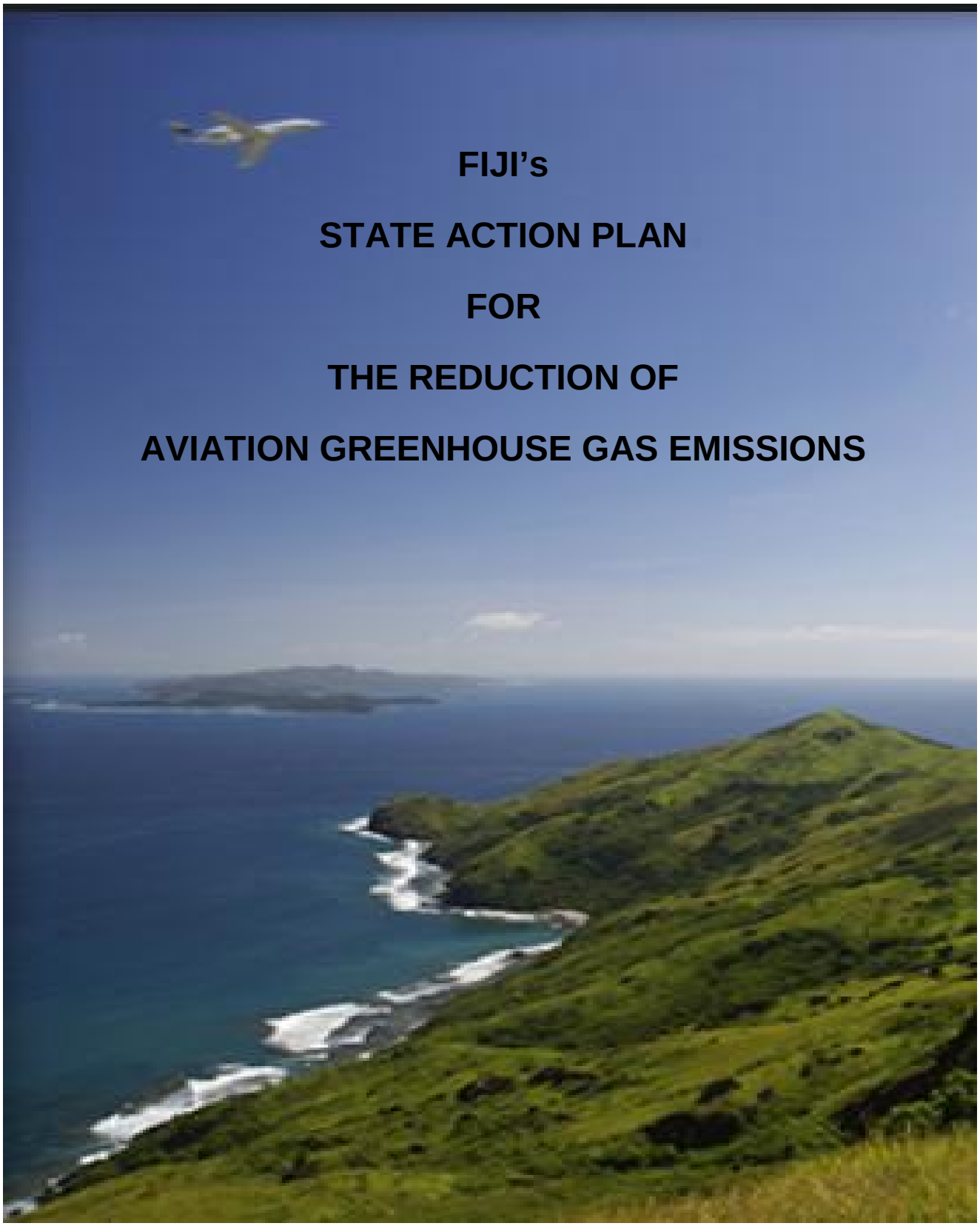
FIJI's

STATE ACTION PLAN

FOR

THE REDUCTION OF

AVIATION GREENHOUSE GAS EMISSIONS



FOREWORD

To meet ICAO Assembly Resolution A38-18, Fiji has put together this State Action Plan detailing its actions to reduce aviation greenhouse gas (GHG) emissions.

This plan to ICAO elaborates on the activities Fiji is undertaking to address CO_2 emissions from international aviation. This plan is intended to demonstrate to ICAO the effectiveness of actions being taken and to enable ICAO to measure Fiji's progress towards meeting the global goals set by Assembly Resolution A38-18.

