5.0% though it dipped in 2012 by 0.9% when compared with 2011. The average performance within this period is due to increasing demand for air travels resulting from a rebound in the global air transport industry following an increase in business confidence in both the global and local economy.

Planning, developing, managing and maintenance of all airports and aerodromes in Ghana are the responsibility of the Ghana Airports Company Limited (GACL), which was established as a result of the decoupling of the existing Ghana Civil Aviation Authority (GCAA).

The Ghana Civil Aviation Organizational Chart



1.6 ENVIRONMENTAL PROTECTION & SUSTAINABLE DEVELOPMENT

One of the major challenges facing the air transport industry is reaching and maintaining an appropriate balance between growth and environmental protection. Initiatives to promote the sustainability of aviation activities in synchronization with growth of the industry over the past four decades have been quite successful, with noise from aircraft reduced by 75% and CO_2 emissions intensity by 70%.

At its 37th Assembly Session, ICAO adopted the global inspirational goals of 2 per cent annual fuel efficiency improvement and, in the medium-term, stabilization of CO_2 emissions. It also had an agreement on the guiding principles for the design and implementation of market-based measures for reduction of emissions in international aviation. ICAO has also concluded agreement on a global framework for the development and deployment of sustainable alternative fuels for aviation, as well as an agreement on the deadline of 2013 for the development of a CO_2 standard for aircraft. Substantive ICAO guidance materials are available to assist States in the implementation of a 'balanced approach' to noise management, comprising four principal elements of reduction of noise at source; land-use planning and management; noise abatement operational procedures; and operating restrictions on aircraft.

1.6.1 Environmental Protection

The assembly re-affirmed its collective inspirational goal of 2 per cent annual fuel efficiency improvement and, in the medium-term, stabilisation of CO_2 emissions, as agreed in the 37th ICAO Assembly, as stated above. Key actions within this strategy period will be geared towards capacity building and assistance to States in the development and implementation of their action plans to reduce CO_2 emissions. Deliberations pertaining to new technologies, operational measures and sustainable

alternative fuels to improve aviation environmental performance, culminated in a multilateral global Market-Base Measure (MBM) agreement, amongst States at the 38th Assembly, with the goal of addressing global climate challenges in the future.

