



# AOT Climate Change Management

## Supporting Document

# Climate Related Management Incentives



CEO	Business Unit Managers	Employees
<p>Mr. Nitinai Sirismatthakarn</p> <p>Our President (CEO equivalent) is entitled to monetary incentives from climate change management.</p>	<p>AOT Senior Executives and member of Energy Conservation Committee are entitled to monetary incentives from eco-efficiency program.</p>	<p>All employees are eligible to monetary incentives from proposing energy efficiency or GHG reduction ideas.</p>
<p><b>Type of incentive:</b> Monetary</p> <p><b>Incentivized KPI:</b> Emission reduction</p>	<p><b>Type of incentive:</b> Monetary</p> <p><b>Incentivized KPI:</b> Eco-efficiency</p>	<p><b>Type of incentive:</b> Monetary</p> <p><b>Incentivized KPI:</b> Efficiency</p>
<p>The performance of emission reduction and climate change management are KPIs as a part of corporate sustainability performance. The improvement of sustainability performances, according to S&amp;P Global Corporate Sustainability Assessment is set as CEO's KPIs which ties to monetary incentives upon the achievement.</p>	<p>Monetary incentives are available for AOT Senior Executives and Energy Conservation Committee, who successfully drive eco-efficiency program and contribute to energy reduction according to the plan.</p>	<p>Monetary incentives and awards are available for employee(s) across the organization who win the innovation contest to improve operational efficiency including energy efficiency and GHG reduction. This is included the success of Airport Carbon Footprint Monitoring according to Airport Carbon Accreditation for 6 airports as KPIs.</p>





Significant Financial Impact

## Transition Risk (Nationally Determined Contributions: NDC)



Impact	Financial impact
AOT is aware of Thailand's Nationally Determined Contributions (NDC) aiming to reduce 20-25 % of GHG by 2030 compared to Business-As-Usual (BAU), which can result in the enforcement of carbon tax or cap and trade scheme, adding more costs to the companies that have high GHG emission.	<b>49,729,680 THB (Financial Impact)</b> <ul style="list-style-type: none"><li>- Potential amount of carbon tax payment for AOT based on its GHG emission.</li></ul> <b>47,000,000 THB (Management Cost)</b> <ul style="list-style-type: none"><li>- Investment of emission reduction technology</li><li>- Investment on renewable energy source to meet sustainable design building</li></ul>

## Physical Risks (Flood)



Impact	Financial impact
High precipitation not only caused aviation problem but also delay of landing and departure due to flooding at the taxiway (which could possibly occur due to higher volume of precipitation in the future with the current condition of airport's infrastructure).	<b>1,700,000,000 THB (Financial Impact)</b> <ul style="list-style-type: none"><li>- The estimated restoration cost to resume the operations at Don Mueang Airport and head office</li></ul> <b>159,200,000 THB (Management Cost)</b> <ul style="list-style-type: none"><li>- Investment on new phase of airport infrastructure</li><li>- Investment on infrastructure maintenance</li></ul>

Impact	Financial impact
The construction of additional runways at Suvarnabhumi Airport does not only benefit AOT in terms of larger service capacity to accommodate more passengers and generate more income but also reduces emission by shortening taxi time for landing and taking off. As AOT is the largest state-owned airport operator of Thailand, this contributes substantially to emission reduction of the airport, airlines and the aviation sector of the country.	<b>28,989,180,000 THB (Annual financial positive impact)</b> <ul style="list-style-type: none"><li>- More passengers capacity and higher revenue generation</li></ul> <b>5,448,985,250 THB (Management Cost)</b> <ul style="list-style-type: none"><li>- Investment on new phase of airport infrastructure</li><li>- investment on renewable energy source and infrastructure to meet sustainable design building</li></ul>





## Scope 3 Emission

# Evidence of Scope 3 Emission Tracking

## Example from Suvarnabhumi Airport



Emissions Sources	Emissions	Unit	%
<b>Scope 1: Direct GHG emissions</b>			
Stationary source	118.73	tCO <sub>2</sub> e	0.01
Mobile source	1,760.49	tCO <sub>2</sub> e	0.09
Other activity	0.56	tCO <sub>2</sub> e	0.00
<b>Total Scope 1 emissions</b>	<b>1,879.78</b>	<b>tCO<sub>2</sub>e</b>	<b>0.10</b>
<b>Scope 2: Indirect GHG emissions</b>			
Emissions from electricity consumption	87,231.45	tCO <sub>2</sub> e	4.69
Purchased cooling water	52,047.95	tCO <sub>2</sub> e	2.80
<b>Total Scope 2 emissions</b>	<b>139,279.40</b>	<b>tCO<sub>2</sub>e</b>	<b>7.49</b>
<b>Scope 3: All other indirect emissions</b>			
LTO cycle	1,021,096.11	tCO <sub>2</sub> e	54.92
APUs	231,314.96	tCO <sub>2</sub> e	12.44
engine testing	284.46	tCO <sub>2</sub> e	0.02
GSE	26,951.73	tCO <sub>2</sub> e	1.45
Surface access	319,136.56	tCO <sub>2</sub> e	17.16
Business travel	89.66	tCO <sub>2</sub> e	0.00
Waste management	346.10	tCO <sub>2</sub> e	0.02
Shuttle bus	786.09	tCO <sub>2</sub> e	0.04
Electricity re-sold	118,161.62	tCO <sub>2</sub> e	6.36
<b>Total Scope 3 emissions</b>	<b>1,718,167.28</b>	<b>tCO<sub>2</sub>e</b>	<b>92.41</b>
<b>Total all scopes of emissions</b>	<b>1,859,326.46</b>	<b>tCO<sub>2</sub>e</b>	<b>100.00</b>

The methodology is in line with Airport Carbon Accreditation Standard





## Internal Carbon Price

# Internal Carbon Price is applied in financial impact assessment on transitional risk: Climate regulation (Carbon Tax)



## Application of Internal Carbon Price

The emerging regulations to reduce GHG as part of NDC may lead to an implementation of carbon tax in Thailand.

