



# Wipro: Business Travel Carbon Footprint Study

Air Travel, FY 14-15 and FY 15-16

# Project Methodology



*\* defined by 'The Greenhouse Gas Protocol': Corporate Accounting and Reporting Standard, World Resources Institute (WRI) World Business Council for Sustainable Development (WBCSD)*

# 1. Business Goal Definition



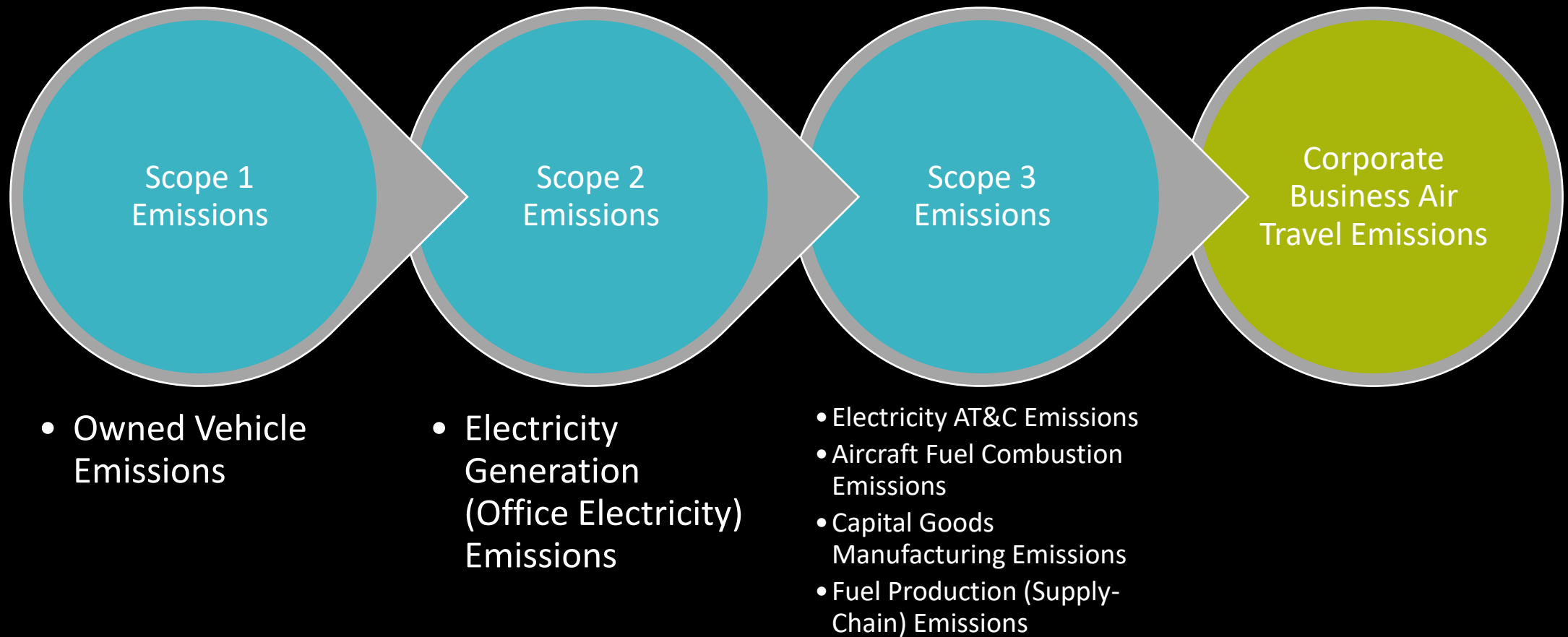
Estimate GHG emissions from Wipro's Air Travel activities and evaluate mitigation alternatives as decision support for development of its Corporate GHG Mitigation Roadmap

## 2. Organizational Boundary Definition



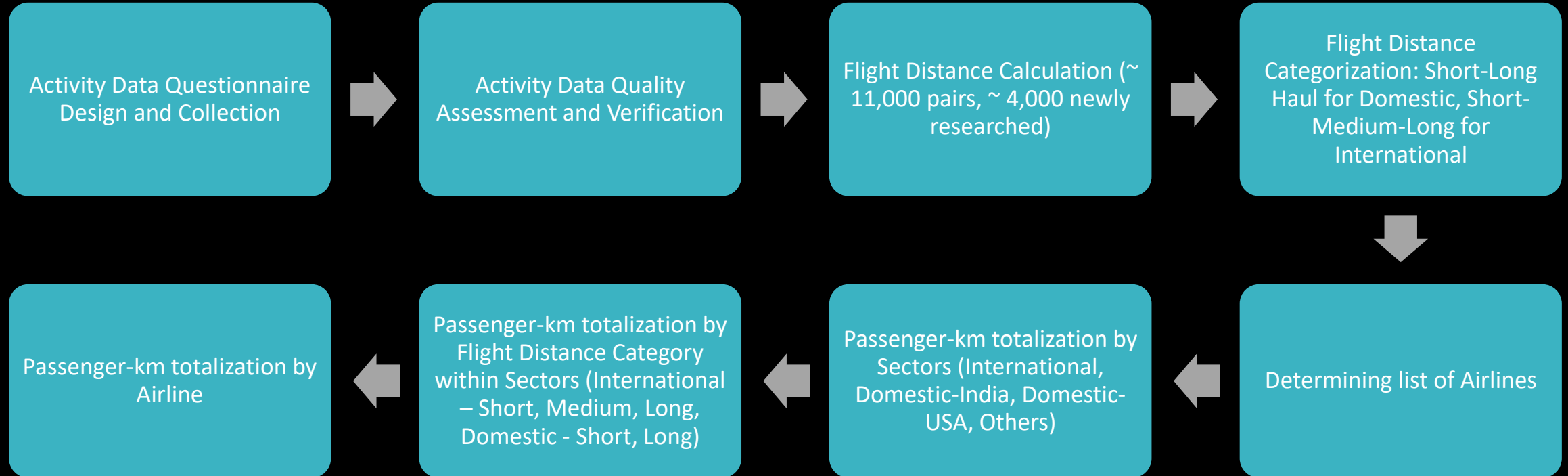
\* based on 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2 - Energy, Chapter 3: Mobile Combustion

# 3. Operational Boundary Definition

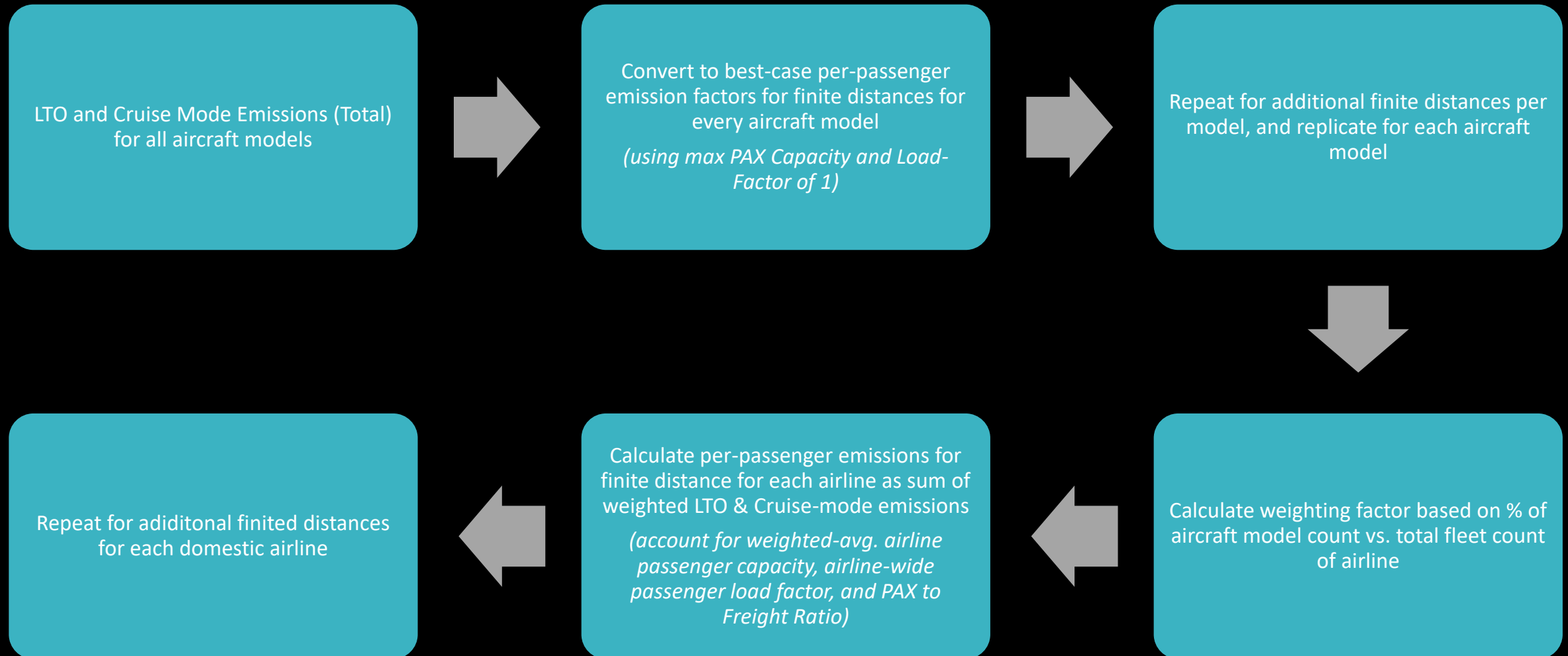


\* based on 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2 - Energy, Chapter 3: Mobile Combustion