It is hoped that this action plan showcases and communicates, both at the national and international level, Fiji's efforts to address GHG emissions from international aviation.

This plan has been divided into five sections:

a) Section 1 — Background information and contacts

b) Section 2 — Baseline

c) Section 3 — Measures to mitigate CO_2 emissions

d) Section 4 – Expected results

e) Section 5 – Assistance needs

SECTION 1 — CONTACT INFORMATION

1.1 **Background**

The Fijian government established the Civil Aviation Authority of Fiji with statutory obligations under the Civil Aviation Authority Act 1979, Cap 174A, to provide regulatory oversight of the civil aviation industry and support an integrated, safe, responsive, and sustainable air transport system.

Fiji's responsibility, under the Chicago Convention, for the provision of air navigation services (ANS) to aircraft operating within the Nadi Flight Information Region (FIR) is assigned to Airports Fiji Ltd (AFL). The Nadi FIR comprises an area of 6.5 million square kilometers and lies between longitudes 163°East and 170°West and latitudes 0330°North and 30°South, this includes the sovereign air space above Fiji, Tuvalu, New Caledonia, Kiribati and Vanuatu.

Fiji lies in the heart of the southwest Pacific Ocean, comprising approximately 333 islands, having a total land area of approximately 18,300 km. The largest island is Viti Levu (10 429 km), which covers 57% of the total area and is the island on which Fiji's two International Airports are located; Nadi International Airport and Nausori International Airport. These 2 international airports service over 20 airlines and connects Fiji to over 15 cities internationally.

Tourism is Fiji's largest foreign exchange earner providing employment directly and indirectly to over 40 000 people, approximately 15% of the labour force, and contributes approximately 17% of total production in the economy.

As an island nation with an open economy, Fiji is heavily dependent on transportation services. The transport sector accounts for around 12 per cent of the national GDP. Fiji's air transport industry is a dynamic industry which is continuing to grow at a rapid rate transporting over a million passengers, approximately 90% of which are tourists and over 1.3 million tonnes of freight annually.

With this heavy reliance on the aviation transport industry, its sustainability is vital to our economy. Fiji is therefore committed to addressing the climate change impacts of aviation. The Fiji Aviation Industry is already achieving reductions in GHG emissions from improvements that are being made in the aviation industry and will continue on this path to ensure that it meets or exceeds the goals it has set.

The two major players in Fiji's efforts to reduce its aviation GHG emissions are the Air Navigation and Aerodrome Service Provider, Airports Fiji Limited (AFL) and Fiji's National Airline, Fiji Airways Ltd.

Airports Fiji Limited is a fully owned Government Commercial Company established under the Public Enterprise Act 1996 and the Civil Aviation Reform Act 1999 to own and operate the Nadi International Airport and manages Nausori International Airport and 13 other domestic outer island airports on behalf of the Government. AFL also provides air navigation services in the Nadi FIR.

Fiji Airways Ltd. is Fiji's flag carrier and boasts a strong position within the region, often ranked among the region's top carriers. The Fijian government owns majority shares in the airline and its regional subsidiary Fiji Link. The airline is made up of modern Boeing aircraft; 4 Boeing 737-800 and 1 Boeing 737-700 and 3 Airbus A330-200 aircraft which operate the international routes and 2 ATR 72-600 and 1 ATR 42-600 aircraft which are operated by Fiji Link on regional routes.

1.2 Contact information

Below is contact information for the focal points within Fiji for our action plan.

Name of the Authority	**Civil Aviation Authority of Fiji**		**Airports Fiji Limited**	
Point of contact	Maibulu Laliqavoka	Ilaitia Tabakaucoro	Ilimeleki Navula	Triza Deeptimala
Address	CAAF Drive, Namaka		AFL Compound, Namaka	
City	Nadi Town		Nadi Town	
Telephone number	+679 6721555	+679 6721555	+679 6725777	+679 6725777
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SECTION 2 — BASELINE

Most aviation-related measures affect both domestic and international operations. To every extent possible, Fiji has distinguished between domestic and international aviation for the collection of fuel consumption and traffic data. Emissions from airport and/or ground support equipment operations are considered as domestic emissions and are beyond the scope of Resolution A38-18.

For the purpose of this plan, only International emissions have been taken into consideration. The definition of International emission (in italics below) as stipulated in the ICAO Doc 9988, Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities, has been applied.

