



COST EFFECTIVENESS ANALYSIS OF LOCAL AIR QUALITY CHARGES

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Overview of presentation



- SCOPE OF THE WORK
- ANALYSIS CONDUCTED
- FINDINGS



SCOPE OF WORK



➤ Aviation NOx emissions only

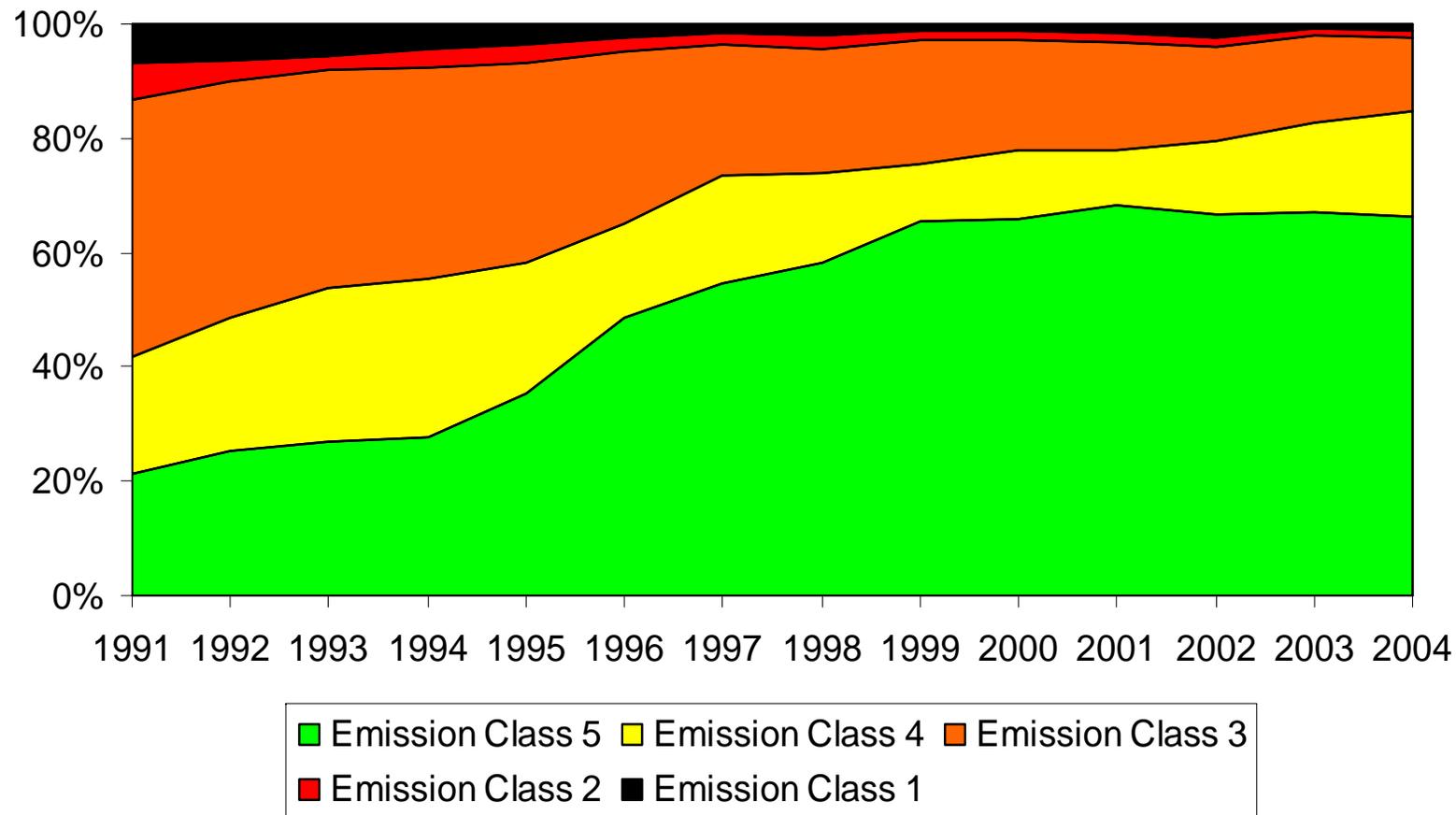
- Two airports – Zurich (1/9/97) - Stockholm 1/1/98
- Terms and conditions of charges introduced:
 - Emission class assigned to engines (5 at Zurich, 6 at Stockholm)
 - A “%” of the landing fees - 0% to 40% at Zurich; 0% to 30% at Stockholm
 - Revenue neutrality
- Not considered:
 - Quantifications of emissions impact
 - Local emission dispersions
 - Impact on human health
 - Formation of secondary particles
 - Identification of hazardous pollutants