# 4. Data Collection & 5. Data Analysis



# 6. Emission Factor Development



\* based on 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2 - Energy, Chapter 3: Mobile Combustion

# Assumptions

- One passenger per booking entry
- Same airline for all legs of multi-stop flights
- GHG mitigation through substitution of Multi-Leg Roundtrip-Flights with Non-Stop Roundtrip-Flights was simple for a roundtrip flight with even-number of legs (eg. 4-leg flight: Mumbai-Dubai-London-Dubai-London) wherein the 'destination' was the middle city (i.e. London). The process of determining the 'destination' for a roundtrip-flight with odd-number of legs (eg. 3-leg flight: Mumbai-Dubai-Geneva-Mumbai) was: identify the city following the 'mid-point' in the even-number sequence (eg. mid-point of 4 city trip would be 2nd-city, the subsequent city would be the 3rd-city in the sequence – i.e. Geneva).
- 100% economy class seats
- Employee Count: 1,20,000
- Additional Employee Time per Flight Leg (Pre-Departure, Transit, Post-Arrival Time) : 3 hours/flight
- For Airlines wherein fleet composition and operation data were not available, the corresponding 'average' emission factor for the Sector was applied (eg. use of Avg. International Short Haul Emission Factor (kg CO<sub>2</sub>e/pass-km) for Ravn Alaska Airline's International Short Haul Flights)



# Materiality and Exclusions

- Scope 1 Emissions from Owned Vehicle use to support Air Travel activities not considered material to footprint and hence excluded
- Scope 2 Emissions attributable to Office Electricity Use (for Air Travel Management Operations) not considered material to footprint and hence excluded
- Scope 3 Emissions attributable to AT&C Losses resulting from Office Electricity Use (for Air Travel Management Operations) not considered material to footprint and hence excluded
- Scope 3 Emissions from Train Travel in the USA excluded
- Flights shorter than 100 kms excluded (considered to be data error)
- Flights costing less than INR 200 excluded (considered to be data error)

# Definitions

Flight Distance Category	Distance Range (km)
International – Short Haul	< 2,000
International – Medium Haul	> 2,000 to < 5,000
International – Long Haul	> 5,000
Domestic – Short Haul	< 500
Domestic – Long Haul	> 500

Data Analysis:

**Know your**

**Air Travel**

**Metrics**

# Distance Metrics

(Million Passenger-kms)

**FY 14-15**

1,269.8

**Total Distance**

**FY 15-16**

1,134.4

**International**

932.9

809.9

**Domestic**

336.9

324.4

**Domestic - India**

161.4

174.3

**Domestic - USA**

160.3

136.4

**Domestic - Others**

15.2

13.7



# Flight Metrics

(Nos. of Flights)

