Doc 9948

Scoping Study on the Application of Emissions Trading and Offsets for Local Air Quality in Aviation

Approved by the Secretary General
and published under his authority

First Edition — 2011

International Civil Aviation Organization

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EXECUTIVE SUMMARY

This study explores the scope for the application of emissions trading and offsetting to the mitigation of airport local air quality (LAQ).

The study starts by outlining airport issues including locally regulated requirements, relevant emissions species and airport sources and assessment of compliance with regulations. An airport LAQ management framework might be established to address a non-compliance issue, and market-based measures, including emissions trading and offsetting, might be incorporated.

Establishing an emissions trading scheme (ETS) requires defining its scope (sources included and geographic coverage), determining a cap on emissions, as well as the allocation of allowances and ongoing operation of the scheme.

Offsetting is a further option that can be permitted. Offset credits are generated by projects which reduce emissions and would not have otherwise been implemented. Parties in an ETS can buy offset credits in partial fulfilment of their ETS obligations.

The study provides a range of examples of ETS and offsetting implementation for local air quality situations, only one of which covers an airport. The lessons that were learned from these are discussed, and a set of principles for new schemes is recommended.

In closing, specific issues that ETS and offsetting present for airport LAQ are provided.

GLOSSARY

The terms contained herein are intended to clarify concepts as used in this document.

Additionality. To avoid giving credits for greenhouse gas emissions reductions that would have happened anyway, eligibility criteria have been developed to determine whether the reductions are "additional" — that is, are more than would have occurred in the absence of the project (environmental additionality) or in the absence of the incentive from the Clean Development Mechanism (CDM) (project additionality).

Allocation. The initial distribution of allowances to accountable entities for a compliance period. This allocation could, for example, be based on historical emissions or a performance standard and level of production and could be made "gratis" or through an auction process.

Allowance (emissions allowance). An allowance is a tradable emissions permit that can be used for compliance purposes in a cap-and-trade system. Each allowance allows the holder to emit a specific quantity of a pollutant (e.g. one tonne of CO_2) one time.

Ambient air quality. The total effect of the range of sources of emissions affecting local air quality within a particular area. In contrast to an inventory, which quantifies the emissions from relevant sources, ambient air quality is quantified in terms of the concentrations (or levels) of pollutant species at any specific location.

Auctioning. The distribution of allowances — either the initial distribution or from a set-aside. This is achieved through an auction in which system participants bid for the right to purchase allowances. Different auction models can be used. Auctions often complement other forms of allowance allocation.

Banking. A banking provision permits allowances issued for one compliance period to be saved for use during a subsequent compliance period.

Baseline. A reference level of emissions. A baseline can be used, for example, to calculate the total quantity of allowances to be distributed under a cap-and-trade scheme or the quantity of credits generated under a baseline-and-credit (emissions intensity) system. A baseline also sets the level of emissions that would occur without policy intervention in an offset programme.

Baseline-and-credit (emissions intensity) system. An emissions trading system that establishes an emissions performance standard and allows regulated participants to generate tradable credits (or "emissions performance credits/allowances") by reducing their emissions intensity below that standard. Regulated participants that remain with an emissions intensity above the standard would need to submit credits to the regulating authority.

Borrowing. A borrowing provision permits an accountable entity to use allowances for a future period to achieve compliance in the current period.

Buyer. A legally recognized entity (individual, corporation, not-for-profit organization or government) that acquires allowances or other compliance units from another legally recognized entity (the seller) through a purchase, lease, trade or other means of transfer.

Cap-and-trade emissions trading system. A cap-and-trade system allows for the trading of emissions allowances that are limited or "capped" in quantity by a regulatory authority. Before each compliance period, the regulatory authority distributes the allowances through a free allocation, sale and/or auction. At the end of the compliance period each

accountable entity must surrender sufficient allowances to cover its actual emissions during the period. The trading of allowances promotes cost-efficient emissions reductions because entities that can reduce emissions at lower cost have the incentive to pursue these emissions reductions and to then sell their surplus allowances to entities that face higher emissions reduction costs.

Climate change. A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is in addition to natural climate variability over comparable time periods.

Credit or offset credit. In this study the term "credit" or "offset credit" is used to denote the compensating emissions reductions (product) that have been achieved and can be applied in the activity of offsetting. An offset credit could equate to a one-tonne reduction of carbon dioxide (CO_2) emissions or a one-kilogram reduction of nitrogen oxide (NO_x) emissions, for example. These credits can be tradable units.

Distribution. The allocation of allowances among accountable entities in a cap-and-trade system.

Emissions inventory. A database that lists, by source, the amount of emissions of pollutants, such as greenhouse gases, that were discharged into the atmosphere over a given period of time.

Emissions trading. Emissions trading is a market-based tool that provides entities the flexibility to select cost-effective solutions to achieve their environmental targets. With emissions trading, entities can meet these targets either by reducing their own emissions or by securing, through the market, compliance units that take account of emissions reductions achieved elsewhere.

Grandfathering. A method for the initial distribution of allowances to entities in an emissions trading scheme that is based on historical data (e.g. gross emissions, entity/industry performance standard multiplied by production) and distributed free of charge.

Greenhouse gas (GHG). The atmospheric gases responsible for causing global warming and climate change. The major GHGs are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Less prevalent but very powerful GHGs include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Greenhouse gas reduction or emissions reduction. A reduction in emissions intended to slow down the process of global warming and climate change. GHG reductions are often measured in tonnes of carbon-dioxide-equivalent (CO_2e), which is calculated according to the global warming potential (GWP) of a gas.

Hot spots. Areas which have an unacceptably high accumulation of pollutant. Hot spots can result, in the context of emissions trading and offsetting, when air quality improvements in one area are achieved at the expense of the air quality in another area.

Kyoto Protocol. An international agreement reached in Kyoto in 1997 that is linked to the United Nations Framework Convention on Climate Change (UNFCCC) and inscribes, among other things, the emissions limitation and reduction commitments made by developed countries for the 2008–2012 First Commitment Period.

Local air quality (LAQ) management framework. A process to address an LAQ problem. An LAQ problem might be first recognized by the measured non-compliance of regulated pollutant concentration limits. An airport operator (or other authority) might set up an LAQ management framework to identify and make an inventory of the relevant emissions sources, calculate the resulting expected pollutant concentrations, take actions to achieve compliance and monitor and report results.

Marginal abatement cost. The financial cost of achieving an additional unit reduction in emissions.

Offset or offset credit. See the definition for ***Credit or offset credit.***

Offsetting. In this study offsetting is the activity of "cancelling out" or "neutralizing" emissions from a sector like aviation using offset credits — compensating emissions reductions created in a different activity or location that have been rigorously quantified and verified. It is only when credits are acquired from outside the emissions trading scheme or linked schemes and used to meet commitments/obligations under the scheme that the activity is referred to as offsetting. On the other hand, if a regulated emitter acquires compliance units (allowances or credits) from another regulated emitter within the same emissions trading scheme or from a linked scheme, this is referred to simply as emissions trading.