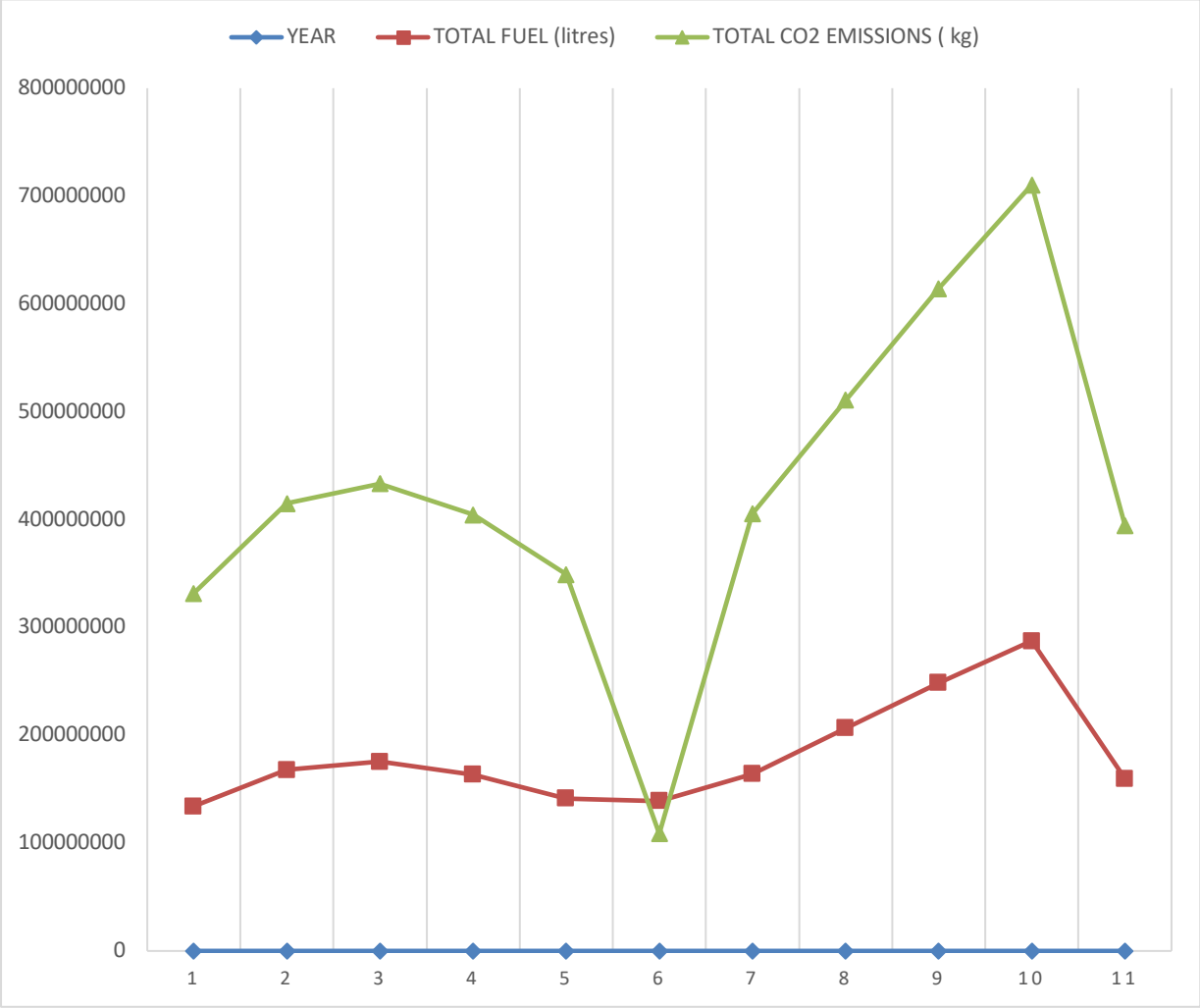
SECTION 2 – BASELINE RESULTS

The objective of this section is to provide States with the necessary guidance on how to select measures to limit or reduce CO_2 emissions from international aviation. It includes sections on baseline establishment, feasibility and emissions reduction potential of measures, prioritization and selection of measures, expected results, metrics and implementation.

Section 2.1 below describes the total fuel consumption, international fuel consumption, total CO_2 emission and CO_2 emission (in Millions), resulting from domestic airlines undertaking international operations.

2.1 Baseline

YEAR	TOTAL FUEL (litres)	TOTAL CO_2 EMISSIONS (kg)	TOTAL Fuel Used (kg)
2010	134,217,800	331,668,290	104,958,319
2011	167,871,800	414,831,362	131,275,748
2012	175,351,200	433,313,857	137,124,638
2013	163,670,300	404,448,952	127,990,174
2014	141,307,800	349,188,531	110,502,700
2015	138,980,035	108,682,387	343,436,344
2016	164,020,400	405,314,091	128,263,953
2017	206,739,600	510,878,360	161,670,367
2018	248,538,100	614,167,470	194,356,794
2019	287,483,600	710,406,474	224,812,175
2020	159,615,300	394,428,506	124,819,165



Graphical representation of Table 2.1

SECTION 3: LISTS OF SELECTED MEASURES ALREADY IN PLACE

Emission Reduction Category	Improved air traffic management and infrastructure use
Action	• Introduction of new routes in the Accra Flight Information Region (FIR) • Flexible and direct routing airspace planning within the Accra FIR • Performance Based Navigation (PBN). Continuous decent operations and continuous climb operations. • Airport collaborative decision making to make decision in real time to reduce fuel. • Atlantic Ocean Random Routing Area (AORRA)
Start date	2010
Date of full implementation	2014
Economic cost	The project is a state owned infrastructure development project funded by Government through Ghana Civil Aviation Authority.
Currency	N/A
Reference to existing legislation	ACT 678, L.I. 2000 Part 16 Section 2 (Aircraft Engine Emissions)
If a new legislation is proposed	N/A
Compliance to the legislation Voluntary Mandatory N/A	Mandatory
Assistance needed	YES
Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education o Research o Other	o Technical support o Education o Research

Currency for financial assistance	N/A
List of stakeholders involved	Air Traffic Services Airlines

Regulatory Measures	ACT 678, L.I. 2000
Action	• Legislative reform • Part 16 Section 2 (Aircraft Engine Emissions)
Start date	2000
Date of full implementation	2000
Economic cost	The project is a state owned infrastructure development project funded by Government through Ghana Civil Aviation Authority.
Currency	N/A
Reference to existing legislation	ACT 678, L.I. 2000 Part 16 Section 2 (Aircraft Engine Emissions)
If a new legislation is proposed	N/A
Compliance to the legislation Voluntary Mandatory N/A	Mandatory
Assistance needed	YES
Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education o Research o Other	o Technology o Technical support o Education o Research

Currency for financial assistance	N/A
List of stakeholders involved	Air Traffic Services airlines

Modernisation of Airport Facilities	Capital Infrastructure of Kotoka International Airport (KIA) phase 3 development project
Action	• Use of renewable energy sources in the upgrade of airport facilities • Use of LED/ other energy serving for electrical facilities • Installing equipment at gates to reduce the use of auxiliary power units
Start date	2010
Date of full implementation	On-going
Economic cost	The project is a state owned infrastructure development project funded by Government's airport development fund through Ghana Civil Aviation Authority and Ghana Airports Company Limited (GACL).
Currency	N/A
Reference to existing legislation	N/A
If a new legislation is proposed	N/A
Compliance to the legislation Voluntary Mandatory N/A	Voluntary
Assistance needed	N/A
Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education	N/A