AOT's internal carbon price is a shadow price based on Singapore carbon tax as it is the first country in Southeast Asia (same region as Thailand) to enforce this regulation. The carbon tax rate of (5 SGD/tCO<sub>2</sub>e or 115 THB/CO<sub>2</sub>e) is internally used to support decision making for executives in terms of energy efficiency and other low carbon projects.





Low Carbon Product

# Emission reduction from airport improvement: Construction of the third and the fourth run way of Suvarnabhumi Airport



Airport improvements	Airfield improvements	Installation of LED instead of classic light (ICAO Secretariat)	$\text{CO}_2 \text{ savings} = 0.4 * \text{kWh} * \text{kg of CO}_2/\text{kWh}_i$	An airport uses 600,000 kWh per year for light. $\text{CO}_2$ released per 1 kWh produced is 0.3 kg (0.0003 tonnes)  The annual $\text{CO}_2$ savings can be estimated as:  $0.4 * 600,000 * 0.0003 = 72 \text{ tonnes CO}_2 \text{ saved}$
		Construction of runways (ICAO Secretariat)	Use IFSET or $\text{FS} = \sum [\text{time savings}_i (\text{min}) * \text{FB}_i / \text{min}]$	An airport with an average of 100,000 arrivals and 100,000 departures annually is building an additional runway. On average, aircraft are expected to save 3 minutes on arrival and 5 minutes on departure from the additional runway. Arriving aircraft typically burn 35 kg (0.035 tonnes) per minute and departing aircraft burn 12 kg (0.012 tonnes) per minute during taxi.  The annual fuel savings can be estimated as:  — arrivals: $3 * 0.035 * 100,000 = 10,500 \text{ tonnes fuel saved}$  — departures: $5 * 0.012 * 100,000 = 6,000 \text{ tonnes fuel saved}$  Total: 16,500 tonnes fuel saved

Reference: ICAO Doc 9988 , Guidance on the development of State's Action Plans on CO2 Emission Reduction Activities



# Example of calculation for AOT's construction of the third and the fourth run way of Suvarnabhumi Airport



## การคาดการณ์จากสมมุติฐานดังกล่าวสรุปได้ว่า Assumptions on fuel consumption in take-off and landing at Suvarnabhumi Airport

สำหรับโครงการสร้างทางวิ่งที่ 3 ของสนามบินสุวรรณภูมิแล้วเสร็จในปี 2565 จะช่วยลดการใช้น้ำมันของ

สายการบินของไทย เข้า-ออก ของสนามบินสุวรรณภูมิ ประมาณ  $(96,710 \times 3 \times 0.035) + (96,710 \times 5 \times 0.012) = 15,957$  ตัน

สำหรับโครงการสร้างทางวิ่งที่ 4 ของสนามบินสุวรรณภูมิแล้วเสร็จในปี 2573 จะช่วยลดการใช้น้ำมันของ

สายการบินของไทย เข้า-ออก ของสนามบินสุวรรณภูมิ ประมาณ  $(148,751 \times 3 \times 0.035) + (148,751 \times 5 \times 0.012) = 24,544$  ตัน

## วิธีการคำนวณปริมาณคาร์บอนไดออกไซด์เทียบเท่า ที่ลดลง Emission Reduction from Fuel saving

ปริมาณน้ำมัน \* Emission Factor = จำนวนปริมาณตันคาร์บอนไดออกไซด์เทียบเท่า

หมายเหตุ ค่า Emission Factor อ้างอิงจาก Airport Carbon and Emission Reporting Tool (ACERT) version 4.0, ACI มีค่าเท่ากับ 3.1528 kgCO<sub>2</sub>e/kg

## ปริมาณคาร์บอนไดออกไซด์เทียบเท่า ที่ลดลง Total GHG Reduction

สำหรับโครงการสร้างทางวิ่งที่ 3 ของสนามบินสุวรรณภูมิแล้วเสร็จในปี 2565 เท่ากับ  $15,957 \times 3.1528 = 50,309$  ตันคาร์บอนไดออกไซด์เทียบเท่า

สำหรับโครงการสร้างทางวิ่งที่ 4 ของสนามบินสุวรรณภูมิแล้วเสร็จในปี 2573 เท่ากับ  $24,544 \times 3.1528 = 77,382$  ตันคาร์บอนไดออกไซด์เทียบเท่า

หมายเหตุ <sup>1</sup> Airport Carbon and Emission Reporting Tool (ACERT) version 4.0, ACI

# Ground Powering and Cooling System for Aircraft

Calculation is based on emission avoidance from fuel combustion by aircraft to generate electricity which has higher emission factor compared to grid electricity

## 5.2 Auxiliary Power Unit (APU) and engine testing

### 5.2.1 Auxiliary Power Unit

The actual fuel flow rate of all APU models operated at BKK and actual running time of each APU operated were not accessible. Therefore, emission of APU was calculated using numbers of flights, and distance of each flight to identify estimated APU fuel consumption of each flight. The fuel consumption was multiplied by emission factors.

#### *Distance criteria for short-haul and long-haul flight*

TGO provides emission factors for short-haul flight and long-haul flight but does not provide the definition of these two classifications. As a result, the distance criteria defined by EUROCONTROL<sup>9</sup>, as shown in Table 13, are used for classifying distance of each flight.

*Table 13: Distance criteria for short-haul and long-haul flight*

Type of flight	Distance
Short haul flight	Less than or equal to 1,500 kilometres
Long haul flight	Greater than 1,500 km