A flight stage is defined as the operation of an aircraft from take-off to its next landing and is classified as either international or domestic based on the following:

a) *International. A flight stage with one or both terminals in the territory of a State, other than the State in which the air carrier has its principal place of business.*
b) Domestic. A flight stage not classifiable as international. Domestic flight stages include all flight stages flown between points within the domestic boundaries of a State by an air carrier whose principal place of business is in that State. Flight stages between a State and territories belonging to it, as well as any flight stages between two such territories, should be classified as domestic. This applies even though a stage may cross international waters or over the territory of another State.

The ICAO methodology (State of registration) has been used in this action plan to differentiate between international and domestic emissions.

2.1 Baseline

Method 3 as stipulated in Doc 9988 was adopted for the purpose of this plan, where a single base year value was used and the future fuel efficiency assumed to be constant.

The year used as Fiji's "Baseline year" was 2010.

Fiji's estimated fuel consumption and CO_2 emissions for international aviation for the year 2010 was calculated using the ICAO calculation tools available on the APER website.

Methodology used:-

1. Obtained historical data.

    a. Aircraft movement data for 2010 was extracted from the aircraft flight movement schedule for 2010. Only scheduled flights were taken into account. This data consisted of aircraft type, airport city pairs and total number of flights for the year. In the absence of actual fuel consumption data which could not be obtained when the plan was being put together, utilization of data from the aircraft flight movement schedule was the next best option available for collating the data required.

2. This data was entered into the ICAO Carbon Emissions Calculator and the CO_2 emissions in kg for all the flights were extrapolated.

3. “Establishing the baseline calculator” was then used to enter data pertaining to Fuel consumption in litres and RTK to obtain fuel efficiency

    a. The international scheduled RTK by State of Air Operator Certificate (AOC) as published by ICAO in its Annual Report (2012) was used to obtain Fiji’s RTK

    b. The annual international RTK growth rate of 6.30% based on ICAO Circular 313 for the Asia/Pacific region was used as the forecasted traffic growth rate (RTK)

YEAR	INTERNATIONAL RTK (‘000)	INTERNATIONAL FUEL BURN (LITRES)	INTERNATIONAL CO_2 EMISSIONS (kg)
2010	408, 946.31	292, 062, 050	737,631,913

BASELINE FORECAST

Year	International Fuel (litres)	International CO2 emissions (kg)
2010	292,062,050.00	737,631,913.48
2011	310,461,959.15	784,102,724.03
2012	330,021,062.58	833,501,195.64
2013	350,812,389.52	886,011,770.97
2014	372,913,570.06	941,830,512.54
2015	396,407,124.97	1,001,165,834.83
2016	421,380,773.85	1,064,239,282.42
2017	447,927,762.60	1,131,286,357.22
2018	476,147,211.64	1,202,557,397.72
2019	506,144,485.97	1,278,318,513.78
2020	538,031,588.59	1,358,852,580.15
2021	571,927,578.67	1,444,460,292.69
2022	607,959,016.13	1,535,461,291.13
2023	646,260,434.14	1,632,195,352.48
2024	686,974,841.50	1,735,023,659.68
2025	730,254,256.51	1,844,330,150.24
2026	776,260,274.67	1,960,522,949.71
2027	825,164,671.97	2,084,035,895.54
2028	877,150,046.31	2,215,330,156.96
2029	932,410,499.23	2,354,895,956.85
2030	991,152,360.68	2,503,254,402.13
2031	1,053,594,959.40	2,660,959,429.46
2032	1,119,971,441.84	2,828,599,873.52
2033	1,190,529,642.68	3,006,801,665.55
2034	1,265,533,010.17	3,196,230,170.48
2035	1,345,261,589.81	3,397,592,671.22
2036	1,430,013,069.97	3,611,641,009.51
2037	1,520,103,893.37	3,839,174,393.10
2038	1,615,870,438.66	4,081,042,379.87
2039	1,717,670,276.29	4,338,148,049.80
2040	1,825,883,503.70	4,611,451,376.94
2041	1,940,914,164.43	4,901,972,813.69
2042	2,063,191,756.79	5,210,797,100.95
2043	2,193,172,837.47	5,539,077,318.31
2044	2,331,342,726.23	5,888,039,189.36
2045	2,478,217,317.98	6,258,985,658.29
2046	2,634,345,009.01	6,653,301,754.76
2047	2,800,308,744.58	7,072,459,765.31
2048	2,976,728,195.49	7,518,024,730.53
2049	3,164,262,071.81	7,991,660,288.55
2050	3,363,610,582.33	8,495,134,886.73

SECTION 3 — MEASURES TO MITIGATE CO2 EMISSIONS

Assembly Resolution A38-18 recommends that for States who choose to prepare their action plans; "*the action plans should include information on the basket of measures considered by States, reflecting their respective national capacities and circumstances, and information on any specific assistance needs*".