Seller. A legally recognized entity (individual, corporation, not-for-profit organization, government, etc.) that transfers allowances or credits to another legally recognized entity via a sale, lease or trade in return for a monetary or other consideration.

Surrender of allowances/credits. The submission of emissions allowances/credits by an accountable entity to fulfil its obligations under an emissions trading scheme.

Tradable unit. A generic term for compliance units that can be traded either domestically or internationally, including allowances from a cap-and-trade system, credits from a baseline-and-credit scheme, and offset credits created from either domestic or regional trading regimes or through the Kyoto flexibility mechanisms (from the Clean Development Mechanism and Joint Implementation projects).

Verification. Verification provides independent assurance that the emissions quantification and reporting have been accurately completed. The "level of assurance" provided depends on the system requirements. In most systems the verifiers must be accredited by a standard-setting organization.

Voluntary action or commitment. An action or commitment, undertaken by an entity, that reduces greenhouse gas emissions in the absence of any requirements to undertake such reductions.

Voluntary market. Markets in which emissions reductions are purchased and then cancelled by entities which seek to manage their emissions for non-regulatory purposes.

LIST OF ACRONYMS AND ABBREVIATIONS

APU	Auxiliary power-unit
CAEP	Committee on Aviation Environmental Protection
CDM	Clean Development Mechanism
CO	Carbon monoxide
EPA	Environmental Protection Agency
ETS	Emissions trading scheme
FEGP	Fixed electrical ground power
GHG	Greenhouse gas
GSE	Ground service equipment
GWP	Global warming potential
HC	Hydrocarbons
LAQ	Local air quality
LTO	Landing and take-off cycle
MBMTF	Marked-based Measures Task Force
MODTF	Modelling and Database Task Force
NO_x	Oxides of nitrogen
PCA	Pre-conditioned air
PM	Particulate matter
PSR	Performance standard rate
(SO_x)	Sulphur oxides
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1

INTRODUCTION

1.1 BACKGROUND

At its seventh meeting the Committee on Aviation Environment Protection (CAEP) tasked the Market-based Measures Task Force (MBMTF) to conduct a "scoping study into the potential for the use of emissions trading for LAQ" (local air quality).[1,2]

1.2 OUTLINE

1.2.1 This study explores the scope of emissions trading and offsetting to mitigate airport local air quality (LAQ). The study first provides an overview and definition of airport LAQ issues and potential mitigation measures and then details the possible application of emissions trading and offsetting in existing airport LAQ management frameworks. This leads to a separate in-depth consideration of the application of emissions trading and offsetting within airport LAQ management frameworks, including conceptual and theoretical elements that broaden the discussion beyond existing experience. The study concludes by drawing a broad way forward intended to inform the ICAO CAEP of the potential measures that could be applied in the areas of emissions trading and offsetting for ameliorating LAQ issues at and surrounding airports.

1.2.2 This study recognizes that "local" air quality may be defined in different ways and addressed at different levels. It can refer to the air quality at a particular point location (an airport in the context of this study) or a wider area (such as an airport and its surrounding area) or it may extend to the regional or national scale (a political boundary for example). Because this study was established primarily to consider the use of emissions trading and offsetting to address LAQ at airports and their immediate surroundings, this will be the primary focus of the study, although the role an airport might play in a broader, regional approach to addressing LAQ will also be considered.

1.2.3 The focus of this study is on ambient air quality — that is, on the total effect of the range of sources of LAQ emissions within a particular area, rather than on emissions from any particular source.

1.2.4 Sections 1.3 to 1.5 of this chapter introduce the concepts of emissions trading and offsetting and outline some aspects of policies to address LAQ that are explicitly excluded from the discussion. Chapter 2 provides a background to the issue of LAQ at and around airports; explains the different geographic scales at which an authority might choose to address LAQ; and defines the main elements of emissions trading and offsetting systems. Chapter 3 provides a summary of desk-based research on the real-world application of emissions trading and offsetting for airport

1. Task M 0.3, Appendix A to the CAEP/7 report (Doc 9886), February 2007.

2. During its preparatory work, the sub-group of the MBMTF in charge of this task came to the conclusion that an extension of the scope of the study to include offsetting for LAQ purposes was appropriate. There were two reasons for this: a) the main issues concerning the application of offsetting to LAQ emissions are similar to those concerning the application of emissions trading to LAQ emissions; and b) it was considered desirable to consider the creation of LAQ allowances in aviation that might be used to offset emissions as part of an emissions trading mechanism associated with any airport LAQ management framework. This extension was agreed to by the CAEP Steering Group in September 2008.

LAQ management. Chapter 4 summarizes the lessons learned from the examples identified in Chapter 3. Chapter 5 examines specific issues that need to be considered for the application of emissions trading and offsetting to address LAQ at airports.

1.3 EMISSIONS TRADING

1.3.1 Emissions trading is a means of harnessing market forces to create incentives for economic agents to discover and implement cost-effective approaches to complying with environmental targets. The basic argument for using emissions trading as an environmental policy tool relates to the potential cost savings a trading system can generate relative to a conventional command-and-control approach. In particular, when regulated entities are allowed to buy and sell emissions instruments, market forces can create an incentive for firms with relatively low-cost emissions reduction options to reduce their emissions by more than needed to satisfy their regulatory requirements. These entities are then able to sell surplus emissions instruments to other regulated firms that are faced with relatively high-cost emissions control options. The opportunity to sell surplus emissions instruments can create incentives for cost-effective compliance with environmental targets. As a result, incorporating an emissions trading system into an environmental policy can mean that the same level of environmental protection can be achieved at a lower overall cost.

1.3.2 There are two different approaches to emissions trading: “cap-and-trade”, which involves the application of an absolute emissions limit (cap), and “baseline-and-credit”, which involves an emissions intensity approach — the reduction of emissions per unit of output. Although the latter approach provides flexibility for changes in output or turnover (in the case of an airport, if its use increased or decreased) this study focuses on the “emissions cap” (allowance-based) approach, examples of which are more widespread and better established. Emissions trading encourages the implementation of cost-effective emissions reduction strategies and provides flexibility to emitters in the way they manage their emissions obligations. With emissions trading, emitters can meet established emissions limits or goals by:

a) reducing emissions from their own sources covered by the scheme;

b) purchasing allowances from another participant within the scheme;

c) purchasing allowances from participants in a linked scheme; or

d) purchasing allowances from emitters not subject to the scheme (offsetting) where that is permitted (see 2.6).

1.4 OFFSETTING

1.4.1 In general terms, an offset is a “compensating equivalent”. As an activity, offsetting is the “cancelling out” or “neutralizing” of emissions from a sector like aviation with emissions reductions in a different activity or location. The term “offset” has been used interchangeably as both an activity to compensate for emissions and as the product of this activity. For the purposes of this study, “offsetting” will be used to describe the actions undertaken to compensate for emissions. An “offset” (as a product) is a credit or unit derived from the reduction of emissions. An offset therefore represents a unit of measurement that quantifies the action of offsetting, e.g. an offset could equate to a one-kilogram reduction of NO_x emissions. These credits can be tradable units. To avoid confusion when referring to the measurement that has been derived from an offsetting activity, the term “offset credit” or “credit” will be used in this study.