**FY 14-15**

**4,98,32**

**7**

**2,02,122**



**2,96,205**



**1,59,166**



**1,13,763**



**23,276**



**Total Flights**

**International**

**Domestic**

**Domestic - India**

**Domestic - USA**

**Domestic - Others**

**FY 15-16**

**4,68,67**

**5**

**1,79,201**



**2,89,474**



**1,73,147**



**96,636**



**19,691**



## 5 Longest International Flights

km

Auckland, New  
Zealand

**18,364.2**

Heathrow,  
United Kingdom

Auckland, New  
Zealand

**18,336.8**

London, United  
Kingdom

Bonaire,  
Netherlands  
Antilles

**18,287.5**

Singapore,  
Singapore

Lisbon, Portugal

**18177.93**

Sydney, Australia

Perth, Australia

**18138.05**

Toronto, Canada

## 5 Shortest International Flights

km

Tallinn, USSR

**101.4**

Helsinki, Finland

Geneva,  
Switzerland

**106.6**

Lyon, France

Cotonou, Benin

**107.2**

Lagos, Nigeria

Porto, Portugal

**109.9**

Vego, Spain

Guangzhou,  
China

**128.5**

Hongkong

## 5 Longest Domestic-India Flights

km

Delhi, India

**2,483.5**

Port Blair, India

Bangalore,  
India

**2,418.7**

Dibrugarh,  
India

Amritsar, India

**2,408.6**

Kochi, India

Kochi, India

**2,385.4**

Guwahati,  
India

Dibrugarh,  
India

**2,368.7**

Pune, India

## 5 Shortest Domestic-India Flights

km

Baroda, India

**102.3**

Ahmedabad,  
India

Bombay, India

**124.1**

Pune, India

Calicut, India

**131.7**

Coimbatore,  
India

Jammu, India

**142.6**

Srinagar, India

Dehradun,  
Uttarakhand

**143.2**

Chandigarh,  
India

# FY 14-15

~4 Flights



**Flights Per Employee**

10.6  
Thousand Pax - km



**Distance Per Employee**

1.51  
Million Hours



**Time Spent in Air**

3.01  
Million Hours

**Total Travel Time\***

12.6  
Hours



**Air time Per Employee**

25.1  
Hours

**Total Travel Time Per Employee**

# FY 15-16

~4 Flights



**Flights Per Employee**

9.45  
Thousand Pax - km



**Distance Per Employee**

1.35  
Million Hours



**Time Spent in Air**

2.76  
Million Hours

**Total Travel Time\***

11.3  
Hours



**Air time Per Employee**

23.0  
Hours

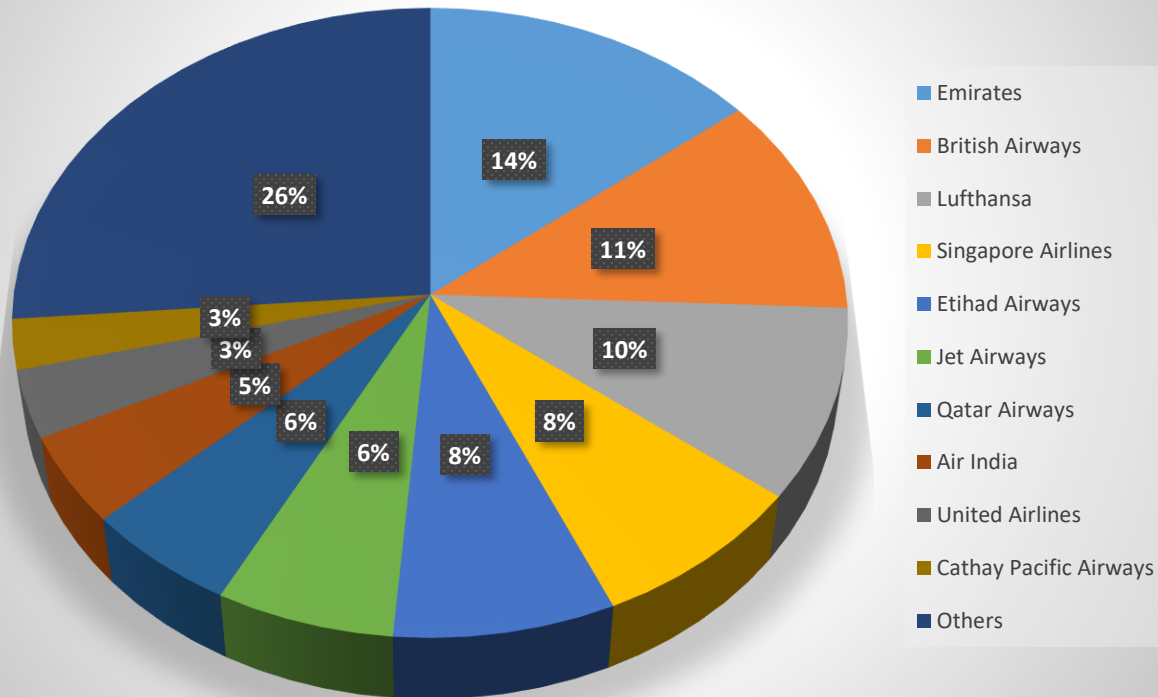
**Total Travel Time Per Employee**

*\*including pre-flight, post-flight, and transit time*

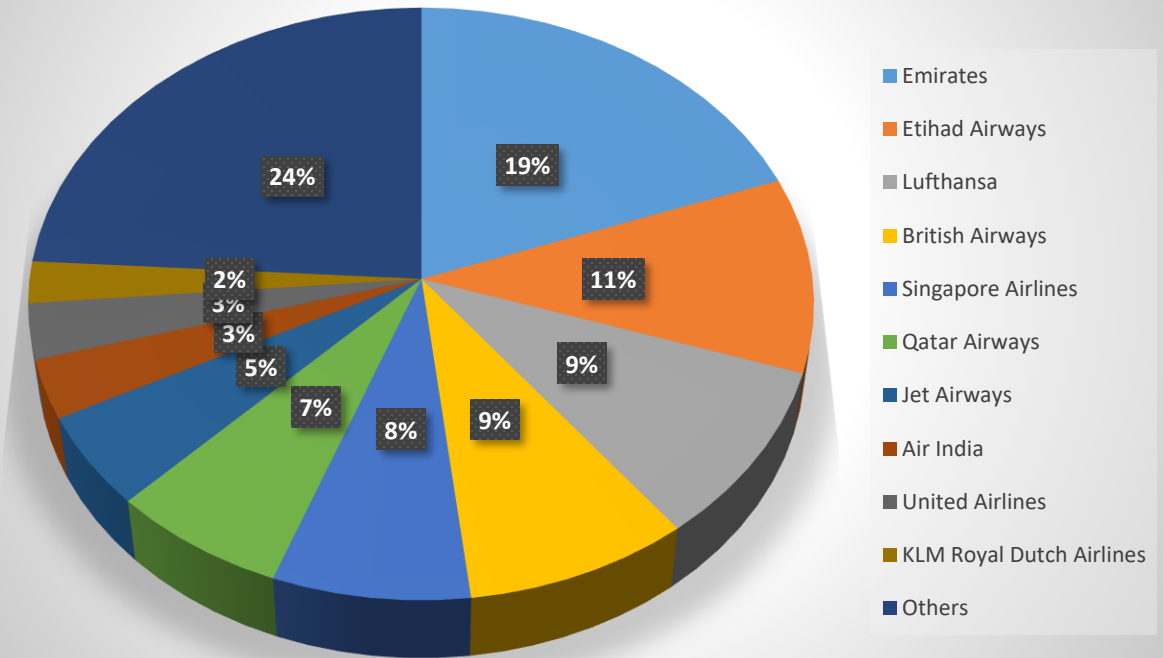


# Most Favoured International Airlines (flight count-based)

Most Favoured International Airlines  
FY 2014-2015

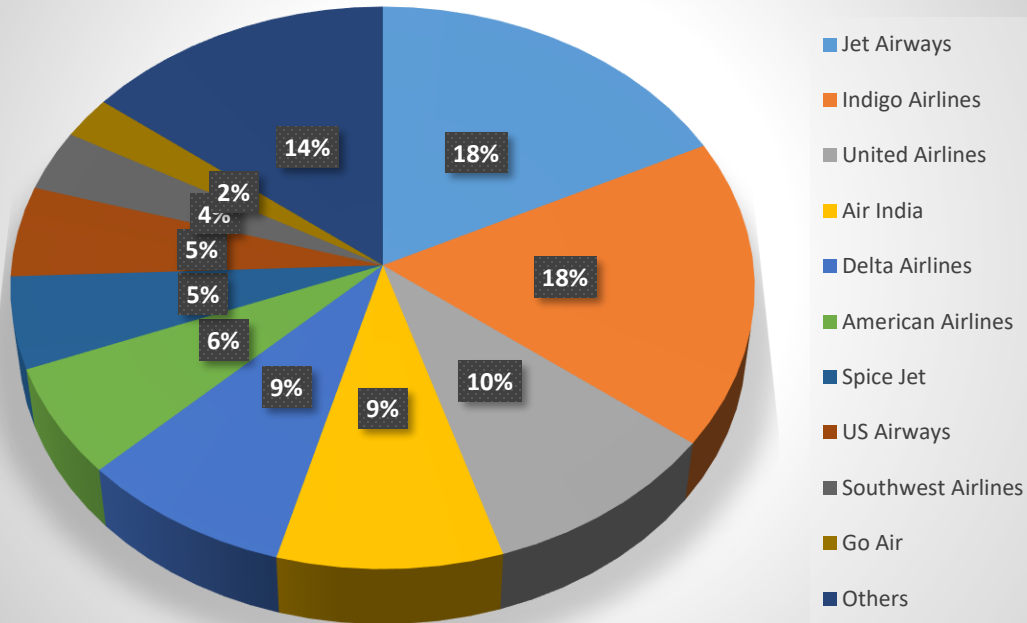


Most Favoured International Airlines  
FY 2015-2016

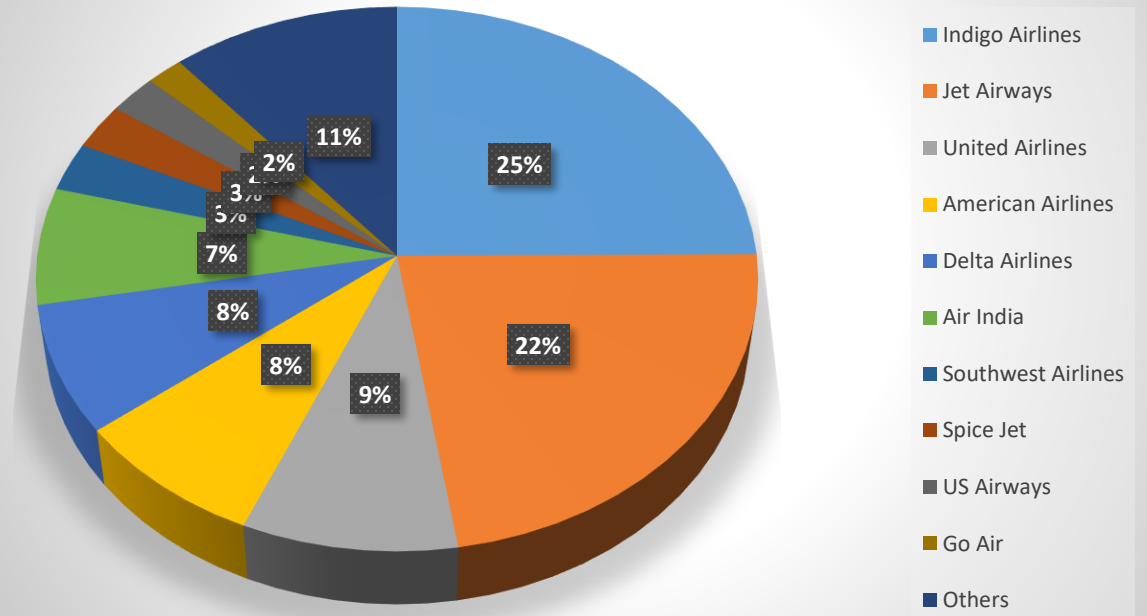


# Most Favoured Domestic Airlines (flight count-based)

Most Favoured Domestic Airlines  
FY 2014-2015



Most Favoured Domestic Airlines  
FY 2015-2016



Data Analysis:

**Know your**

**Baseline GHG**

**Emissions**

# Corporate Business Travel (Air Travel) Emissions

('000 Tonnes CO2e)

FY 14-15

Category	Scope 3 – Aircraft Fuel Combustion	Scope 3 – Fuel Supply Chain	Scope 3 – Aircraft Manufacturing	Total
International Air Travel	100.7	15.0	7.38	123.2
Domestic Air Travel	38.9	5.95	2.12	46.9
Total	139.6	21.0	9.51	170.1

# Corporate Business Travel (Air Travel) Emissions

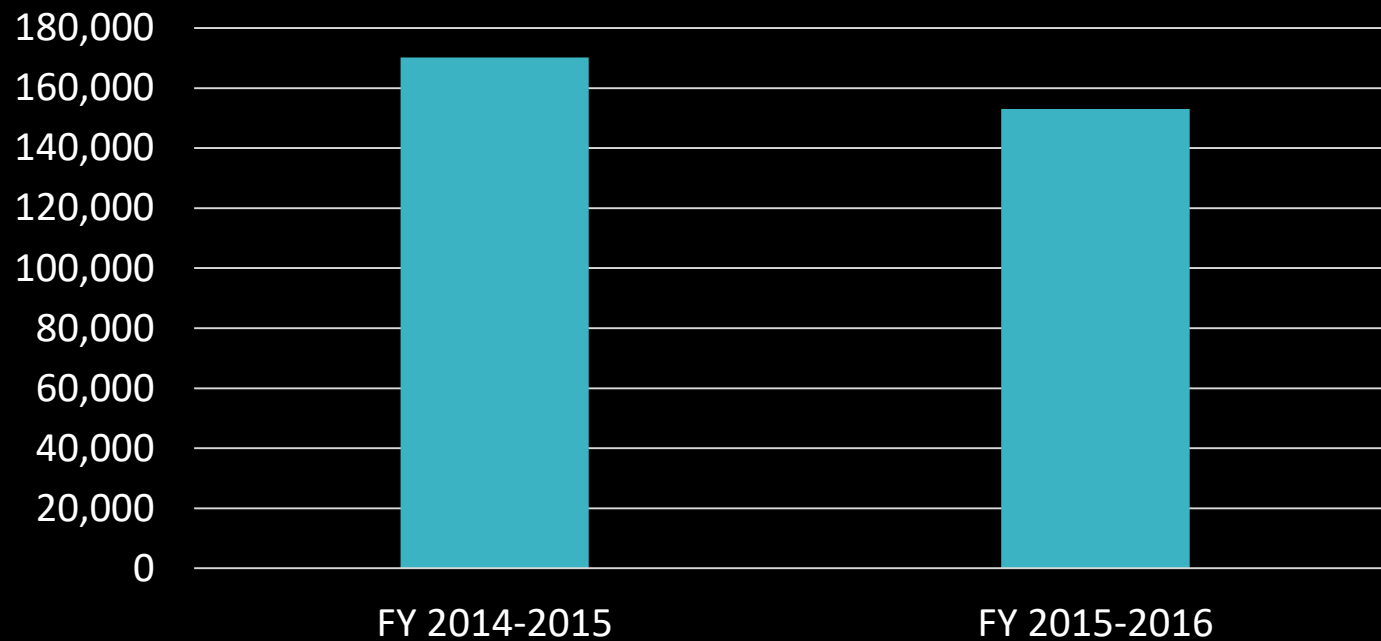
('000 Tonnes CO2e)