ANALYSIS



Aircraft movements by emission charge classes at Zurich



NOx

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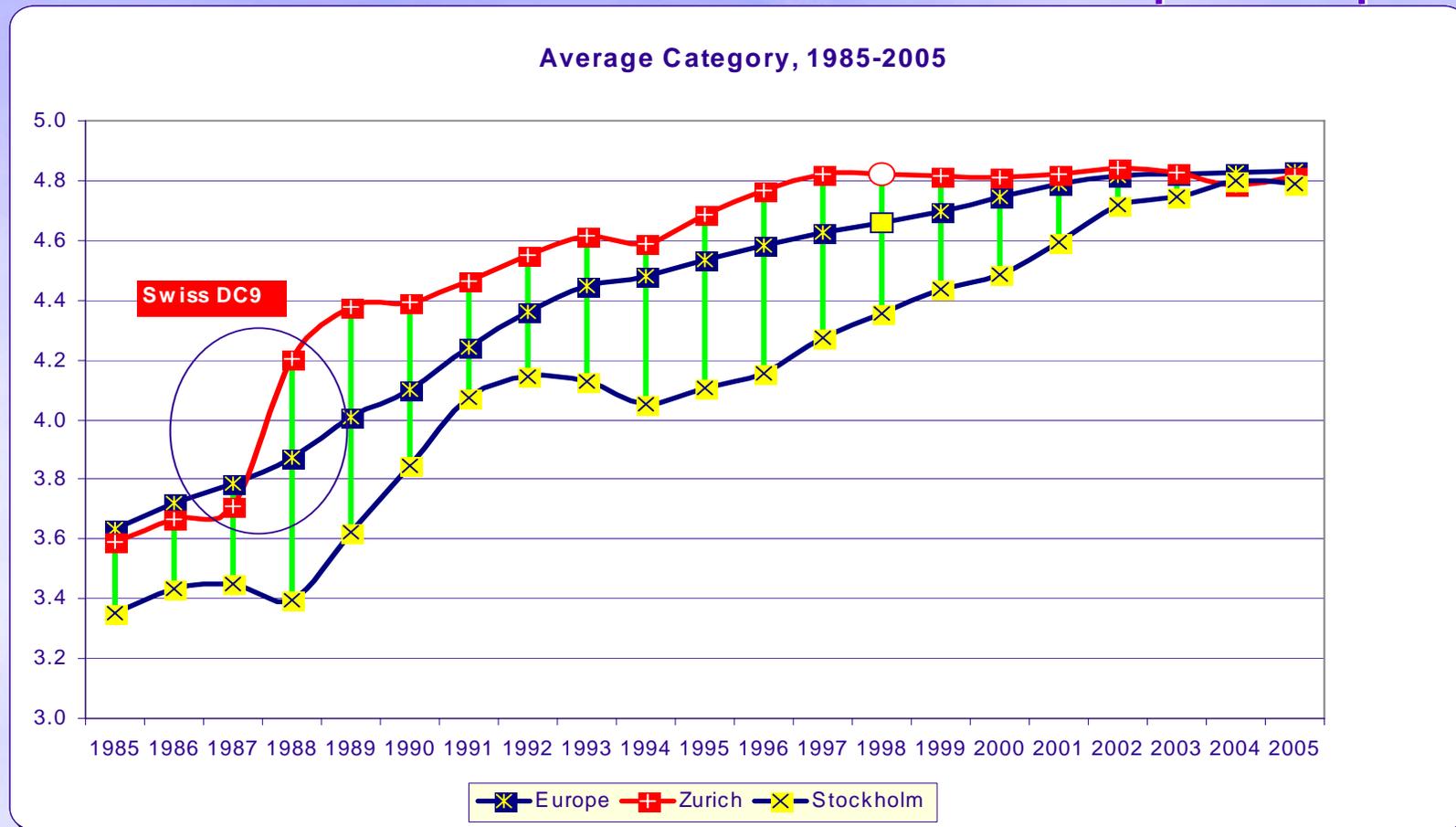
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ANALYSIS