1.4.2 Offsetting must also be distinguished from emissions trading. If, for example, a regulated emitter acquires emissions credits or emissions allowances from another regulated emitter within the same emissions trading scheme or from a linked scheme, this is referred to as emissions trading.

1.4.3 A more detailed explanation of both emissions trading and offsetting, and of the distinction between them, is provided in Chapter 2.

1.4.4 In terms of emissions sources, this study assumes that a framework to improve airport LAQ will include both aircraft and non-aircraft sources in order to provide the scope for emissions reductions around the airport. In turn, this is based on the assumption that although aircraft are usually the dominant source of LAQ emissions at airports, they are unlikely to represent the simplest and lowest-cost source of emissions abatement.

1.4.5 For the purposes of this study, an emissions "allowance" (used in emissions trading) and emissions "credit" (used in offsetting) are defined as tradable units granting the holder permission to emit a specific quantity of pollution once (e.g. 1 kg of NO_X).

1.5 SPECIFIC EXCLUSIONS OF THIS STUDY

1.5.1 It is important to note that this study focuses only on the application of emissions trading and offsetting as means to mitigate LAQ at and near airports. It does not seek to explore the genesis of LAQ problems or the means by which emissions from individual sources could be mitigated. Neither does this study address technological or operational measures for the reduction of local emissions by the airlines or airports themselves. Although emissions trading and offsetting constitute market-based measures, other market-based measures such as emissions-based landing charges are not considered here. These issues and measures have been analyzed by CAEP and detailed in the following documents:

a) Doc 9884 — *Guidance on Aircraft Emissions Charges Related to Local Air Quality*. The most relevant part of this document is Chapter 3 which covers LAQ assessment, including reviewing standards and regulation, determining airport air quality and assessing compliance.

b) Doc 9889 — *Airport Air Quality Guidance Manual.* This document covers issues related to the assessment of airport-related air quality that are either specifically within the remit of ICAO (such as aircraft main engine emissions) or where there is established understanding on other non-aircraft sources (such as aircraft handling, infrastructure and stationary sources, and ground vehicle traffic) that can contribute, to a greater or lesser extent, to air quality impacts. The document also addresses LAQ standards and regulations, emissions inventories and the temporal and spatial distribution of emissions.

1.5.2 This study does not consider noise or climate change impacts of aviation, although it is recognized that there can be trade-offs between improvements in local air quality and reductions in noise or greenhouse gases.

Chapter 2

BACKGROUND AND DEFINITIONS

2.1 AIRPORT LOCAL AIR QUALITY

Emissions species that affect airport local air quality

2.1.1 Common emissions species considered in airport air quality assessments include oxides of nitrogen (NO_x), hydrocarbons (HC), particulate matter (PM) and carbon monoxide (CO), although other pollutants such as sulphur oxides (SO_x) are often assessed as well.

2.1.2 NO_x and HC are the main contributors to combustion-related local air pollution and precursors of ground level ozone, and for aircraft both are subject to international standards.[1] However, not all pollutants or their sources are regulated.

2.1.3 Of the primary air pollutants resulting from aircraft activities having an impact on airport LAQ, NO_x emissions are formed most intensively during the high-power phases of engine running, in particular for take-off. CO and HC are emitted primarily during low-power phases of engine running, for example taxiing, as a result of incomplete fuel combustion. Engine emissions also include particulate matter (PM).

2.1.4 The application of trading and offsetting for the mitigation of LAQ issues is fundamentally more complex than their application for the reduction of GHG emissions. This is the case because the climate impacts associated with GHG emissions are global — that is, it does not matter where atmospheric inputs of CO_2 are made, whereas the impacts of NO_X, SO_X, HC, PM and CO emissions have their main impacts on local air quality.

Assessing and defining airport local air quality

2.1.5 LAQ in and around an airport is usually quantified in terms of ambient pollutant concentrations. Ambient pollutant concentrations can be ascertained either by direct measurement using air sampling and analysing equipment, or by calculation (using airport activity data, emissions inventory, numerical dispersion models of emissions from each source and their interaction with the physical environment). Usually a combination of both is required.

2.1.6 Doc 9889 covers issues related to the assessment of airport-related air quality, and therefore these issues are not covered in any depth here. In 2010, CAEP/8 developed dispersion modelling guidance and measuring guidance to include in that manual. More information on identifying relevant LAQ standards, regulations and ways of determining airport air quality can be found in Doc 9884.

1. Annex 16 — *Environmental Protection*, Volume II — *Aircraft Engine Emissions* defines mandatory limits on NO_x, CO and HC emissions for engine certification.

Airport local air quality emissions sources

2.1.7 There are a great variety of LAQ emissions sources at an airport; however data compiled by the CAEP Modelling and Database Task Force (MODTF) shows that aircraft typically account for the majority (30 to 85 per cent depending on species) of total airport emissions. Aircraft emissions with LAQ effects are considered in Doc 9884 as "… aircraft emissions generated in the vicinity of an airport by aircraft either arriving or departing from that airport. The aircraft emissions include those generated from aircraft main engines either on the ground or in the air up to a level deemed to have a local effect, as defined by the jurisdiction where the emissions are released".

2.1.8 Generally the airport authority would be responsible for the emissions sources it owns such as GSE (ground service equipment), airside vehicles, power generation and heating/cooling plants. At many airports, major airlines own and operate their own GSE. Some airport authorities might include within their area of responsibility emissions from public vehicles while on the airport property, parking garages, and staff travel to and from home.

2.1.9 The largest sources of LAQ emissions at airports are aircraft during the landing and take-off cycle (LTO), taxiing and aircraft auxiliary power-units (APUs). While airlines are clearly the owners of these sources, airports can exert influence in respect of the management of these emissions. Providing fixed electrical ground power (FEGP) and pre-conditioned air (PCA) to aircraft at gates allows reduced APU usage. Holding aircraft at the gate until departure slots are ready and providing direct taxiways can reduce taxiing and queuing. Within an airport LAQ emissions trading scheme, it would be important to identify the party responsible for the surrender of allowances for aircraft emissions, and the manner in which variables such as taxiing and queuing periods, reduced thrust-take-off and continuous descent approach should be accounted for.

2.1.10 In deciding whether a particular source or source category should be included in an LAQ management framework, regulators may consider whether the source makes a significant contribution to overall emissions, any relevant legal limits for emissions levels, potential health problems associated with the emissions, and whether emissions from the source can be reliably measured and verified. As mentioned, Doc 9884 and Doc 9889 can assist in this regard.

2.1.11 Privately-owned vehicles including cars and trucks are a major group of emissions sources that are not usually subject to regulation or emissions caps. While they might be included in an airport LAQ management framework as a source that an airport can influence, for example by the rate of parking fees, they would not be included in an airport LAQ ETS.