FY 15-16

Category	Scope 3 – Aircraft Fuel Combustion	Scope 3 – Fuel Supply Chain	Scope 3 – Aircraft Manufacturing	Total
International Air Travel	88.6	13.1	6.4	108.2
Domestic Air Travel	37.0	5.7	2.0	44.7
Total	125.6	18.8	8.4	152.9

# Air Travel Emission Trend – FY 14-15 vs. FY 15-16

Air Travel GHG Emissions: FY 14-15 and FY 15-16

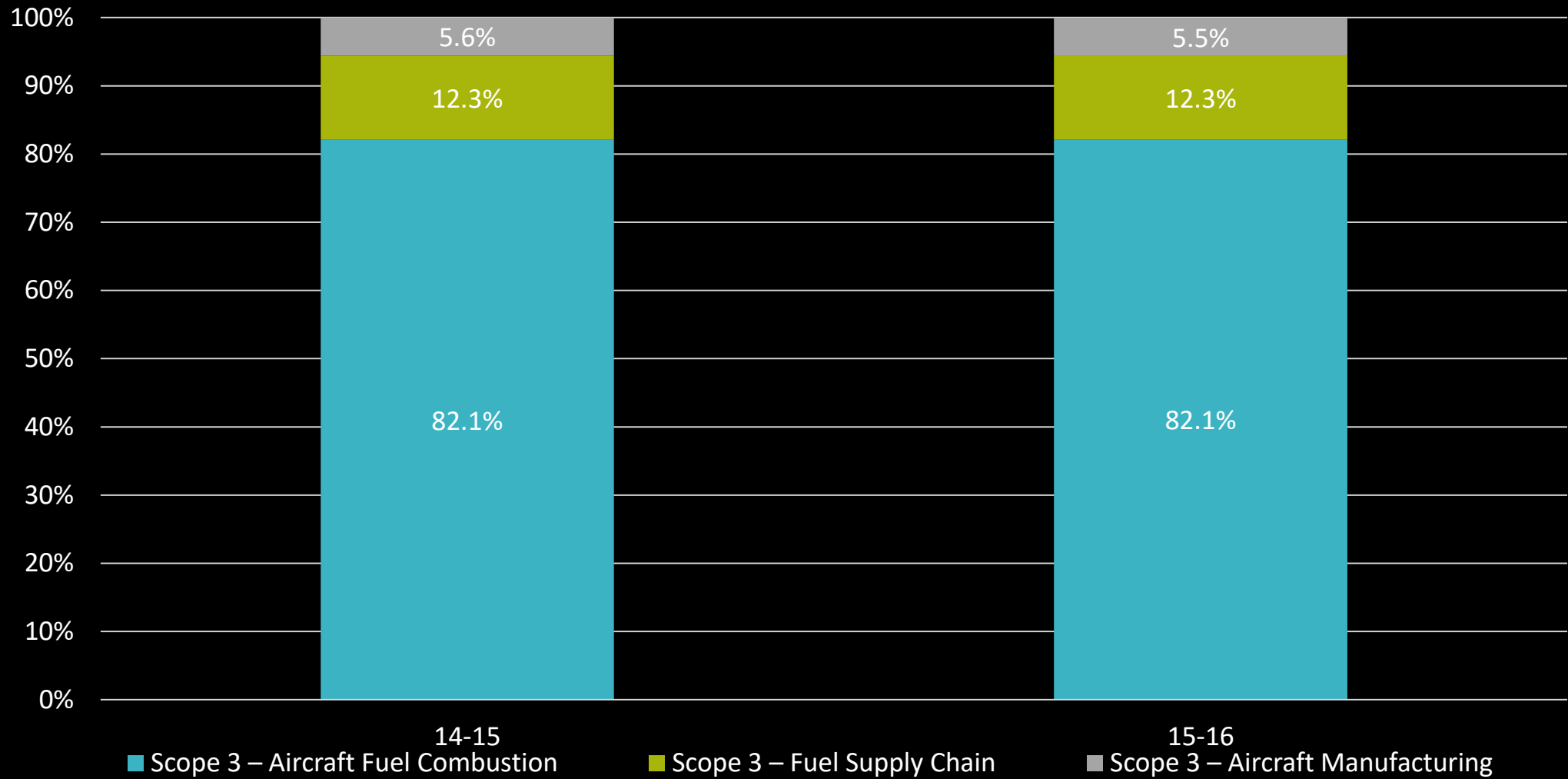


## Air Travel Emission Trend

GHG Emissions FY 2014 - 2015 -  
170.1 Thousand tonne CO2e

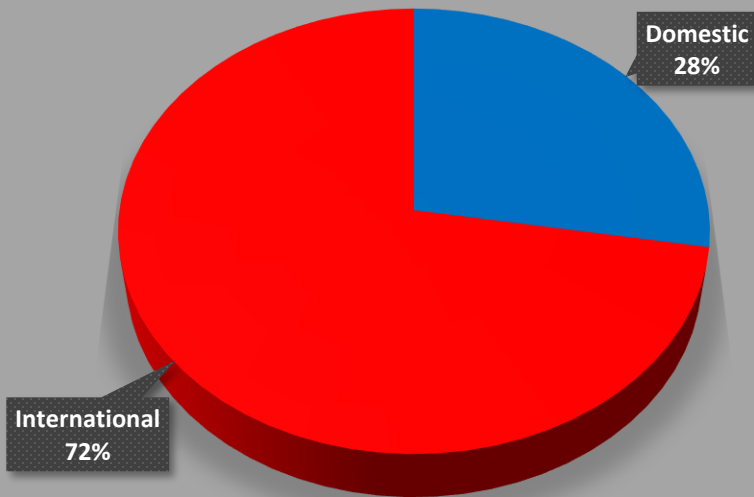
GHG Emissions FY 2015-2016 -  
152.9 Thousand tonne CO2e

# Activity-Wise Air Travel Emission Distribution



# International vs. Domestic Air Travel Emission Distribution

**FY 2014-2015**



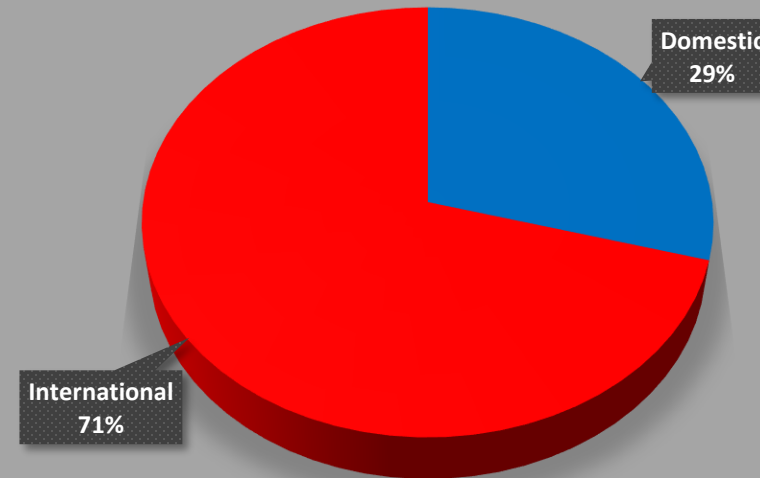
GHG Emission Distribution

Total GHG Emissions-  
170.1 '000 Tonnes CO<sub>2</sub>e

International -  
123.2 '000 Tonnes CO<sub>2</sub>

Domestic -  
46.9 '000 Tonnes CO<sub>2</sub>e

**FY 2015-2016**



GHG Emission Distribution

Total GHG Emissions-  
152.9 '000 Tonnes CO<sub>2</sub>e

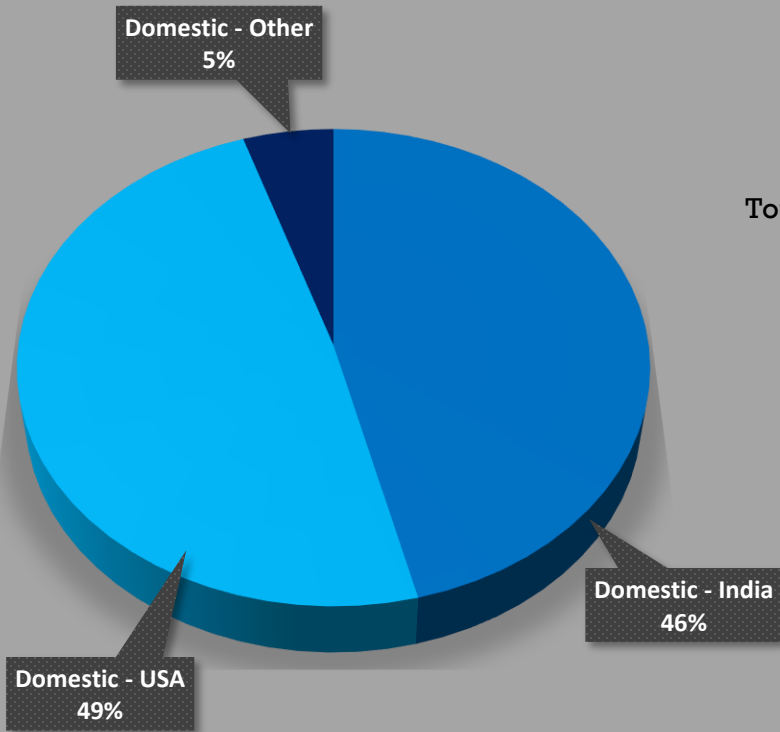
International  
108.2 '000 Tonnes CO<sub>2</sub>e