Changes in average aircraft classification Zurich, Stockholm, Western Europe Airports





ANALYSIS



Cost Comparison of different aircraft types

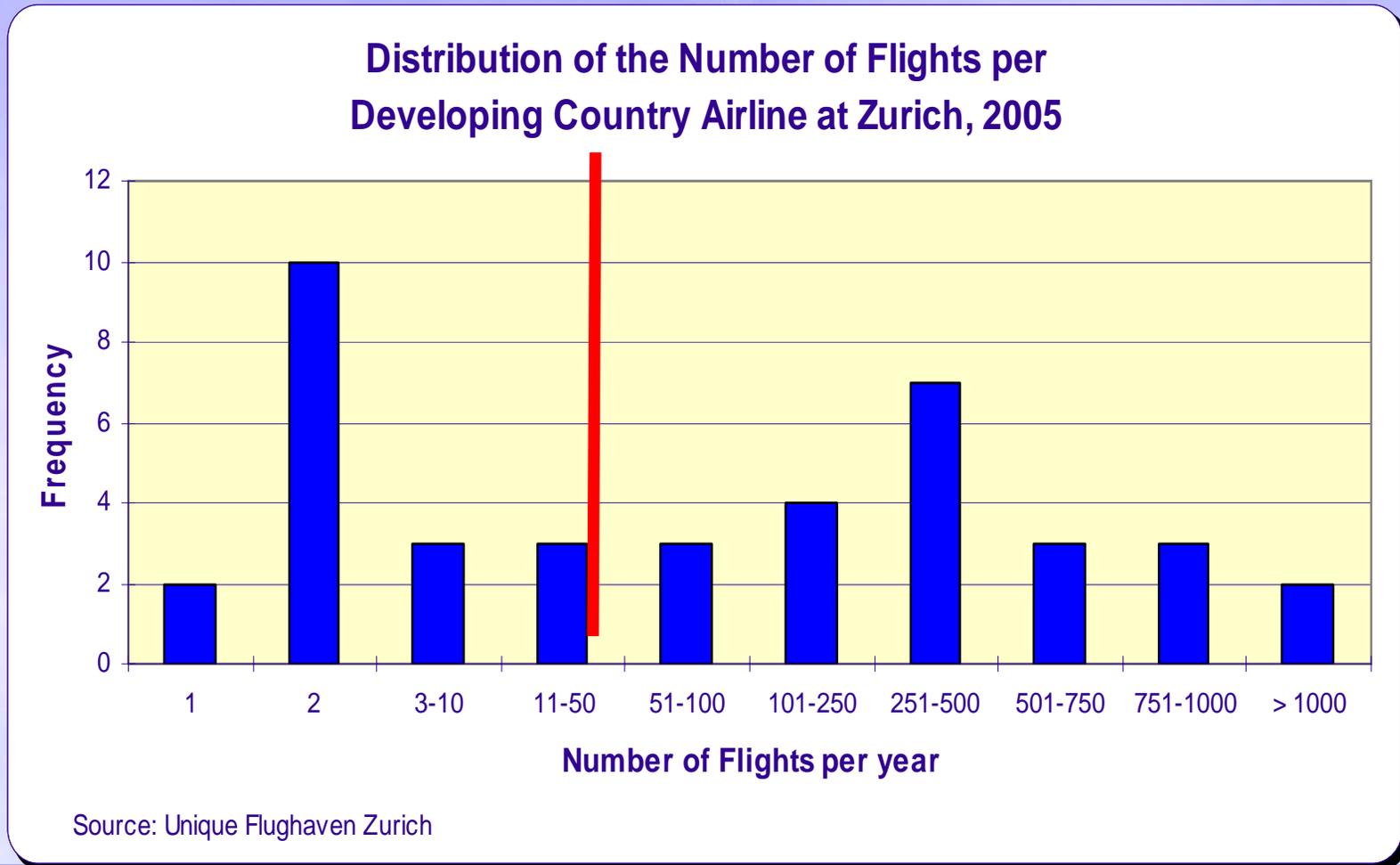
Aircraft # of seats	NEW 123 Reference	Older 125	Smaller 72	Bigger 198
Operating Costs				
Emission NOx Charge	0.5%	1.1%	0.3%	1.5%
Capital Costs per trip	16.2%	5.2%	10.4%	23.5%
Other DOC	83.3%	87.4%	49.7%	104.7%
Total DOC	100.0%	93.7%	60.4%	129.7%