2.2 ESTABLISHING AN AIRPORT LOCAL AIR QUALITY MANAGEMENT FRAMEWORK

2.2.1 An LAQ management framework can be defined according to a variety of different attributes. These could include geographic scope, pollutant species and concentration or the emissions sector(s) subject to management. The definition of an airport LAQ management framework will influence the scope and nature of any emissions trading and offsetting that are employed to help fulfil its objectives.

Defining an airport local air quality management framework by geographic coverage

Airport boundary

2.2.2 One approach to defining an airport LAQ management framework is to use the boundary of the airport itself. This could include one or a number of emissions sectors or defined activities, e.g. aircraft-only or all sources (see 2.2.10 to 2.2.14).

2.2.3 However, this approach would introduce difficulties if not all emissions sources within the airport boundary (including private vehicles that move into and out of the boundary) were covered by the framework. In such a case, emissions sources within the framework may achieve the desired goal although ambient emissions levels remain above required levels due to an increase in emissions levels from sources not subject to the framework.

2.2.4 Strict adherence to the airport property for defining a framework may not always be appropriate. For example, some airport activity may take place off the airport property but immediately adjacent to it (e.g. an aircraft maintenance hangar). Efforts to include such activities may be required, even if the levels of emissions are negligible, to ensure that emissions are not simply displaced to avoid counting.

Airport and surrounds

2.2.5 Although "regional" LAQ frameworks are outside the scope of the core discussion in this study, an airport LAQ framework could potentially be extended on a limited basis to cover a defined area surrounding an airport. This would enable the inclusion of "external" emissions sectors and sources that might have been proven to have a direct and significant impact upon airport LAQ (for example a nearby power station or motorway). Particular local circumstances would influence the definition of the boundary to an "airport and surrounds" framework, including, for example, the existence of emissions sources outside of the airport and prevailing wind conditions.

2.2.6 There is a range of potential scenarios for the definition of such a framework, from the inclusion of specific point emissions sources outside of the airport boundary, to the defining of a "buffer" zone outside of the airport. Generally, through the inclusion of a greater number and quantity of emissions sources, an "airport and surrounds" framework would provide for a greater degree of emissions trading and offsetting.

2.2.7 However, the extension of the geographic coverage of an airport LAQ framework beyond an airport property could result in problems of ensuring that LAQ at the airport itself is actually improved. Any trend for trading and offsetting to favour emissions sources beyond the airport might have an impact on the effectiveness of LAQ improvements at the airport itself. The effect of increasing the distance of emissions sources from an airport itself could be managed by assigning a greater "value" to trades and offsets according to their proximity to the airport in question.

2.2.8 Further considerations may include the unwillingness of emitters external to and unrelated to an airport to participate in such an airport LAQ framework. Mandatory inclusion could raise objection. In addition, by enlarging the region in which emissions reductions can take place, it is possible that emissions "hot spots" may arise. The airport itself could become a "hot spot" if the majority of low-cost emissions reductions were outside the airport itself, which would confound the aims of the management framework.

2.2.9 Thus this study assumes that any proposed market-based measures are designed to address an LAQ problem at, or in the immediate surroundings of, an airport. Broader, regional-scale LAQ management frameworks are not covered in this study because they will likely comprise larger, overarching multi-sectoral initiatives in which airports could participate but would not have any element of control.

Defining an airport local air quality management framework by emissions source

2.2.10 While the predominant source of emissions at an airport will usually be aircraft, an airport will also have a number of other emissions sources, including aircraft maintenance and testing, ground support equipment, airport vehicles and other stationary sources such as boilers and power generation. This presents two principal options for the scope of an LAQ management framework — aircraft-only or all sources.

Aircraft-only sources

2.2.11 This scenario assumes that only the aircraft operating from an airport are included within an LAQ framework and any associated emissions trading/offsetting mechanism. Various measures are available to aircraft operators to reduce emissions, relating primarily to operating practices and engine technologies. However not all of these measures will be within the direct control of the aircraft operator. In addition, the marginal abatement cost of these measures (that is the financial cost of achieving an additional unit reduction in emissions) tends to be high, and the range of marginal abatement costs between these measures tends to be low, thereby making trading less effective as a tool for reducing compliance cost.

2.2.12 Offsetting between aircraft operators might, in theory, be possible. However, in view of the limited opportunities for abatement and relatively high marginal abatement cost, it is unlikely that such offsetting would be feasible.

2.2.13 Given the limitations associated with this option, it will not be considered further within the scope of this study.

All sources

2.2.14 The incorporation of emissions sectors other than aircraft enables greater flexibility and scope for emissions reductions over an aircraft-only framework. The extent of the inclusion of such additional sources would be influenced also by the geographic coverage of the framework in question. For an “airport boundary” framework this would be restricted to emissions sectors at the airport itself (for example airport power generation and ground-based transport). If the geographic coverage of an airport LAQ management framework was set beyond the boundary of the airport, then the scope of the inclusion of sectors could be very wide ranging, depending on the location of roads, industrial plants and power generation, etc., near the airport.

Defining an airport management framework by source specification

2.2.15 For the purposes of establishing an emissions trading system (ETS) for LAQ, an alternative approach would be to draw up an explicit list of the sources that would be included in the scheme. This would avoid geographical or sectoral difficulties relating to sources not subject to the mandatory cap of the ETS (e.g. private vehicles), or mobile sources that cross into or out of the airport property or other potential ETS boundary.

2.2.16 From the outset, the ETS would clearly identify the emissions sources and the scope of the scheme. For example an LAQ ETS could include, *inter alia,* any of the following sources:

a) a power or heat generation station, either owned by the airport or one located near the airport;

b) aircraft during the LTO cycle (typically below 3 000 ft) including start-up, APU and taxiing emissions;

c) airside vehicles and ground service equipment;

d) ground transportation vehicles including public transport and private vehicles while on the airport property;

e) airport staff and tenant vehicles from point-of-origin to airport and return;

f) construction and maintenance activities on the airport property.

2.3 REGULATING LOCAL AIR QUALITY IN THE VICINITY OF AIRPORTS

2.3.1 Regulations on this issue have two fundamentally different forms:

a) local air quality regulations — limits of acceptability in the form of concentrations of pollutant species at receptor locations;

b) emissions limits — limits placed on the emissions of individual sources such as annual mass of NO_x for a power station or mass of NO_x per operation of an aircraft.

2.3.2 LAQ is regulated in many States and regions through a variety of different approaches. In many cases, regulations apply binding, State-wide limits on the ambient levels of different pollution species. These would apply equally to airports, cities and transport corridors. Location-specific regulations (for example at an airport or in the region within which an airport is located) are also possible. In most cases, it is the legal requirement to meet LAQ regulations that might prompt the introduction of LAQ measures at, or in the region surrounding, an airport.

2.3.3 Regulations on emissions apply to the individual types of sources. Examples include the following:

a) regulations on emissions from power generators or power stations;

b) ICAO standards on CO, HC and NO_x emissions from aircraft engines, which must be met before a new engine can be certified;

c) State and national regulations on emissions from cars and trucks.