The different categories constituting the basket of measures which were identified and endorsed by the High-Level Meeting on International Aviation and Climate Change is summarised in the table below along with a brief on Fijis' actions in these areas:-

Basket of measures	**Fiji's proposed actions**
a) aircraft-related technology development;	Replacement of the national carriers aging aircraft. 2 Boeing 747s (in operation since 1989) and a Boeing 767-300 (in operation since 1994) replaced with:- • 3 new Airbus A330-200 in 2013 • Addition of 1 B737-800 and 1 A330-300 to commence operations in 2016
b) alternative fuels	Still in exploratory stage
c) improved air traffic management and related infrastructure use;	The Aviation System Block Upgrade (ASBU) methodology is being used to guide Fiji's improvement of its air navigation capacities and will enable in addition to harmonization with other States in the region, increased capacity, and improved environmental efficiency. Several ASBU modules were identified that would bring immediate and significant emissions reduction and these are outlined below in succeeding rows.
	Installation of a sophisticated air traffic management system, Aurora, to replace the procedural strip system in use at Nadi Oceanic control unit, allowing for a more homogeneous airspace resulting in more efficient use of airspace; routing and level, leading to a reduction in fuel burn and emissions.
	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B (B0-OPFL). • ADS B ITP operational trials conducted in 2014 and 2015. ADS B ITP operations envisaged for 2016 in the Nadi FIR between appropriately equipped ADS B aircraft.
	Improved Traffic Flow through Sequencing (B0-RSEQ). Installation of a sophisticated air traffic management system to complement the current method of control of air traffic by Nadi and Nausori Aerodrome and Approach Control Units; i.e. procedural control using the flight

	progress strip system. This will enable improvement in traffic flow management within terminal and aerodrome airspace. Introduction of Surveillance Control in 2017 for terminal and aerodrome airspace. This will enable more expeditious and efficient handling of traffic.
	Enhanced terminal support facilities to bring about a reduction in the congestion at the apron; eliminating delays in taxiing after engine start and on arrival to allocated parking gate. This is part of the Nadi International Terminal upgrade 2014 – 2016.
	Improved Operations through Enhanced En-route Trajectories (B0-FRTO). • Availability of Flex Tracks and User Preferred Routes (UPRs) in the Nadi FIR. • Availability of Dynamic Airborne Routing Procedures (DARPs) in the Nadi FIR
	Improved Safety and Efficiency through the Application of Data Link En-route (B0-TBO). • CPDLC and ADS C implementation in the Nadi FIR, alleviating HF congestion and enabling a more efficient response to level requests
	Performance Based Navigation (PBN) initiatives: • Introduction of PBN departures (Vicky 1 & Vicky 2) for departures off Runway 20 at Nadi from 2012 • Introduction of RNAV (GNSS) approaches at Nadi and Nausori International Airports • Introduction of STARS at Nadi International Airport from 2017 • Implementation of LNAV/BVNAV approaches for Runway 02, and 09 at Nadi International Airport and Runway 28 and 10 at Nausori International Airport from 2017 • Review of current SIDs to ensure efficiency and separation with proposed STARS
	Improved flexibility and efficiency in aircraft departure profiles through improvement to Continuous Climb Operations (B0-CCO) from 2017
	Improved flexibility and efficiency in aircraft decent profiles through Improvement to Continuous Descent Operations (B0-CDO) from 2017
	Fiji through Airports Fiji Limited to join the ASPIRE program.