Domestic  
44.7 '000 Tonnes CO<sub>2</sub>e



# Domestic Air Travel Emission Distribution

FY 2014-2015



Domestic GHG Emission  
Distribution

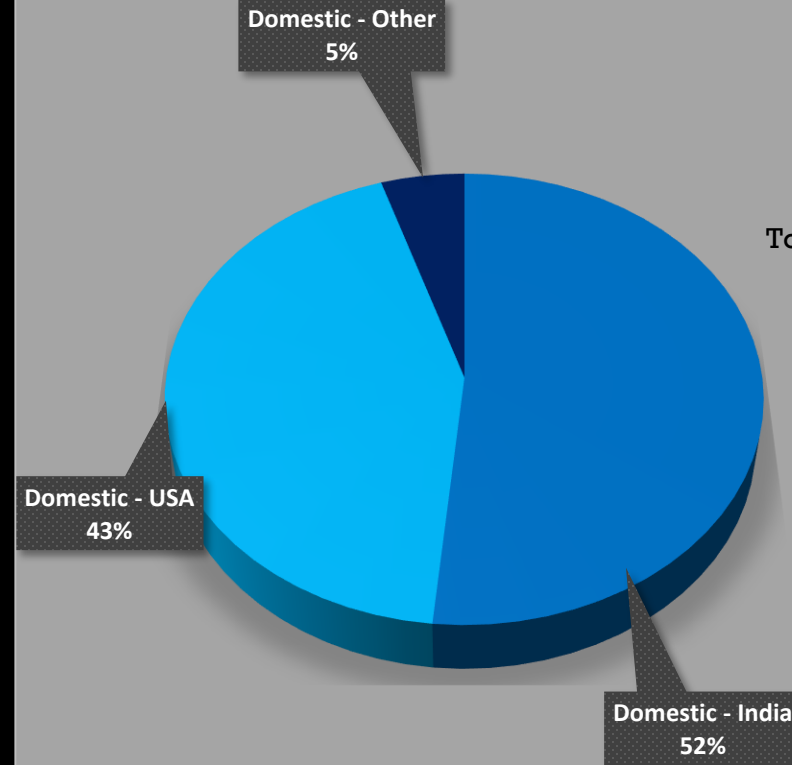
Total Domestic GHG Emissions  
46.9 '000 Tonnes CO<sub>2</sub>e

Domestic - India  
21.7 '000 Tonnes CO<sub>2</sub>e

Domestic - USA  
23.0 '000 Tonnes CO<sub>2</sub>e

Domestic - Other  
2.38 '000 Tonnes CO<sub>2</sub>e

FY 2015-2016



Domestic GHG Emission  
Distribution

Total Domestic GHG Emissions  
44.7 '000 Tonnes CO<sub>2</sub>e

Domestic - India  
23.1 '000 Tonnes CO<sub>2</sub>e

Domestic - USA  
19.5 '000 Tonnes CO<sub>2</sub>e

Domestic - Other  
2.21 '000 Tonnes CO<sub>2</sub>e

**FY 14-15**

**FY 15-16**

# GHG Emission Benchmarks

1.42 Tonnes  
CO<sub>2</sub>e



**Emission Per Employee**



1.28 Tonnes  
CO<sub>2</sub>e

341.6  
kg CO<sub>2</sub>e



**Emission Per Flight**



326.5  
kg CO<sub>2</sub>e

21.3 g CO<sub>2</sub>e



**Emission Per Rupee**



20.4 g CO<sub>2</sub>e

53.8  
Million Litres



**Litres of fuel burnt**



48.4  
Million Litres

## GHG Emission Benchmarks - Peers

76,557 Tonnes  
CO<sub>2</sub>e

**Total Air Travel Emissions**

110,809  
Tonnes CO<sub>2</sub>e

0.39 Tonnes  
CO<sub>2</sub>e

**Emission Per Employee**

0.36 Tonnes  
CO<sub>2</sub>e

?

**Emission Per Flight**

326.5  
kg CO<sub>2</sub>e

## Airline Emission Factor Benchmarks – International Airlines (kg CO2e/pass-km)

Benchmark	International – Short Haul		International – Medium Haul		International – Long Haul	
Lowest EF - 1	Ryanair	0.0748	Ryanair	0.0681	Rwand Air	0.0608
Lowest EF - 2	Norwegian Air Shuttle	0.0830	Rwand Air	0.0685	Ryanair	0.0657
Lowest EF - 3	Spirit Airlines	0.0895	Alaska Airlines	0.0755	Alaska Airlines	0.0691
Highest EF - 1	Hanh Airlines	0.4413	Regional Express	0.2707	Regional Express	0.2684
Highest EF - 2	Regional Express Airlines	0.2799	New England Airlines	0.2811	New England Airlines	0.2801
Highest EF - 3	Porter Airlines	0.2797	Hahn Airlines	0.3828	Hahn Airlines	0.3636
Average EF	0.1292		0.1116		0.1058	

## Airline Emission Factor Benchmarks – Popular International Airlines (kg CO<sub>2</sub>e/pass-km)

Benchmark	International – Medium Haul	
EF Rank - 1	United Airlines	0.0779
EF Rank - 2	Jet Airways	0.0960
EF Rank - 3	Lufthansa	0.0977
EF Rank - 4	KLM	0.1048
EF Rank - 5	Qatar Airways	0.1116
EF Rank - 6	Singapore Airlines	0.1133
EF Rank - 7	British Airways	0.1144
EF Rank - 8	Air India	0.1159
EF Rank - 9	Emirates	0.1240
EF Rank - 10	Etihad	0.1253

## Airline Emission Factor Benchmarks – Domestic (India) Airlines (kg CO<sub>2</sub>e/pass-km)

Benchmark	Domestic – India Short Haul		Domestic India – Long Haul	
Lowest EF - 1	Indigo Airlines	0.1289	Spice Jet	0.0861
Lowest EF - 2	GO Air	0.1304	Indigo Airlines	0.0867
Lowest EF - 3	Air Asia India	0.1378	GO Air	0.0877
Highest EF - 1	Air India	0.1996	Air India	0.1329
Highest EF - 2	Jet Airways	0.1806	Jet Airways	0.1198
Highest EF - 3	Spice Jet	0.1670	Vistara	0.1105
Average EF	0.1582		0.1031	