ANALYSIS



NOx Charge - Developing Country Carriers



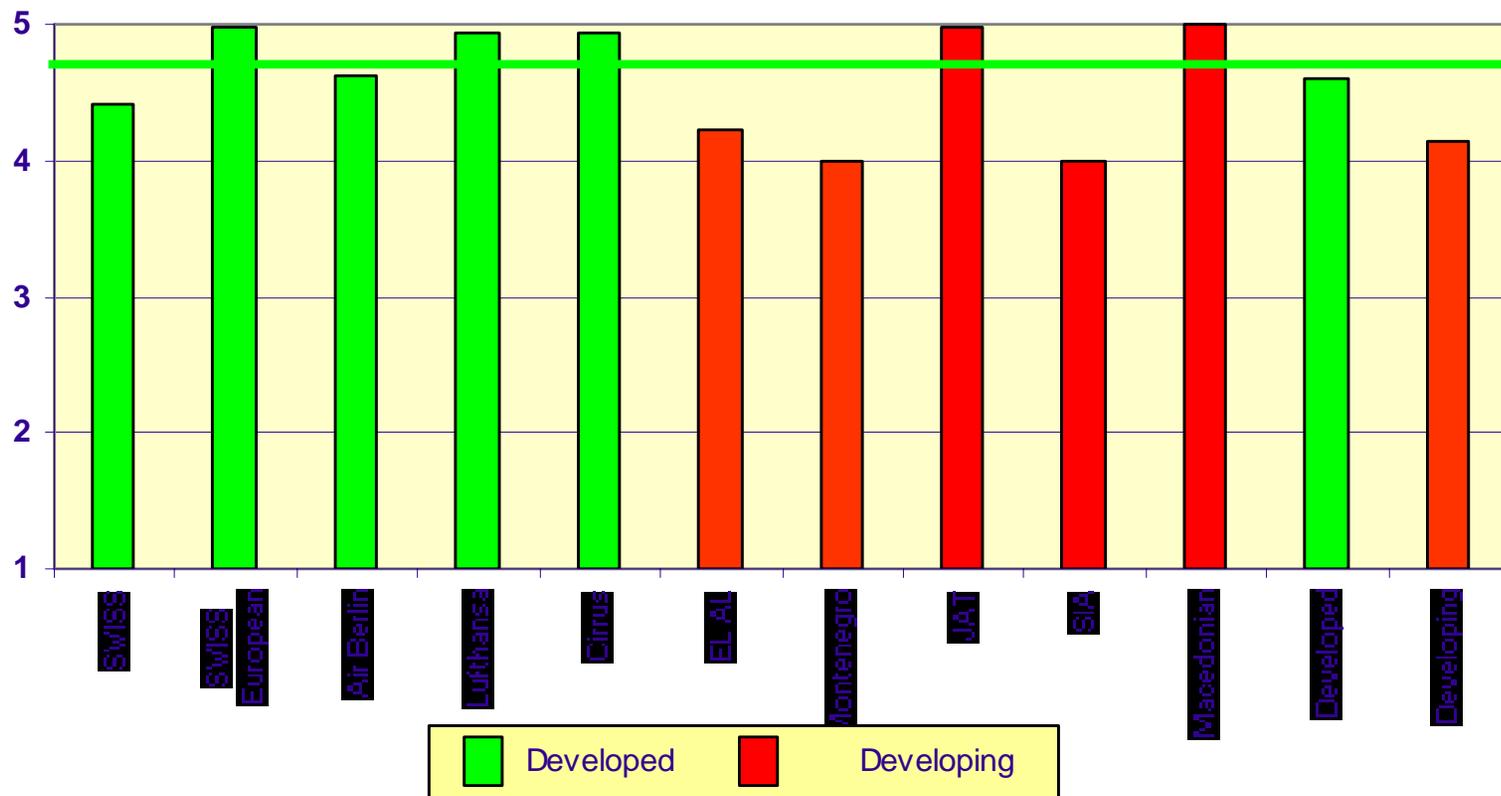


ANALYSIS



NOx Charge - Developing Country Carriers

Emission Class for 5 biggest Developed & Developing Country's Carriers, Zurich, 2006