2.3.4 In general, an overarching LAQ regulatory requirement will be behind the setting up of an LAQ framework. An airport authority may establish an LAQ management framework to determine how best to address an issue of non-compliance with local LAQ requirements. Alternatively a regulating authority may set up a regional LAQ management framework and include the airport within it.

2.3.5 Responsibility for compliance with the LAQ requirement might fall to either:

a) the “emitters” themselves (e.g. airline operators and fixed-based emitters); or

b) those who administer and operate airports (e.g. airport authorities).

2.3.6 For example, the State might consider all of the emissions directly associated with the airport, no matter what the source, and set a total cap on the emissions. If the State could regulate the airport (with the consequences of non-compliance well defined), the airport administrator would have to develop a plan to reduce emissions to levels no greater than the cap. In the U.S., for example, under the Clean Air Act (1990), State power is available to impose emissions caps, although this power is limited to “new or modified” airports. However, there may not always be a source of authority for States to impose emissions caps on airports, and in this situation States and airport authorities could instead formulate “voluntary” and “cooperative” agreements.

2.4 APPLICATION OF MARKET-BASED MEASURES BY AIRPORT LOCAL AIR QUALITY MANAGEMENT FRAMEWORKS

2.4.1 The means to improve LAQ at airports will ultimately entail the application of the process or technology improvements previously outlined. Market-based measures (trading and offsetting) provide the incentive (where emissions limits are challenging) to implement the lowest cost improvements. In other words, market-based measures are simply a tool available to authorities to cost-effectively achieve their LAQ objectives.

2.4.2 Market-based measures to achieve an LAQ goal can be used as an alternative to a regulating authority applying emissions limits to individual sources. This should allow the necessary emissions reductions to be achieved in the most cost-effective manner.

2.5 EMISSIONS TRADING AS A MECHANISM FOR AIRPORT LOCAL AIR QUALITY MANAGEMENT FRAMEWORKS

"Cap-and-trade" systems

2.5.1 Emissions trading generally requires regulation to require emissions declared by participants to be verified and allowances equal to these emissions to be surrendered. Emissions trading would generally form an integral part of a regulated overarching framework (in the context of this study an airport LAQ management framework). As noted in Chapter 1, 1.3.2, this study focuses on the "cap-and-trade" approach, whereby a regulatory authority sets a cap on total emissions, issues allowances equal to this cap and then allows participants to purchase allowances from other participants in the system to use for compliance purposes. This may apply to a group of regulated emitters or a single body (such as an airport operator) over a set period. The regulator will issue allowances equal to the cap. Regulated emitters are required to possess and then surrender allowances equal to the amount of their emissions over a period. If an emitter has excess allowances, these can be sold to an emitter that requires more. Conversely, if an emitter has allowances less than its total expected emissions for the period, it must purchase additional allowances. The benefits of such a trading system are the certainty of not exceeding an absolute cap on total emissions and a mechanism that encourages use of the most cost-effective emissions reductions.

2.5.2 As already detailed in Chapter 1, 1.3.2, a further type of emissions trading mechanism exists in the form of a "baseline-and-credit" approach. Although this study focuses on "cap-and-trade", it is noted that a baseline-and-credit system establishes an emissions performance standard and allows regulated participants to generate "emissions performance allowances" by reducing their emissions intensity below that standard. These allowances can be traded with anyone that requires them. Such frameworks are subject to the criticism that there is no binding cap on emissions. However, because emitters' targets (implicit allocation) are defined in proportion to their level of production, emitters receive a more stable financial incentive to reduce their emissions intensity, independent of their level of production. This incentive to reduce emissions per unit of output is retained even when going though an economic recession, thereby preserving the environmental benefit of the scheme.

Setting a local air quality emissions cap

2.5.3 The target level for emissions of any species of pollutant will constitute the overall emissions cap. A cap may keep total emissions at pre-existing levels or introduce a reduction in total emissions according to the nature of the target. The cap would be pre-determined based on the environmental benefit/improvement in LAQ sought, but economics, technical feasibility and potential effects on other environmental problems such as noise and greenhouse gas emissions may also need to be taken into account. Emissions caps may be fixed or set to become more stringent over time. Emissions from any individual source within the framework may vary as long as the overall cap is not exceeded. The stringency of the cap is a key factor influencing the market price of emissions allowances.

Defining and allocating emissions allowances

2.5.4 The setting of an emissions cap enables the definition of emissions allowances, the tradable unit or "currency" that can be used for compliance purposes in an airport LAQ management framework. An allowance grants

the holder permission to emit a specific quantity of pollution once (e.g. one kilogram of NO_X). The total number of allowances available from any emissions trading mechanism equals the overall emissions cap. The allocation process to distribute allowances to emitters for each compliance period could include:

a) grandfathering, in which allowances are distributed according to historic levels of emissions, output or both;

b) auctioning, in which emitters bid to purchase allowances; or

c) output or performance-based allocations, based on a common emissions factor multiplied by the current activity level.

2.5.5 It is also possible to use a combination of allocation methods such as grandfathering and auctioning. For example, a new emissions trading mechanism might allocate a proportion of the allowances for free, based on historic emissions, and make the remainder available through an auction. The proportion distributed for free can be set to decrease over time.

2.5.6 Mechanisms such as flexible timing, the borrowing or banking of allowances, can be applied to the use of emissions allowances. Borrowing allows a permit holder to use allowances earlier than their "vintage year" (the compliance period for which the allowances have been defined), while banking allows a user to store allowances for future use. These issues are not considered in detail in this study.[2]

Voluntary or mandatory emissions trading

2.5.7 As outlined in the section on scope, it is assumed that participation within an emissions trading mechanism (as part of an airport LAQ framework) will be mandatory. Mandatory participation enables the regulation of targeted emitters to ensure the emissions target is achieved. Trading helps to reach this target at a lower cost. The setting of the cap is a key design decision.

2.5.8 It is possible to allow any other non-targeted emitter to voluntarily participate within an airport LAQ framework (and as such any associated emissions trading mechanism) in order to reduce the net impact of its activities. If the cost of reducing emissions is high, the volume of voluntary reductions would tend to be small. However, it may always be worth considering voluntary participation for the limited LAQ benefit, but also to increase the scope of the trading market and provide a flexible means to achieve emissions reductions in future and as a means to obtain practical experience in trading.

2.6 OFFSETTING AS A MECHANISM FOR AIRPORT LOCAL AIR QUALITY MANAGEMENT FRAMEWORKS

2.6.1 As with emissions trading, the application of emissions offsetting will depend on the definition of an airport LAQ framework. That definition will establish which actions are eligible for the generation of offset credits to be used in offsetting.

2. For further information, see the MBMTF M.02 report contained in the *Scoping Study of Issues Related to Linking "Open" Emissions Trading Systems Involving International Aviation* (Doc 9949).

Distinction between emissions trading and offsetting

2.6.2 As detailed in Chapter 3 of Doc 9949, the activity of emissions trading occurs only when both the seller and buyer of emissions allowances operate within the same system or in formally linked systems. If the generation of emissions reductions occurs outside these systems, but the reductions (quantified as offset credits) are accepted for achieving compliance within the system, the activity is called offsetting. Offset credits need to meet the requirements of the regulator, as set out in the requirements for achieving compliance with the regulator obligation.

