



Internalising external costs

Policy instruments to internalise externalities at airports



CE Delft

- Independent, not-for-profit consultancy
- Transport, Energy, Economy
- Over 10 years of experience with environmental policies for aviation
- EC, national governments, airports, airlines, aircraft manufacturers, UNFCCC, ICAO





Outline

- Externalities at airports
- Aims of internalisation
- Policies to internalise noise externalities
- Policies to internalise air pollution externalities
- Conclusions





Externalities at airports

- Noise
 - Air pollution
 - Land use
 - Climate change
 - External safety
-
- At airports, noise and air pollution are the largest externalities



Externalities at airports

- Noise costs per LTO

Aircraft category	External noise cost per LTO (€1999)
40 seats	180
100 seats	300
200 seats	600
400 seats	1,200

- CE (2002) External costs of aviation



Externalities at airports

- Air pollution costs per LTO

Aircraft category	NOx	PM2.5	HC + SO ₂	Total (€1999)
40 seats	10	20	3	33
100 seats	66	44	9	119
200 seats	186	44	11	241
400 seats	512	95	24	631

- CE (2002) External costs of aviation



Aims of internalisation

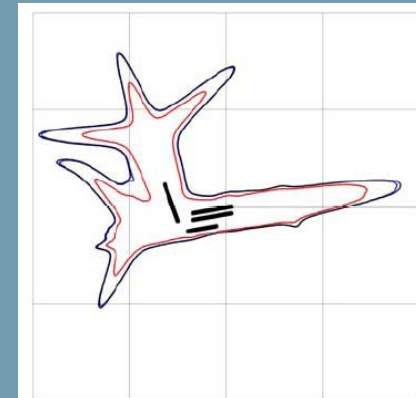
- Make polluter pay
- Arriving at socially optimal level of externalities
 - Increasing welfare





Internalising noise externalities

- Differentiated landing fees
- Noise charges
- Noise permit trading
- Cross-cutting issues





Internalising noise externalities

Differentiated landing fees

- Prevalent at 50% of major EU airports
- Basis often cumulative margin
- Often classes of aircraft (e.g. Chapter 4; Chapter 3 -5dB; Chapter 3)
- Based on certification data





Internalising noise externalities

Differentiated landing fees

- Revenues (if any) used for insulation, noise measurement, et cetera
- Few airports have quantified effect (1-2 dB reduction in noise; 45% reduction in contour area)



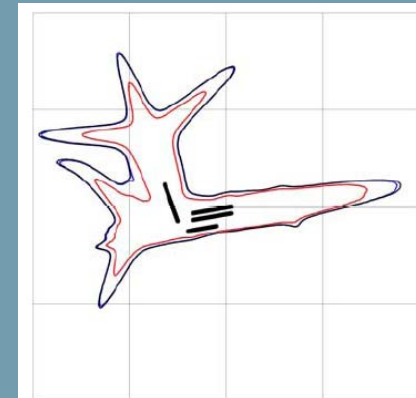


Internalising noise externalities

Noise charges

- Levied at some airports
- Often aimed to generate revenues for insulation and other measures
- Basis
 - Cumulative margin

$$- 10 \left(\frac{FO + LA + AP - 270}{45} \right)$$





Internalising noise externalities

Noise permit trading

- Possible in principle
 - Permits based on certificated noise or quota count
 - Geographical scope: airport
 - Trading entities: aircraft operators and inhabitants of noise contour
- Permit may have different value depending on time of day
- Feasibility may be limited due to market power of home carrier
- Needs further assessment



Internalising noise externalities

- Measured noise or certificated noise
 - Administrative burden
 - Incentive for acquisition or for operation
- Certificated noise or noise margin?
 - Certificated noise more alligned with size of externality
 - Margin accounts for fact that large aircraft make more noise
- dB value or $10^{\wedge}dB$ value
 - dB value is logarithmic: noisy aircraft pay relatively less



Internalising LAQ externalities

- LTO NO_x charges
- Air emission charges
- NO_x emission trading
- Differentiated ticket tax/departure tax
- Cross-cutting issues





Internalising LAQ externalities

LTO NOx charges

- Charges based on NOx emitted in LTO
 - ICAO engine emission databank
 - ICCAIA turboprop databank
 - Swiss database
- Aircraft in classes (CH) or charge per kg (ECAC/ERLIG recommendation 27/4)





Internalising LAQ externalities

LTO NOx charges

- In one case (ARL) level based on external costs
 - Not clear whether damage of NOx emitted at height is the same as emissions at ground level
- Revenue neutral at most airports
 - Charge/benefit scheme (BAA)
 - Reduced airport fees (ARL)





Internalising LAQ externalities

Air emission charges

- LTO NO_x charges can be extended to air emission charges
- Similar calculation for PM, CO, HC
 - SO₂ depends on fuel
- Values for external costs are available
- Currently not applied
- Air emission charges would internalise LAQ externalities better than NO_x charges



Internalising LAQ externalities

NO_x emission trading

- Currently not applied in aviation
- Would increase efficiency if cheap options for reductions exist in other sectors
- Administration more complex than charge or charge/benefit scheme





Internalising LAQ externalities

NOx emission trading

- Feasible in principle
 - Basis: LTO emissions
 - Geographical scope: airport and region
 - Trading entity: aircraft operator, installation operator
 - Cap: in line with air quality directive?





Internalising LAQ externalities

Differentiated air travel tax/departure tax

- Currently being contemplated in NL
- Only feasible if tax exists
- Tax differentiated according to
 - LTO NOx emissions per seat or MTOW
 - Aircraft in classes





Internalising LAQ externalities

- Internalisation currently based on calculated LTO NO_x emissions
 - Approximation of real emissions
 - Incentive for fleet renewal
 - No incentive for operational measures to reduce emissions





Conclusions

- Several instruments exist to internalise external costs of aviation noise and air emissions
- Currently most instruments are revenue neutral or earmarked
 - Provides incentives
 - Not all polluters pay
- Currently most instruments based on certificated noise and emission data
 - Administratively simple
 - Incentivises technical measures only



Thank You

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