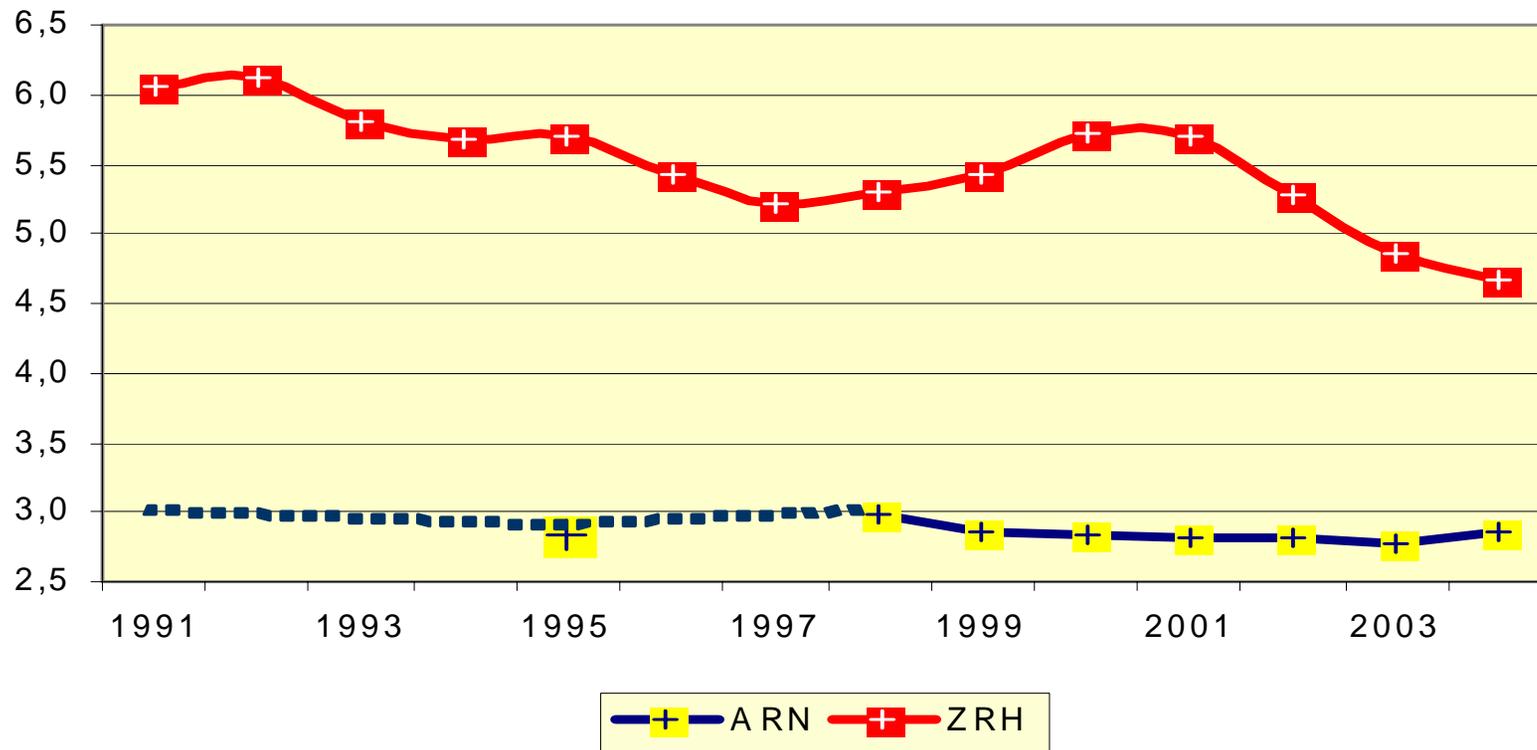


ANALYSIS

NOx Emissions per Aircraft Movement



Total NOx emissions (kg) per movement





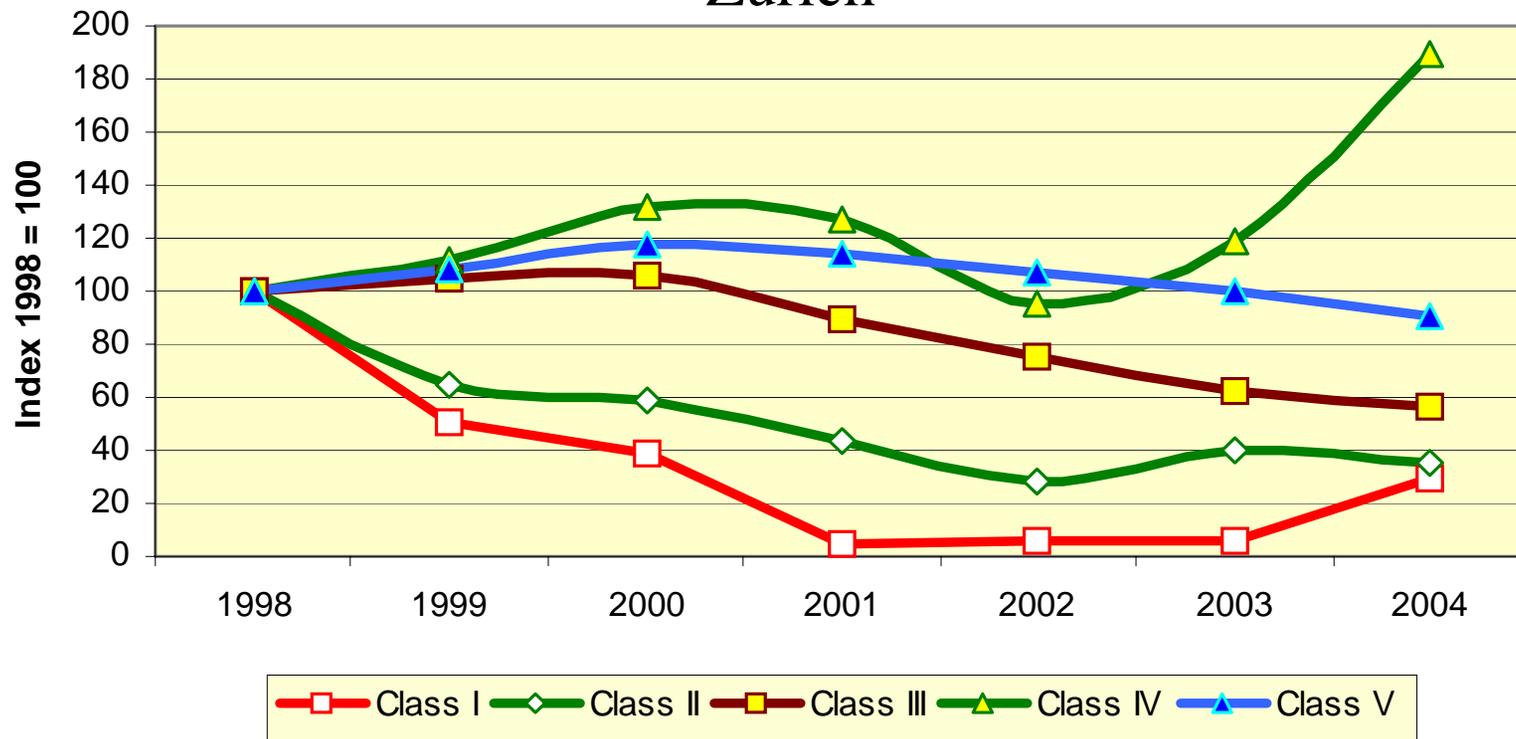
ANALYSIS

Aircraft Movements per NOx Emissions Class



Indexed Number of Movements, by Emission Class

Zurich



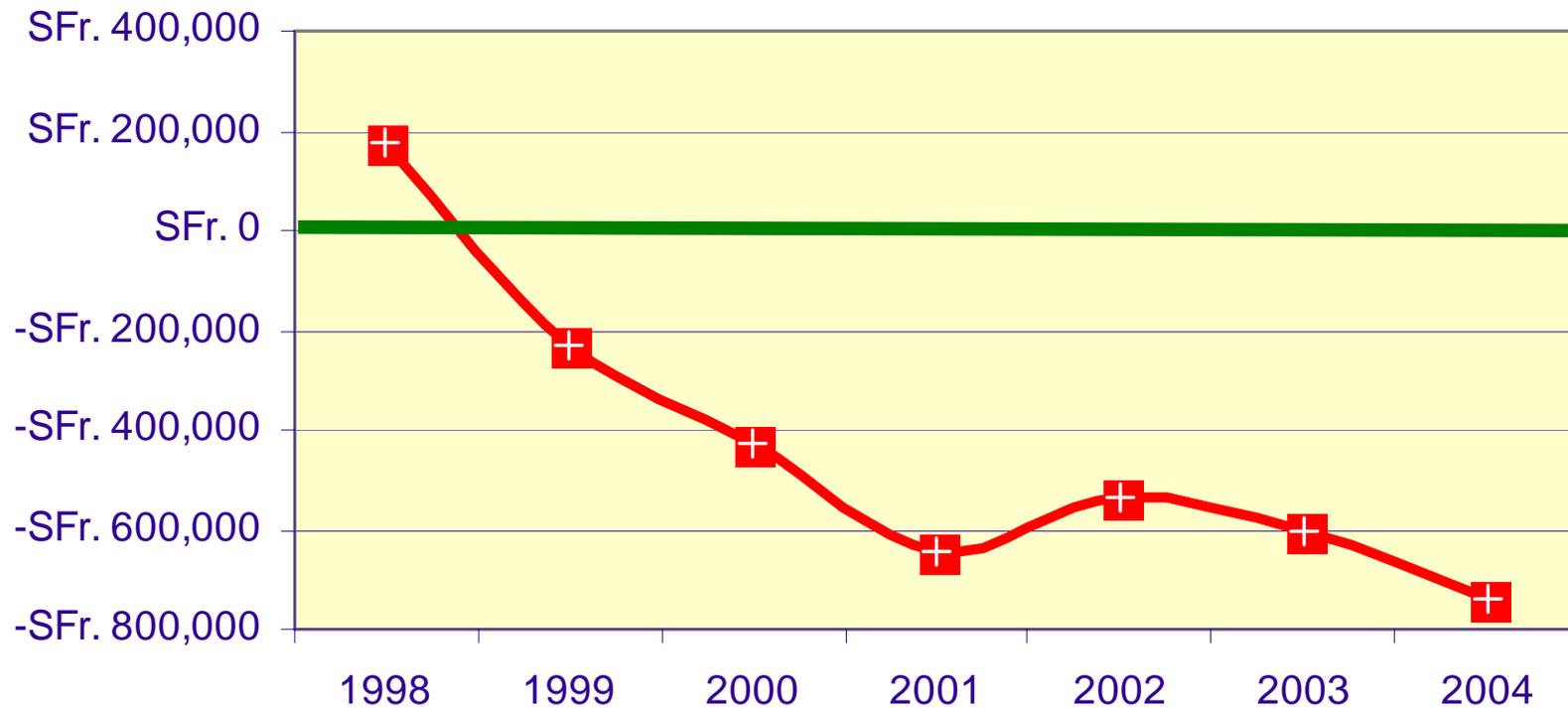


ANALYSIS

Revenue-neutrality of Charge - Zurich