How offsetting works

2.6.3 Offsetting is the act by companies or individuals of compensating for their emissions by, for example, financing (through the purchase of offset credits) the reduction of an equivalent amount of emissions elsewhere. Offsetting can be purely voluntary when the emitter is not subject to any regulated limit on its emissions, or complementary to the normal trading of allowances as part of a regulated emissions trading scheme. The concept of offsetting has been used in the context of reducing GHG emissions to address climate change, but the concept can also be applied to LAQ management.

2.6.4 Regulated emitters in an emissions trading mechanism as part of an airport LAQ management framework may be permitted to use emissions reductions from a source not included within the scope of that LAQ management framework for compliance purposes.[3] For example, if an airport can no longer easily reduce the emissions from a source within an LAQ framework, it might be permitted to use the reduction of another source outside the framework. This might include the emissions reductions achieved when the airport funds the introduction of lower-emission buses transporting passengers to the airport. Such an action would generate an emissions reduction (referred to as an “offset credit” or a “credit”) recognized by the framework regulatory authority as equivalent to an allowance within the framework mechanism. As with allowances, an offset credit grants the holder permission to emit a specific quantity of pollution once (or to surrender that credit to “offset” their emissions). A limit could be set on the volume of offset credits that could be used for compliance. Depending on local circumstances, for example the size of the LAQ management framework, or the characteristics of the pollutant being managed, the opportunities for offsetting may be limited.

2.6.5 Another application of offsetting would involve entities outside of the scope of an LAQ management framework acquiring and cancelling allowances from within the framework. This action has the effect of tightening the cap, thereby forcing emitters to further reduce their emissions. This kind of action has occurred with the European Union ETS; however, it will not be considered further in this study.

2.7 ADDITIONALITY

For an offset credit to receive approval for use within an LAQ management framework, it must have environmental integrity. More specifically, an offset credit needs to demonstrate the generation of permanent, verifiable emissions reductions that are additional to or beyond business-as-usual activities. The proof of “additionality” is a fundamental part of the offsetting process, but it makes the mechanism more complex to operate than might initially be apparent. The concept of additionality remains one of the most widely and contentiously debated elements in the generation of acceptable offset credits, especially in relation to the project-based instruments of the Kyoto Protocol.

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3. If the source is covered by another linked ETS then the activity would be “emissions trading” rather than “offsetting” See the MBMTF M.02 report contained in Doc 9949.

Chapter 3

EXAMPLES OF THE APPLICATION OF EMISSIONS TRADING AND OFFSETTING FOR LOCAL AIR QUALITY MANAGEMENT

This chapter contains a summary of information gathered from research on the application of emissions trading and offsetting for LAQ management that has been established to date in countries across the world.

Existing and historical emissions trading and offsetting frameworks for local air quality management — tabulated

Framework title	Country	Date commenced and objective	Scope	Framework details	Status	Comments — Results of evaluations
U.S. Acid Rain Trading Programme	U.S.	1995 — Reduce acid rain.	Electricity-generating plants — national coverage	National cap of 8 million tonnes. Tradable allowances equal to the cap are freely allocated based on heat input and historical output of each plant. Limited (2.8 per cent) auctioning takes place. Banking of allowances permitted.	Active	Between 1989–1991 and 2006–2008 average ambient sulphate concentrations have decreased by 38 per cent in the Mid-Atlantic, 44 per cent in the Midwest, 43 per cent in the Northeast, and 28 per cent in the Southeast. More detailed information can be obtained from the U.S. Environmental Protection Agency (EPA).
Northeastern U.S. NO_x Budget Trading Programme	U.S.	2003–2004 (Phase 3) — Reduction of regional tropospheric ozone (smog) through reduction of NO_x emissions.	12 States in Northeastern U.S. Applies to electricity-generating facilities and industrial boilers of 15-MW capacity or greater.	Cap-and-trade system based on 1990 emissions levels. Emissions allowances allocated to units by relevant State. Banking of allowances permitted under controlled circumstances.	The NBP was replaced by the Clean Air Interstate Rule (CAIR) NO_x ozone season trading programme. It went into effect May 1, 2009.	The 2008 NO_x Budget Trading Programme Annual Report, covering 20 eastern states and the District of Columbia, shows the summertime NO_x emissions from power plants and large industrial sources were down by 62 per cent compared to year 2000 levels and 75 per cent lower than in 1990. More detailed information can be obtained from the U.S. EPA.
Los Angeles Air Basin RECLAIM Programme	U.S.	1994 — Meet legal requirements to reduce NO_x and SO_x.	South Coast Air Quality Management District governing the area surrounding Los Angeles, California. Multi-industry framework.	Cap-and-trade system	Active	Initial oversupply of allowances did not incentivise emissions reductions until the 2000/2001 energy crisis when old, high-emitting equipment were brought back into service, using up allowance allocations and brought available allowances into the market. Resultant high price and scarcity of emissions allowances led to amendments to stabilize the market. More detailed information can be obtained from the U.S. EPA.

Framework title	Country	Date commenced and objective	Scope	Framework details	Status	Comments — Results of evaluations
Boston Logan Airport	U.S.	2001 — Maintain airport associated NO_x emissions at or below 1999 modelled levels.	Boston Logan Airport	Cap-and-trade system based on 1999 emissions levels. Use of NO_x emissions allowances in the event that NO_x emissions exceed 1999 baseline.	Active	Currently, NO_x emissions remain below 1999 baseline (emissions in 2005 were approximately 600 tonnes/year less than 1999 levels, a 28 per cent decrease). As such, there has been no trading of NO_x emissions allowances. Although there has been no need to trade NO_x emissions allowances, the framework has not actually defined the source of such emissions allowances should they be required. Airlines have questioned the legality of the framework.
Ontario Emissions Trading Programme (Ontario)	Canada	2001 — Not to exceed 39 kilotonnes of NO_x by 2007. 2005 — Reduce emissions of NO_x by 21 per cent and emissions of SO_x by 46 per cent on 1990 baseline levels by 2015.	Province of Ontario Electricity sector 7 industrial sectors	Cap-and-trade system	Active	Framework incorporates pollutant emissions both within and upwind of Ontario and, as such, permits the use of other (U.S. or other Canadian provinces) emissions reduction credits from eligible emissions trading programmes within a defined zone.
Slovakia SO_2 Trading Programme	Slovakia	2002 — Reduce SO_2 emissions to achieve compliance with the Gothenburg Protocol.	Slovakian emissions sources exceeding 50-MW output capacity (80 per cent of Slovakian SO_2 emissions). Emissions targets set by district.	Cap-and-trade system. Banking of emissions quotas is not permitted.	Active	In the first phase of the programme (2002–2004), emissions quotas were higher than the baseline emissions. In the current phase (2006 onwards) total allowances have been set below the baseline emissions, and by 2010 the quotas will be reduced by 45 per cent. Purchasing quotas is not permitted in regions non-compliant with ambient air quality norms, as such sources located in such regions have only one option to reduce their emissions.
Dutch NO_x Trading Programme	Netherlands	2005 — Comply with EU Directive on National Emissions Ceilings (NEC Directive) and reduce overall NO_x emissions from 490 000 tonnes in 1995 to 260 000 tonnes in 2010.	National	Based on "relative caps" directly related to the "activity level" of a facility. Allowances automatically determined by multiplying the performance standard rate (PSR) by total fuel input or production of the facility.	Active	One of the reasons an ETS was implemented was because of the need to limit reduction costs. The use of a PSR provides greater flexibility for participants to increase production as required. A uniform PSR would favour the more proactive companies that have taken early action. An ETS based on PSRs is not able to guarantee emissions reduction targets in absolute terms.