d) more efficient operations;	Implementation of improvements to:- • pre-flight procedures such as implementation by the national airline of a new flight planning system which will ensure the aircraft is flight planned at the most optimum level and route • start-up and taxiing procedures • in-flight procedures; attainment of aircraft operational approvals to enable aircraft to take advantage of PBN operations during the enroute phase of flight; RNAV 10, RNP 4, UPR and DARPing and during the departure phase of flight on special departure tracks that have reduced track miles in comparison with the published Standard Instrument Departures.
e) Airport Improvements	Exploring the options of replacing classic runway lights with LED lights.
f) economic/market-based measures	Still in exploratory stage
g) regulatory measures/other;	State Regulation mandating ADS-B equipage on all Fiji registered aircraft. This enables the utilisation of the new ATM system and implementation of Surveillance control for more efficient operations.
	Workshop on Carbon Emissions held in 2012 Future workshops for industry to be organised by the Civil Aviation Authority of Fiji

SECTION 4 – EXPECTED RESULTS

In the table below is the projected fuel consumption and CO2 emissions after implementation of the mitigation actions pertaining to aircraft technology (i.e. replacement of 3 aging aircraft), and some of the ATM and infrastructure improvements identified. Other mitigating measures identified in section 3 have yet to be quantified and will be carried out once more data is at hand.

Year	International RTK	International Fuel (litres)	International Fuel Efficiency	International CO2 Emissions (kg)
2010	408,946,313.00	292,062,050.00	0.714	737,631,913.48
2011	434,709,930.72	310,461,959.15	0.714	784,102,724.03
2012	462,096,656.35	329,942,087.58	0.714	833,301,736.38
2013	491,208,745.70	326,306,345.77	0.664	824,119,306.87
2014	522,154,896.68	348,407,526.31	0.667	879,938,048.44
2015	555,050,655.18	371,901,081.22	0.670	939,273,370.73
2016	590,018,846.45	396,874,730.10	0.673	1,002,346,818.33
2017	627,190,033.78	422,526,068.85	0.674	1,067,131,839.48
2018	666,703,005.91	450,745,517.89	0.676	1,138,402,879.99
2019	708,705,295.28	480,742,792.22	0.678	1,214,163,996.04
2020	753,353,728.88	512,629,894.84	0.680	1,294,698,062.41
2021	800,815,013.80	546,525,884.92	0.682	1,380,305,774.96
2022	851,266,359.67	582,557,322.38	0.684	1,471,306,773.40
2023	904,896,140.33	620,858,740.39	0.686	1,568,040,834.74
2024	961,904,597.17	661,573,147.75	0.688	1,670,869,141.95
2025	1,022,504,586.79	704,852,562.76	0.689	1,780,175,632.51
2026	1,086,922,375.76	750,858,580.92	0.691	1,896,368,431.97
2027	1,155,398,485.43	799,762,978.22	0.692	2,019,881,377.80
2028	1,228,188,590.01	851,748,352.56	0.693	2,151,175,639.22
2029	1,305,564,471.18	907,008,805.48	0.695	2,290,741,439.11
2030	1,387,815,032.87	965,750,666.93	0.696	2,439,099,884.39
2031	1,475,247,379.94	1,028,193,265.65	0.697	2,596,804,911.73
2032	1,568,187,964.88	1,094,569,748.09	0.698	2,764,445,355.78
2033	1,666,983,806.66	1,165,127,948.93	0.699	2,942,647,147.81
2034	1,772,003,786.48	1,240,131,316.42	0.700	3,132,075,652.74
2035	1,883,640,025.03	1,319,859,896.06	0.701	3,333,438,153.48
2036	2,002,309,346.61	1,404,611,376.22	0.701	3,547,486,491.77
2037	2,128,454,835.44	1,494,702,199.62	0.702	3,775,019,875.37
2038	2,262,547,490.08	1,590,468,744.91	0.703	4,016,887,862.14
2039	2,405,087,981.95	1,692,268,582.54	0.704	4,273,993,532.07
2040	2,556,608,524.81	1,800,481,809.95	0.704	4,547,296,859.20
2041	2,717,674,861.88	1,915,512,470.68	0.705	4,837,818,295.95
2042	2,888,888,378.18	2,037,790,063.04	0.705	5,146,642,583.21
2043	3,070,888,346.00	2,167,771,143.72	0.706	5,474,922,800.57
2044	3,264,354,311.80	2,305,941,032.48	0.706	5,823,884,671.63
2045	3,470,008,633.44	2,452,815,624.23	0.707	6,194,831,140.56
2046	3,688,619,177.35	2,608,943,315.26	0.707	6,589,147,237.03
2047	3,921,002,185.52	2,774,907,050.83	0.708	7,008,305,247.58
2048	4,168,025,323.21	2,951,326,501.74	0.708	7,453,870,212.79
2049	4,430,610,918.57	3,138,860,378.06	0.708	7,927,505,770.82
2050	4,709,739,406.44	3,338,208,888.58	0.709	8,430,980,369.00