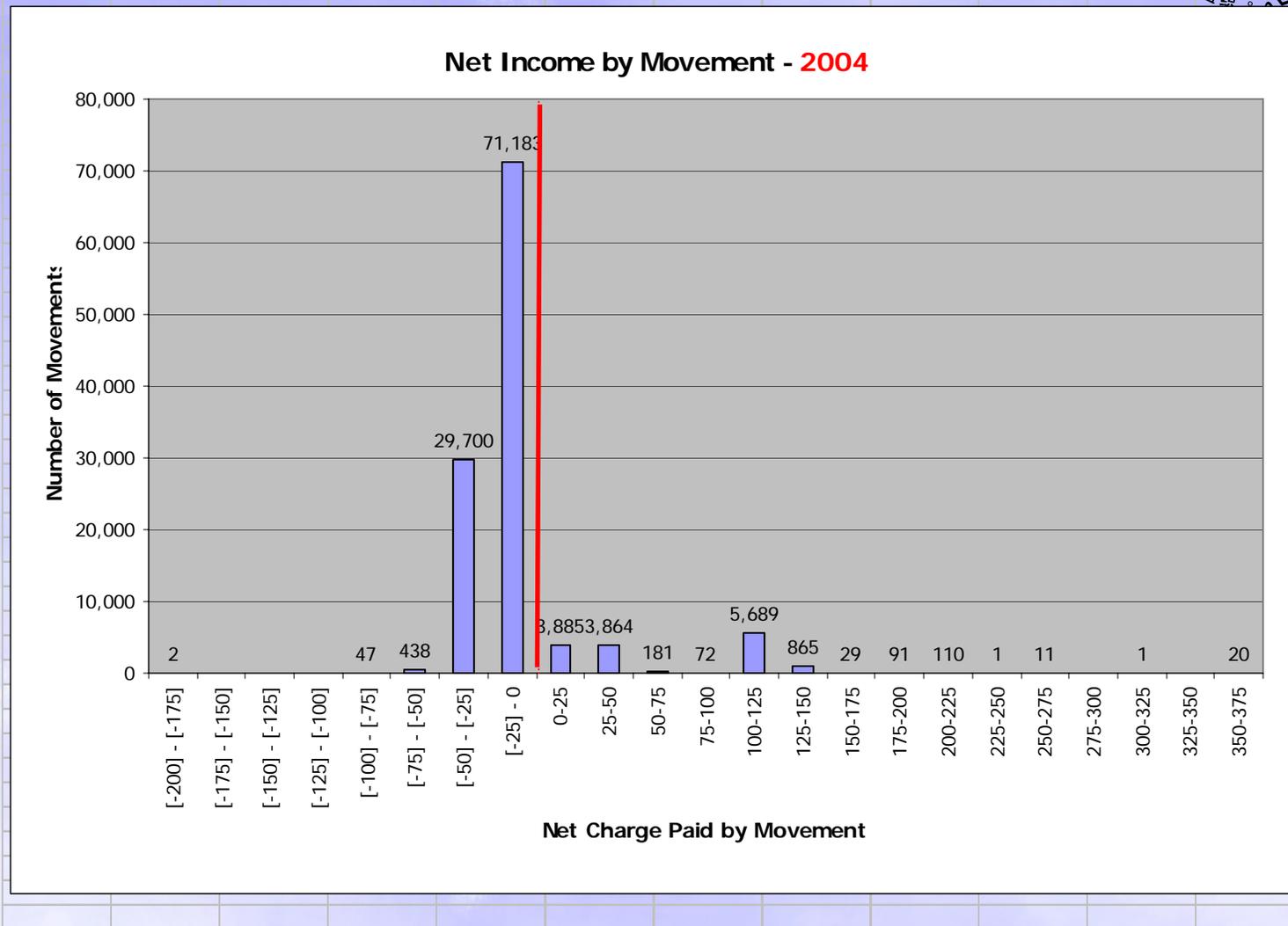
Revenue neutrality of Zurich Nox charges





ANALYSIS

Net income of NOx Charge – Zurich





ANALYSIS



Use of charges' "net revenues"

- Zurich - Mitigation measures & proceeds of charge
 - Negative net proceeds
 - Measures not contributing to NO_x emissions reductions excluded from analysis, e.g.
 - Air quality monitoring
 - Development of an emission inventory and dispersion modeling
 - Air quality management and research work
 - Only measure considered – construction of fixed ground power for aircraft at piers
 - 75 tonnes of NO_x saved attributable to measure
 - Costs of NO_x saved on high side but not extreme Add text



FINDINGS



From analysis conducted

- Comparable shift to less NO_x emitting aircraft at other airports but without a charge
 - *Significance of normal fleet renewal*
 - *Level of the charge not high enough*
- Revenue-neutrality led to winners > losers
- Additional NO_x reduction achieved at low cost effectiveness from a mitigation measure
- Marginal impact on NO_x emissions directly attributable to the charge at Zurich and Stockholm



THANK YOU
for your attention