Framework title	Country	Date commenced and objective	Scope	Framework details	Status	Comments — Results of evaluations
Chilean PM10 Emissions Trading Programme (Santiago)	Santiago, Chile	1992 — Control of particulate matter (PM10) emissions.	Santiago area — programme covers large industrial sources of PM10 with exhaust gas flow rates greater than 1 000 m^3/hour).	Emission-offsets trading programme	Active	All large industrial sources have met the emissions reduction goal. Although the targets to reduce PM10 were met, during the first three years of the programme, no transactions were approved while the regulatory authority developed source and emissions inventories. Subsequent to this there has been little market activity due to high transaction costs, uncertainty and low enforcement.
Chinese Pilot Emissions Trading Programmes	China	1994 — Reduction of SO_2 emissions from electricity generators and industrial sources using emissions trading (pilot projects).	Experimental programme covering cities of Baotou, Kaiyuan, Liuzhou, Taiyuan, Pingdingshan and Guiyang.	Emissions trading programmes taking different forms, including: allowance transfers within an enterprise, environmental compensation fees to obtain additional emission rights, investments in non-point source pollution control to obtain additional emission rights; and allowance transfers from sources with surplus allowances to new or existing sources with insufficient allowances.	Assumed now inactive	Pilot programme; exact results unknown. Pilot frameworks identified “issues and barriers” that may apply in an airport context, including need to establish a legal authority (China had issued no explicit legal authorization); need for uniform allocation method (flexibility in determining allocations was given to regions and districts); monitoring and verification (need for standardization and continuous measurement); and need to address coordination and compatibility with other policy instruments.

Chapter 4

LESSONS LEARNED FROM EXISTING AND HISTORICAL LOCAL AIR QUALITY EMISSIONS TRADING AND OFFSETTING SCHEMES

4.1 ESSENTIAL FEATURES FOR THE APPLICATION OF EMISSIONS TRADING AND OFFSETTING IN ADDRESSING AIRPORT LOCAL AIR QUALITY

4.1.1 While there are relatively few examples of offsetting frameworks on which to base conclusions, the examples set out in Chapter 3 facilitate identification of necessary components and characteristics for the incorporation of emissions trading and offsetting in future airport LAQ management frameworks.

Responsibility and competence of regulators

4.1.2 In a voluntary airport LAQ management framework, each participating entity will have agreed to comply with the framework. However, in a mandatory framework, the implementing body must have responsibility for regulating all the sources covered by the framework. While many local or regional authorities have the competence to ensure compliance with national LAQ standards and regulations, they may not have the ability to directly regulate individual emissions sources. This is particularly true in the transport sector with regard to mobile sources.

4.1.3 Offsetting presents a slightly different set of issues. Offsetting must first have received approval by the regulator of any airport LAQ management framework (and any associated emissions trading mechanism) as an acceptable means by which participants can meet their emissions obligations. The regulators of a framework may dictate the circumstances for the use of offsetting, including limits on use, and may also define criteria for acceptable offsets.

4.1.4 In terms of existing systems, China's experience of trading SO_2 showed that many pilot frameworks had variable rates of compliance. This was attributed to the lack of enforcement, caused in turn by the absence of any explicit legal authorization. Similarly, plans for the inclusion of Boston Logan Airport in a city trading framework encountered legal difficulties because the State environmental protection authorities did not have a remit to address aircraft emissions.

Coverage and targets

4.1.5 The primary purpose of LAQ emissions trading and offsetting is to establish a cost-effective means of achieving compliance with the regulatory obligation stemming from an overarching objective to ensure that concentrations of a given pollutant do not exceed prescribed thresholds. If emissions trading or offsetting is used to help achieve this objective, it is important that all relevant emissions sources that influence the relevant LAQ pollutant concentrations are covered by the system.

4.1.6 Because LAQ pollutants generally have impacts at or close to the point of emission, it is important that emissions are reduced within the boundary of the relevant overarching LAQ management framework where feasible. This makes trading and offsetting for LAQ management purposes fundamentally less flexible and more difficult to

implement than for GHGs. However, the definition of the scope of any LAQ framework, and the conditions on the use of trading and offsets, may permit emissions trades and offsets with emissions sources outside the boundary of the LAQ management area to help remedy this.

4.1.7 It is important that any LAQ management framework recognize the need to control emissions at all locations where LAQ is a problem. When air quality improvements in one area are achieved at the expense of the air quality in another area, it could result in a "hot spot" — an unacceptably high accumulation of the pollutant in the latter area. In order to minimize hot spots, an emissions trading and offsetting system that is very broad and occurs under a cap that results in emissions reductions in all areas or a system that identifies acceptable compliance units by location, or discounts units by location, should be considered. However, if an LAQ management framework requires too many restrictions on use to avoid hot spots, it may be preferable to develop a more conventional regulatory approach to address the problem.

Cost-effectiveness

4.1.8 The advantage of emissions trading and offsetting is that they allow entities with high marginal abatement costs to purchase allowances and credits from entities with lower marginal abatement costs. This cost-effectiveness feature is particularly relevant in relation to aviation where abatement costs are typically high. However, there is a cost point where all but the participants with the highest mitigation costs will find it cheaper to invest in mitigation measures to reduce the emissions from their own activities. It is also important for the longer term that reductions are also made within the sector to ensure it remains sustainable.

4.1.9 The design and management of emissions trading as part of an airport LAQ framework will also need to consider costs borne by regulated entities for monitoring, reporting and verifying emissions (or emissions reductions) and for enforcement — that is, costs beyond those required to acquire allowances and credits. In the U.S., the RECLAIM trading framework (introduced in Chapter 3) required significant changes to the permit and information management systems that cost millions of dollars and additional staff resources. Generally, these additional costs should not outweigh the advantages of trading, but careful planning, preparation and management by the regulator during development and throughout the life of the programme can help to minimize this burden. In this respect the regulator must have a good understanding of the regulated entities and the factors having an impact on their decision-making. It is also important to note that the kinds of costs outlined above may be incurred by entities in any case, as a result of some overarching LAQ legislation, rather than a specific mechanism applied to an airport.