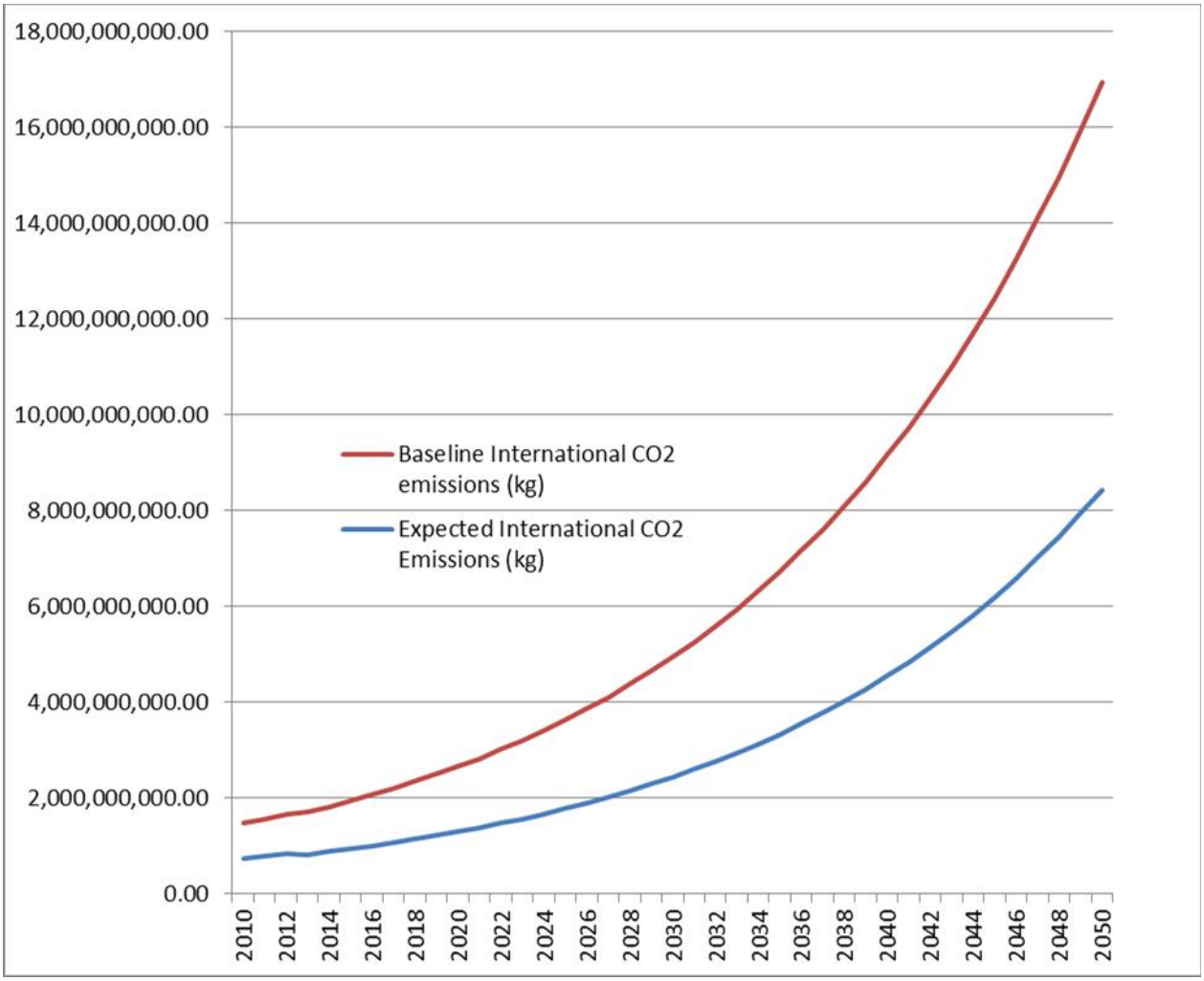

Figure 1 Comparison between Baseline and Expected Emissions

SECTION 5 – ASSISTANCE NEEDS

Fiji would require assistance in:-

- Training and capacity building by way of workshops, hands on training and guidance to enable improvement of the State Action Plan, refinement and implementation of measures identified and further enhancement of the knowledge of all stakeholders.
- Research and Development