○ Research ○ Other	
Currency for financial assistance	N/A
List of stakeholders involved	Airlines Ground handling Companies Ghana Airports Company Limited (GACL) Ghana Civil Aviation Authority (GCAA) Ghana Environmental Protection Agency (GEPA)

Airlines Ground handling Companies	Introduction of new aircraft to their fleets and equipment
Action	• Airline operators are adopting new operational measures to increase their fuel efficiency. • Airline operators have introduced maintenance systems and planning procedures to ensure reduction in CO_2 emissions. • Introduction of environmental management practices like ISO14000 by ground handlers is contributing to the reduction in emissions in general.
Start date	
Date of full implementation	On-going
Economic cost	N/A
Currency	N/A
Reference to existing legislation	N/A
If a new legislation is proposed	N/A
Compliance to the legislation Voluntary Mandatory N/A	Voluntary
Assistance needed	N/A

Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education o Research o Other	N/A
Currency for financial assistance	N/A
List of stakeholders involved	Airlines Ground handling Companies Ghana Airports Company Limited (GACL) Ghana Civil Aviation Authority (GCAA)

Airport Improvements	Development of additional runways
Action	• Construction of extra apron (northern Apron) to relieve aircraft congestion • Install airport renewable energy systems like solar panels • Reduce energy consumption
Start date	2020
Date of full implementation	On-going
Economic cost	The project is a state owned infrastructure development project funded by Government's airport development fund through Ghana Civil Aviation Authority and Ghana Airports Company Limited (GACL).
Currency	N/A
Reference to existing legislation	N/A
If a new legislation is proposed	N/A

Compliance to the legislation Voluntary Mandatory N/A	Voluntary
Assistance needed	N/A
Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education o Research o Other	N/A
Currency for financial assistance	N/A
List of stakeholders involved	Airlines Ground handling Companies Ghana Airports Company Limited (GACL) Ghana Civil Aviation Authority (GCAA) Ghana Environmental Protection Agency (GEPA)

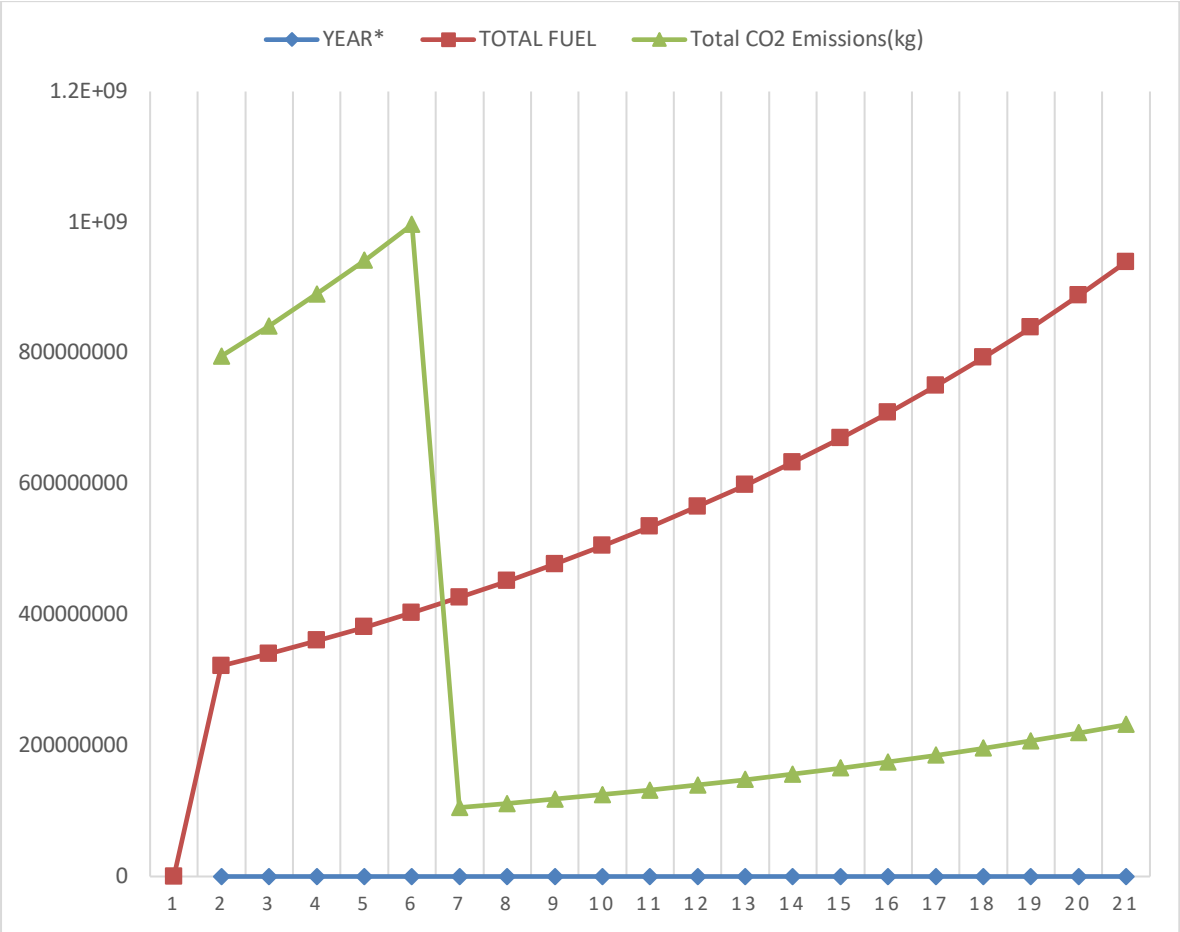
More efficient operations	Introduction of new vehicles to existing fleets
Action	• Purchase low or zero-emission vehicles
Start date	2022
Date of full implementation	On-going
Economic cost	N/A
Currency	N/A
Reference to existing legislation	N/A
If a new legislation is proposed	N/A
Compliance to the legislation	