Review process

4.1.10 The application of emissions trading and offsetting as techniques for the management of LAQ is still only developing. Indeed, many LAQ frameworks employing these techniques are in a "learning by doing" phase, and as more experience is gained, frameworks may be modified to ensure that they remain an effective means of achieving LAQ objectives. They may also have to react to external events or shocks. For example, in the U.S. RECLAIM programme, many power-generation facilities were caught without enough time to install emissions controls to react to the 2000–2001 energy crisis when older, more polluting, generating capacity was brought back into use. This quickly drained available emissions allowances from the market and required an amendment of the RECLAIM rules. The introduction, abolition or amendment of other policy instruments introduced to tackle the same impact may require changes to the LAQ framework.

4.1.11 The way an emitter behaves in any market will be influenced by the long-term knowledge and certainty of what it will be required to do over a given time horizon. An established review mechanism could provide information that will improve the ability and predictability of changes to be made in the LAQ framework when these unforeseen external events occur.

4.2 PITFALLS TO AVOID

Over-allocation

4.2.1 Experience from the RECLAIM programme shows that the level of allocation influences the effectiveness of an LAQ framework. The impact of over-allocation at the beginning of RECLAIM substantially lessened the incentive for facilities to install control equipment due to the availability of inexpensive emissions allowances. This problem is not uncommon in new LAQ frameworks where compromises in the level of the cap are often required to gain political agreement or to provide an adaptation period for entities to be regulated where the adaptation costs will not cause them significant financial difficulty. Some tendency to over-allocate allowances in the initial years is evident from research.

4.2.2 This problem can generally be avoided if the allocations are based on baseline emissions that are equal or close to actual emissions. This could be achieved by averaging emissions over the preceding three to five years, for example.

4.2.3 Therefore, the level of allocation, at least initially, must strike a balance between the need for environmental effectiveness and the need to get buy-in to the programme and allow participants to adapt at reasonable cost.

Free allocation

4.2.4 Under an LAQ framework with free distribution of allowances, existing firms get an initial allocation free while new entrants often have to purchase all allowances. Such a distribution system imposes a competitive disadvantage on new entrants. To address this concern, some auctioning of allowances could help level the playing field, or a programme of set-aside allowances could be established for facilities demonstrating that their activity levels exceeded the baseline by a certain amount.

4.3 IMPORTANT FACTORS IN THE EFFECTIVENESS OF EMISSIONS TRADING OR OFFSETTING SYSTEMS

Conditions that increase effectiveness

4.3.1 Based on the experience and lessons set out above, it is possible to draw some general conclusions regarding the circumstances and conditions where emissions trading and offsetting are likely to be effective for LAQ management purposes. Relevant circumstances and conditions include:

a) where the marginal abatement cost varies widely between sources, encouraging emitters with low-cost abatement options to invest in making emissions reductions and selling their excess allowances to emitters whose abatement costs exceed the allowance cost;

b) where there is a sufficient number of system participants to maintain liquidity in emissions trading markets and, when offsetting is allowed, where the volume of potentially eligible offset projects is sufficiently large;

c) where there is a greater uniformity of concentration of pollutants in the geographic area under consideration, rather than pockets of high concentration (so as to avoid localized hot spots);

d) where emissions trading and offsetting are determined to be the best market-based mechanisms available. For example, raising the cost of emissions using an emissions tax can be relatively

ineffective in a growing economy. With inflation a tax will decrease in real terms, potentially failing to meet its environmental objective unless regularly reviewed;

e) where transaction costs are relatively low.

4.3.2 Certain preconditions are required to ensure that any emissions trading and offsetting employed as part of an LAQ management framework are transparent, credible and have long-term viability. These include:

a) a sufficient level of information and scientific understanding to set a politically acceptable and environmentally-effective emissions cap for the LAQ framework;

b) the ability to monitor emissions to an accepted level of accuracy, track the transfer of allowances, and an acceptable capability to enforce compliance;

c) permit holders who are sufficiently knowledgeable about the system and able to use the system effectively.

4.3.3 Similarly, specific preconditions with regard to the use of offset credits for compliance within the LAQ framework also apply. These include:

a) implementing a complementary system for the generation of offset credits that represent real, additional and verifiable emissions reductions;

b) implementing a system that tracks offset credits to ensure they cannot be used more than once;

c) establishing the rules for the use of offset credits generated outside the LAQ framework boundary that recognizes the local impact of the emissions as well as the potential for creating hot spots.

4.3.4 While the above factors are important in the setting of objectives for an LAQ management framework, the LAQ problem at hand, the defined objectives of the LAQ framework and the wide-ranging local circumstances, including political, social and geographic influences, will determine which of these preconditions are vital for the success of the system and the relative importance of the other factors.

Lessons on importance of certain factors

4.3.5 Based on these lessons learned the following principles are recommended for consideration:

a) Flexibility — flexible timing, including borrowing or banking allowances, increases flexibility. (Borrowing allows a permit holder to use allowances earlier than their stipulated date; banking allows a user to store allowances for future use. Allowing borrowing or banking can make enforcement somewhat more complex.)

b) Simplicity — transparent formulae make compliance simpler and reduce the incidence of challenge or manipulation. Rules should be clearly defined up front, without ambiguity.

c) Monitoring and enforcement — strong monitoring or enforcement regimes have made for more effective achievement of the system objectives.

d) Standardization and continuous measurement.

Chapter 5

AIRPORT-SPECIFIC CONSIDERATIONS

In conclusion, this section summarizes the main airport-specific issues that might need to be taken into account when considering emissions trading or offsetting for addressing an airport's local air quality situation.

5.1 EMISSIONS TRADING SCHEMES

When considering an ETS for an airport LAQ situation, the following items should be considered.

a) Has non-compliance with an LAQ regulation triggered a need for action to reduce emissions at or near an airport?

b) Are there sufficient non-aircraft emissions sources contributing to the problem at or near the airport to warrant incorporation in an ETS because all would have to be operated within a total emissions cap?

c) Would sources operating outside the ETS cap (e.g. private vehicles) potentially undermine the benefits of the ETS?

d) Is the ETS best delineated by a geographic scope, by inclusion of specific sources or by a combination of both?

e) What emissions cap should be enforced to ensure that LAQ goals are achieved?

f) How are allowances to be allocated?

g) Can an airport operator be held responsible for emissions from private vehicles visiting the airport or used for staff travel?

h) Could the use of offsets from off-site sources result in "hot spots" at the airport itself?

i) How will emissions be measured or monitored?

5.2 OFFSETTING

Relevant considerations and criteria for the use of offsetting include:

a) Will the ETS accept offsetting as a means to meet scheme obligations?

b) Should a limit on the use of offsetting be included?

c) How will projects generating offset credits be monitored, verified and regulated?

d) Are the projects achieving emissions reductions that mitigate the airport LAQ situation?

e) What are the trading and governance procedures for emitters to buy and sell offsets?

f) Could the availability and cost of offset credits determine, in part, the stringency of the emissions reductions required by an LAQ framework?

g) Can emissions reduction projects directly funded by an airport, such as transit infrastructure or city bus fleet renewal, be counted as offsets?

— END —

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