## Airline Emission Factor Benchmarks – Domestic (USA) Airlines (kg CO2e/pass-km)

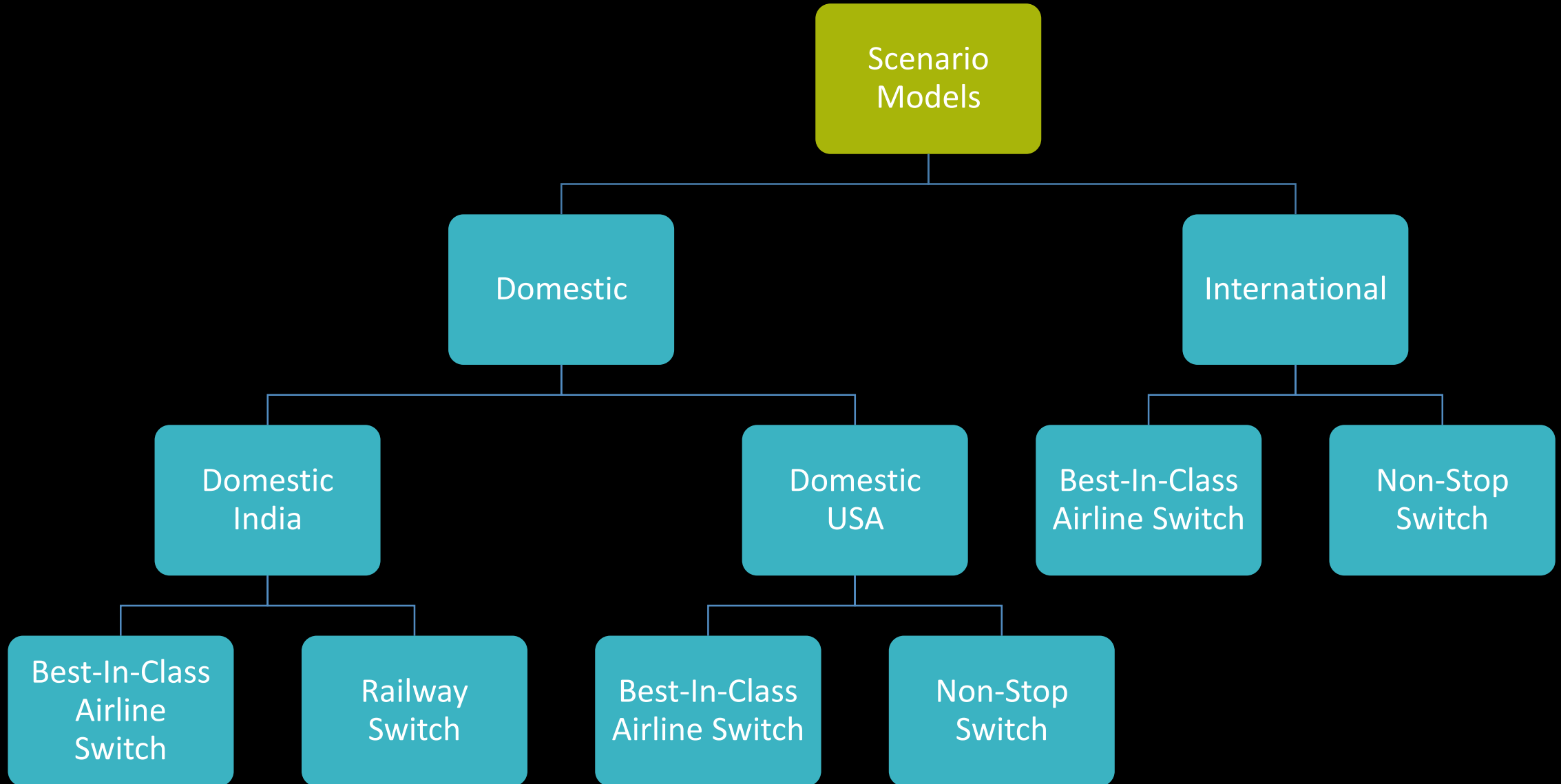
Benchmark	Domestic – USA Short Haul		Domestic USA – Long Haul	
Lowest EF - 1	Spirit Airlines	0.1299	Spirit Airlines	0.0860
Lowest EF - 2	West Jet	0.1462	West Jet	0.0931
Lowest EF - 3	Jet Blue	0.1512	Alaska Airlines	0.0955
Highest EF - 1	Porter Airlines	0.4370	Porter Airlines	0.2695
Highest EF - 2	Air Tran Airways	0.2649	Air Tran Airways	0.1779
Highest EF - 3	American Airlines	0.2100	Silver Airways	0.1619
Average EF	0.1832		0.1226	

Scenario Modelling:

**Know your  
Mitigation  
Options**

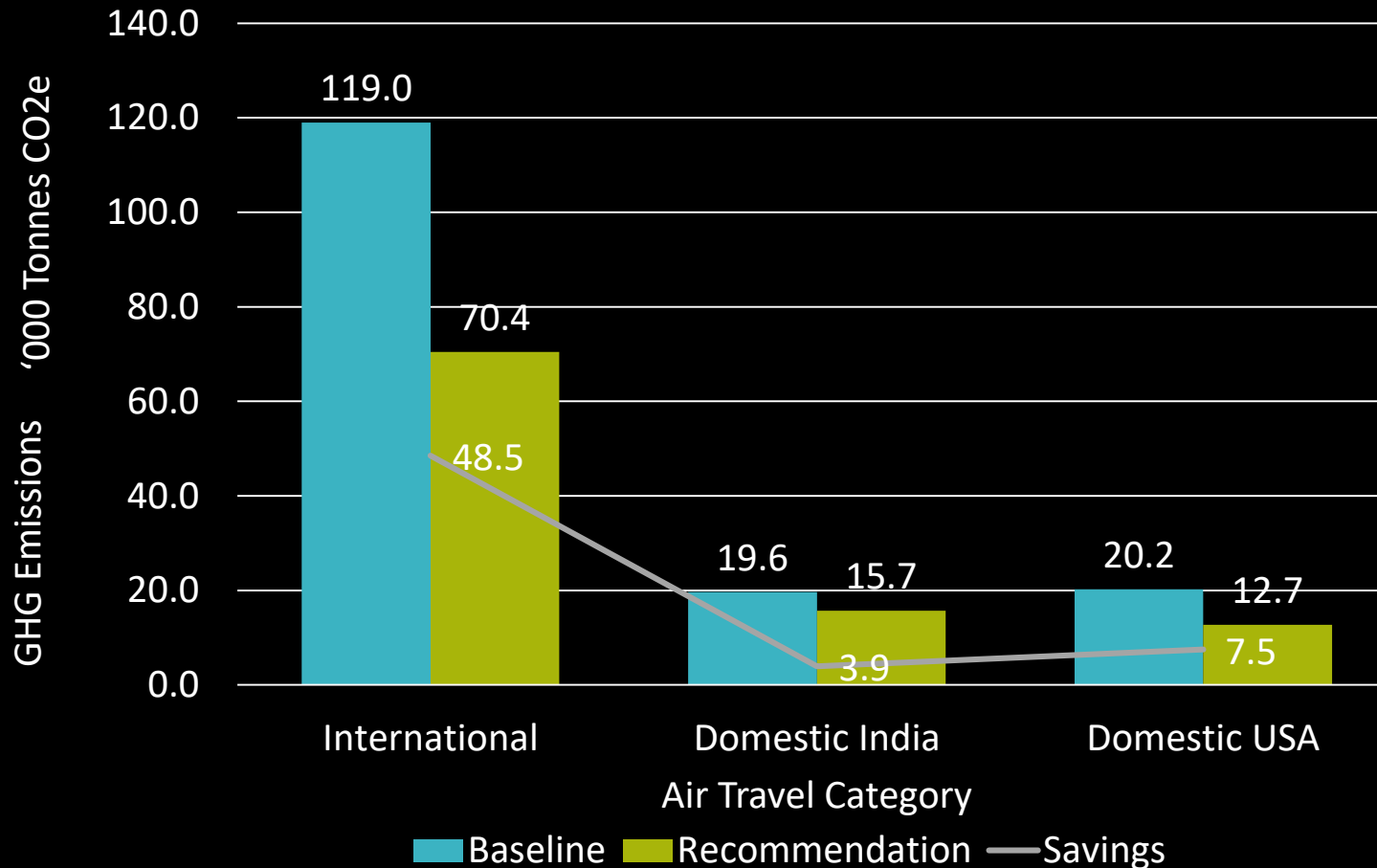


# Scenario Flowchart



# Scenario Flowchart

FY 14- 15  
Best In Class Switch



Best In Class Switch

## International

**Baseline** - 119.0 Thousand tonne CO2e

**Recommendation** - 70.4 Thousand tonne CO2e

**Savings** - 48.5 Thousand tonne CO2e

**Saving %** -41%

## Domestic India

**Baseline** - 19.6 Thousand tonne CO2e

**Recommendation** - 15.7 Thousand tonne CO2e

**Savings** - 3.9 Thousand tonne CO2e

**Saving %** -37%

## Domestic USA

**Baseline** - 20.2Thousand tonne CO2e

**Recommendation** - 12.7 Thousand tonne CO2e

**Savings** - 7.5 Thousand tonne CO2e

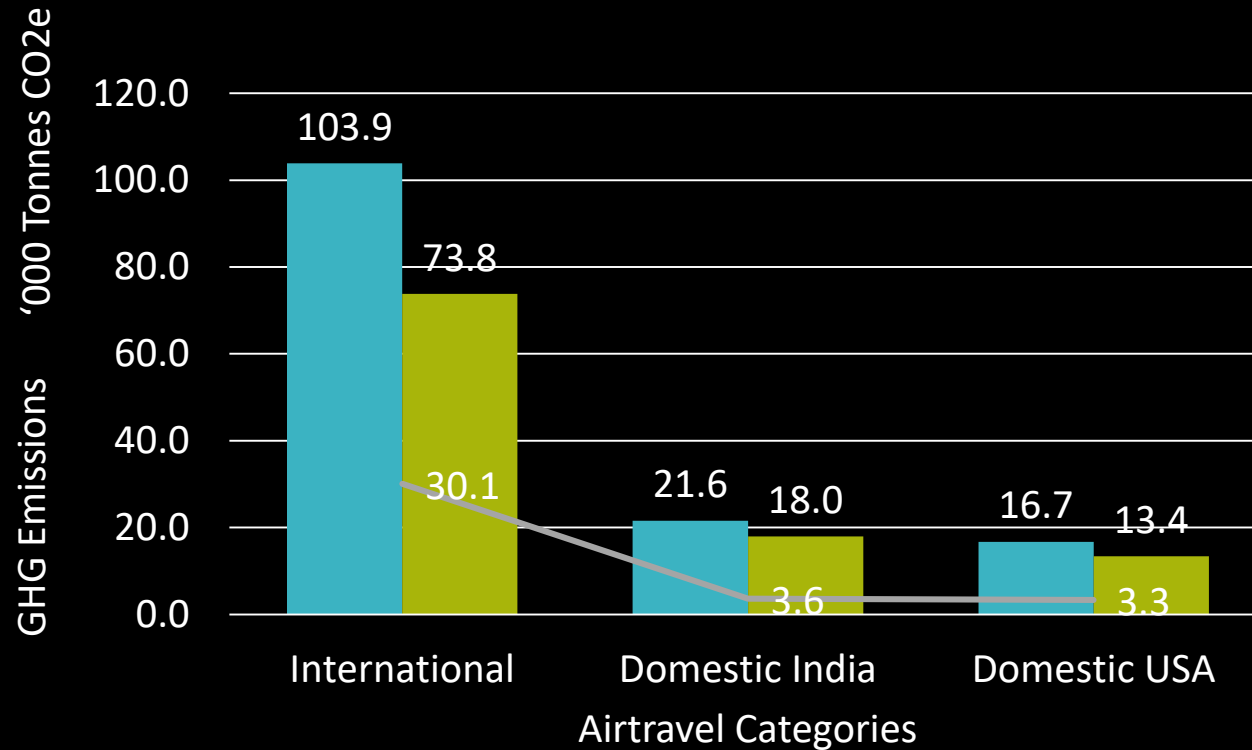
**Saving %** - 20%

# Scenario Flowchart

FY 15- 16

Best In Class Switch

Best In Class Switch



## International

**Baseline** - 103.8 Thousand tonne CO<sub>2</sub>e

**Recommendation** - 73.8 Thousand tonne CO<sub>2</sub>e

**Savings** - 30.0 Thousand tonne CO<sub>2</sub>e

**Saving %** - 29%

## Domestic India

**Baseline** - 21.6 Thousand tonne CO<sub>2</sub>e

**Recommendation** - 18.0 Thousand tonne CO<sub>2</sub>e

**Savings** - 3.6 Thousand tonne CO<sub>2</sub>e

**Saving %** - 17%

## Domestic USA

**Baseline** - 16.7 Thousand tonne CO<sub>2</sub>e

**Recommendation** - 13.4 Thousand tonne CO<sub>2</sub>e

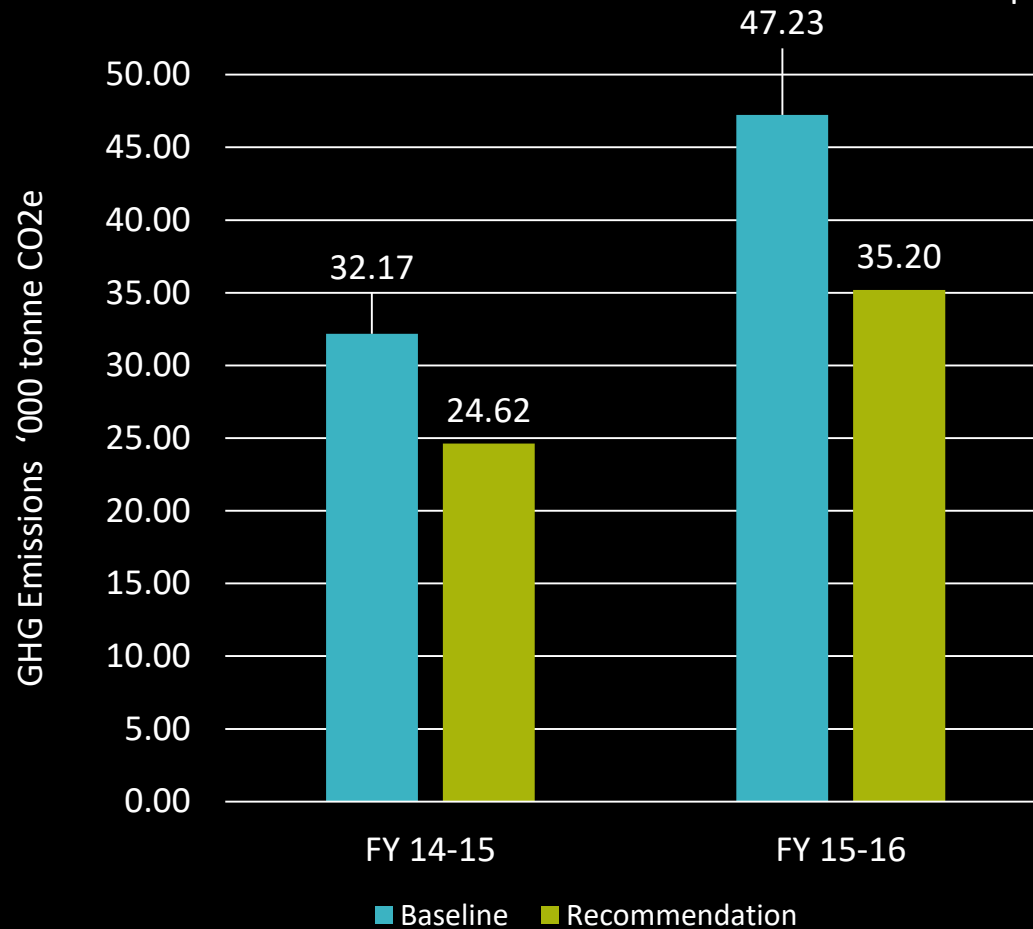
**Savings** - 3.3 Thousand tonne CO<sub>2</sub>e

**Saving %** - 20%

# Scenario Flowchart

## Best In Class Switch for Top GHG Emission contributing sectors

FY 14-15 vs FY 15-16



### Best In Class Switch for Top GHG Emission contributing sectors

#### FY 14 -15

Baseline – 32.17 Thousand tonne CO2e

Recommendation – 24.62 Thousand tonne CO2e

Savings – 7.54 Thousand tonne CO2e

Savings % - 23%

#### FY 15-16

Baseline – 47.23 Thousand tonne CO2e

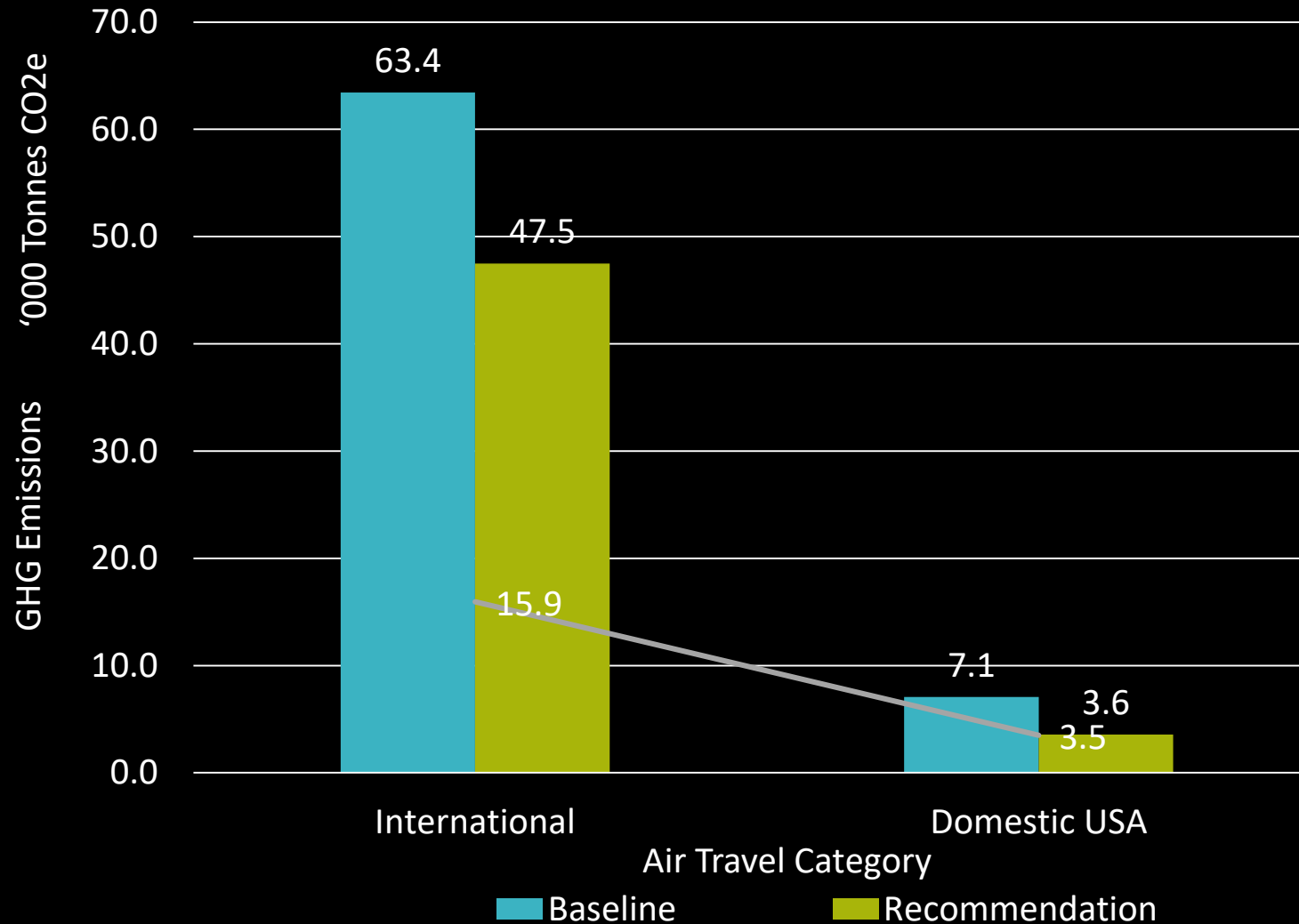
Recommendation – 35.20 Thousand tonne CO2e