Voluntary Mandatory N/A	Voluntary
Assistance needed	N/A
Assistance needed (you can select more than one) o Finance o Technology o Technical support o Education o Research o Other	N/A
Currency for financial assistance	N/A
List of stakeholders involved	Airlines Ground handling Companies Ghana Airports Company Limited (GACL) Ghana Civil Aviation Authority (GCAA)

SECTION 4: EXPECTED RESULTS

YEAR *	TOTAL RTK (Annual rate 5.8%)	TOTAL FUEL (litres)	Total CO2 Emissions(kg)	International RTK	International Fuel Litres (Litres)	International CO2 Emissions (kg)
2021	0.058	321,786,792	795,173,777	0.110	85,211,387,045	210,567,562,754
2022	0.058	340,463,122	841,325,230	0.110	94,584,639,620	214,143,354,657
2023	0.058	360,209,983	890,122,093	0.110	104,988,949,977	259,440,294,067
2024	0.058	381,102,162	941,749,174	0.110	116,537,734,474	287,978,726,413
2025	0.058	403,206,087	996,370,625	0.110	129,356,885,266	319,656,386,217
2026	0.058	426,592,040	105,416,012	0.110	143,586,142,645	354,818,588,811
2027	0.058	451,334,379	111,530,141	0.110	159,380,618,335	393,848,633,576
2028	0.058	477,511,773	117,998,889	0.110	176,912,486,351	437,171,983,270
2029	0.058	505,207,456	124,842,825	0.110	196,372,859,849	485,260,901,427
2030	0.058	534,509,489	132,083,709	0.110	217,973,874,432	538,639,600,583
2031	0.058	565,511,039	139,744,564	0.110	241,951,000,619	597,889,956,649
2032	0.058	598,310,679	147,849,749	0.110	268,565,610,687	663,657,851,880
2033	0.058	633,012,699	156,425,034	0.110	298,107,827,862	736,660,215,586
2034	0.058	669,727,435	165,497,686	0.110	330,899,688,926	817,692,839,298
2035	0.058	708,571,627	175,096,552	0.110	367,298,654,707	907,639,051,616
2036	0.058	749,668,781	185,252,152	0.110	407,701,506,724	1.00747934729
2037	0.058	793,149,570	195,996,777	0.110	452,548,672,463	1.11830207549
2038	0.058	839,152,245	207,364,590	0.110	502,329,026,433	1.24131530379
2039	0.058	887,823,075	219,391,736	0.110	557,585,219,340	1.37785998721
2040	0.058	939,316,814	232,116,457	0.110	618,919,593,467	1.52942458580

* Minimum data to be entered
In optimal conditions:
1 litre of fuel is approximately equivalent to 0.8 kg of fuel. (*Please note that the density may vary between 750 and 850 kg/m^3 at 15^{o}Celsius – see Guidance material page 19).*
1 kg of fuel burn is equivalent to 3.157 kg of CO_2 emissions. *Density used (782) and annual RTK rate value for projected years.*



Graphical representation of Table 4

4.1 **Supporting Documents**

The data for the Baseline results were obtained from a major fuel distribution outfit in Ghana, Joint Use Hydrant Installation (JUHI) and Puma Energy Distribution Company Limited. These results were then mathematically extrapolated to obtain the Expected Data in table in Section 4.