Savings – 12.04 Thousand tonne CO2e

Savings % - 25%

# Scenario Flowchart

FY 14-15  
Non Stop Switch



Non Stop Switch

## International

**Baseline** - 63.4 Thousand tonne CO2e

**Recommendation** - 47.4 Thousand tonne CO2e

**Savings** - 15.9 Thousand tonne CO2e

**Saving %** -25%

## Domestic USA

**Baseline** - 7.0 Thousand tonne CO2e

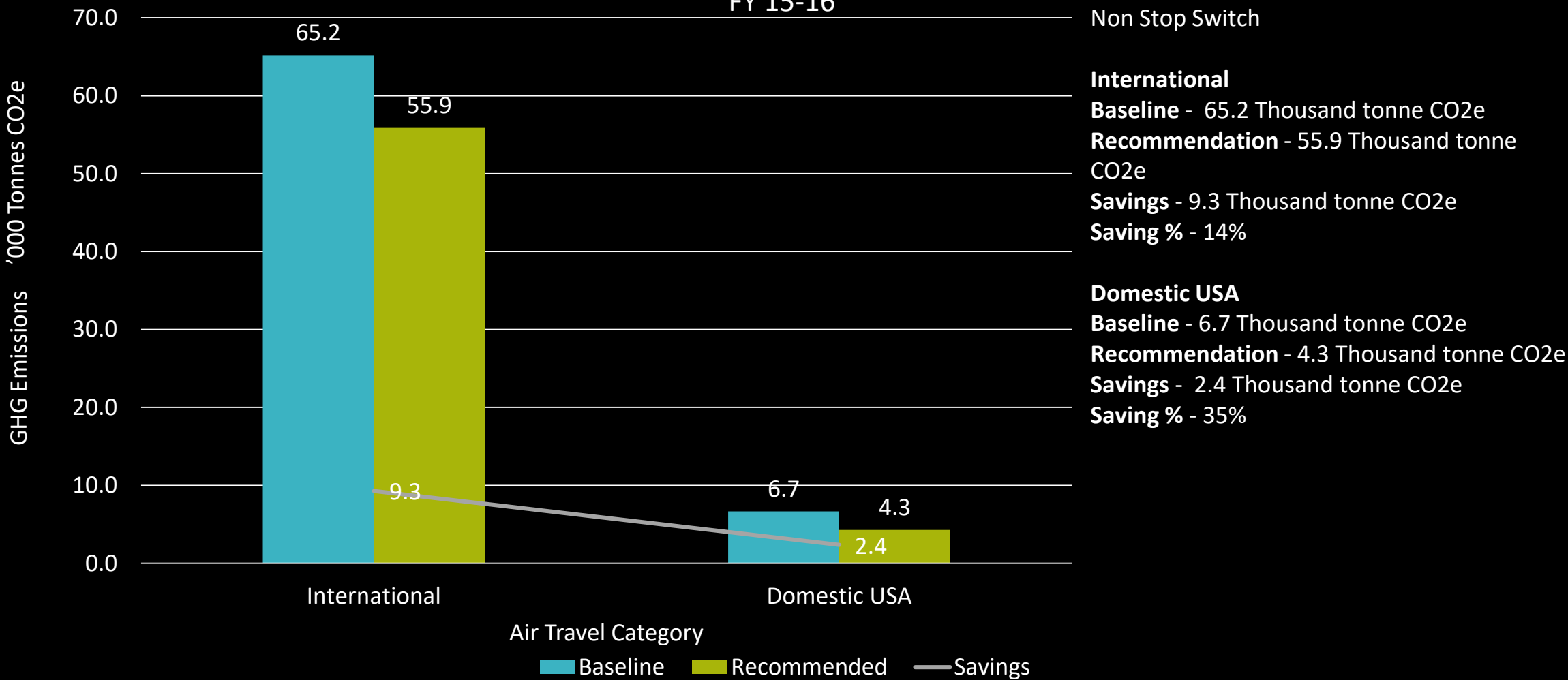
**Recommendation** - 3.6 Thousand tonne CO2e

**Savings** - 3.50 Thousand tonne CO2e

**Saving %** -25%

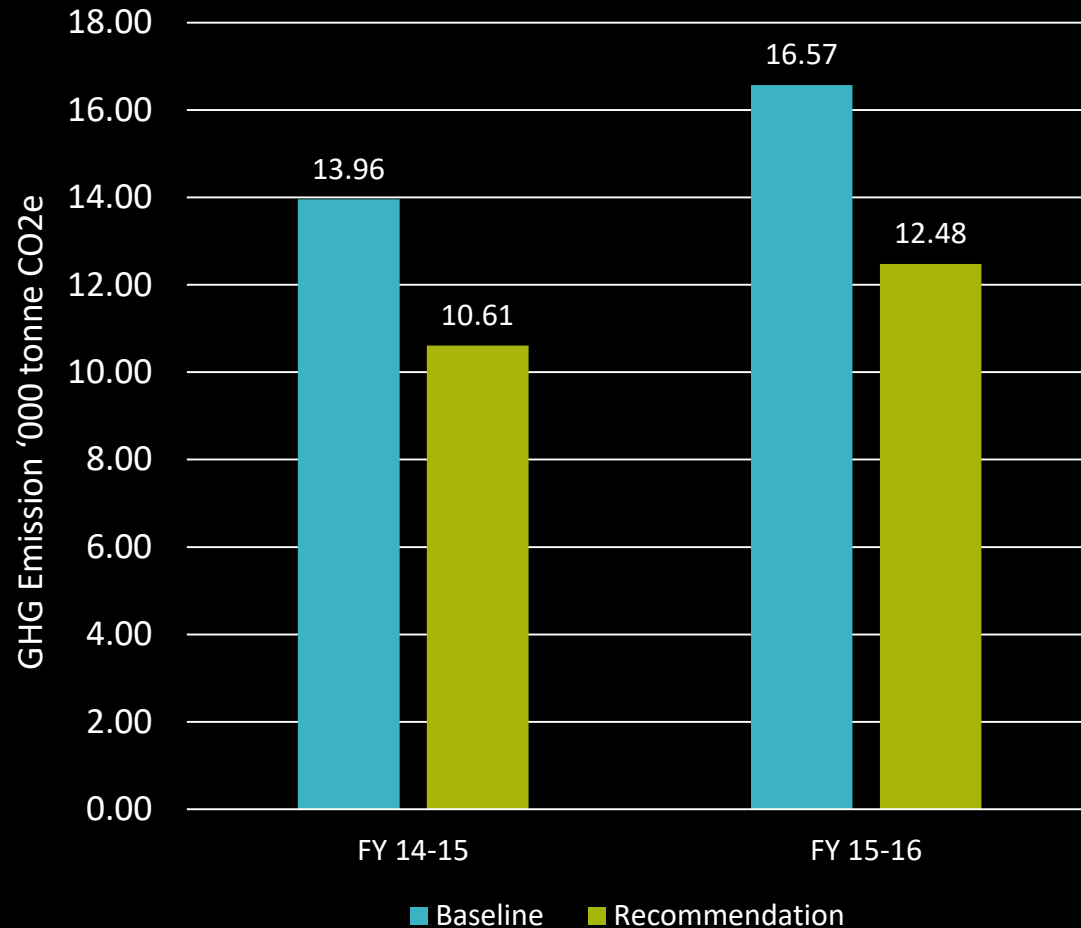
# Scenario Flowchart

Non Stop Switch  
FY 15-16



# Scenario Flowchart

## Non Stop Switch for Top GHG Emission contributing sectors



### Non Stop Switch for Top GHG Emission contributing sectors

#### FY 14-15

Baseline – 13.96 Thousand tonne CO2e

Recommendation – 10.61 Thousand tonne CO2e

Savings – 3.34 Thousand tonne CO2e

Savings % - 24%

#### FY 15-16

Baseline – 16.57 Thousand tonne CO2e

Recommendation – 12.48 Thousand tonne CO2e

Savings – 4.09 Thousand tonne CO2e

Savings % - 25%

# Key Recommendations

- Give priority to Best-In-Class Airlines:
  - For International Travel: United Airlines, Jet Airways, Lufthansa
  - For Domestic Travel in India: Indigo, Go Air, Spicejet
- Switch journeys of < 200 km to shared vehicular transport such as express busses, express trains and car-pooled intercity-cabs
- Switch to Rajdhani, Duronto, Shatabdi , Amtrak Train Travel for Routes between key-city pairs served by these high-speed trains
  - For India-Travel: Mumbai-Ahmedabad, Mumbai-Baroda, Kolkata-Ranchi, Kolkata-Puri, Jaipur-Delhi, Bangalore-Chennai, Mysore-Chennai, Chennai-Coimbatore, Pune-Hyderabad, New Delhi-Chandigarh, New Delhi-Amritsar
  - For US-Travel: New York City-Boston, New York City-Philadelphia, Houston-Dallas, New York City-Washington DC
- Consider time savings from avoided air travel (with tele-video conferencing as a substitute) to be eligible for partial consideration as vacation-time for employees.