

Air Transport between the poles of economy, ecology and society – Travel time savings and emissions at Zurich Airport

Dr. Andreas Wittmer

Content of the presentation

- Point of departure
- Economic calculation base: Travel time savings
- Analysis of Gas-Emissions
- Noise estimations
- Comparison of scenarios
- Conclusions

Big Picture concerning sustainability of air transport

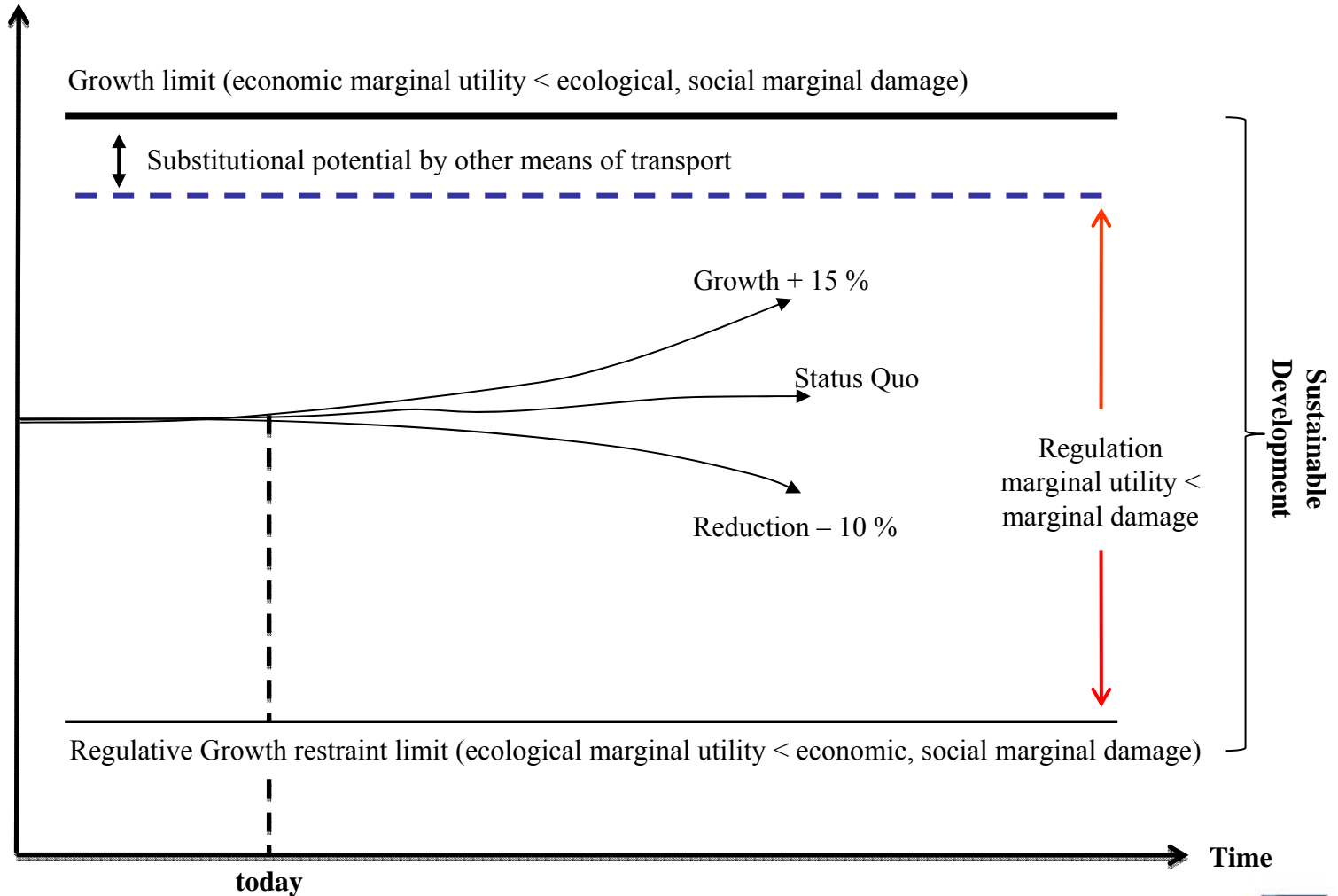
- It is global and regional
 - global with respect to climate change
 - regional with respect to noise, smell and politics
- Three perspectives:
 - local around airports
 - Economic: employment, living location, business location, financial effects, development potentials, etc.
 - Ecologic: noise, smell
 - Social: mobility = quality of life
 - National
 - Economic: export orientation, location attractiveness
 - Ecologic: noise and emissions
 - Social: mobility = quality of life
 - International
 - Economic: international competitiveness
 - Ecologic: global climate change
 - Social: global mobility needs

What is sustainability in air transport?

Source: Koller, Wittmer, Fröhlich

Growth (Movements, Emissions, etc.)

275'000 flight movements;
86,5 mio. flight hours,
323'000 – 404'000 t gas-
emissions; 69'000 persons
are molested by noise over
55 dB



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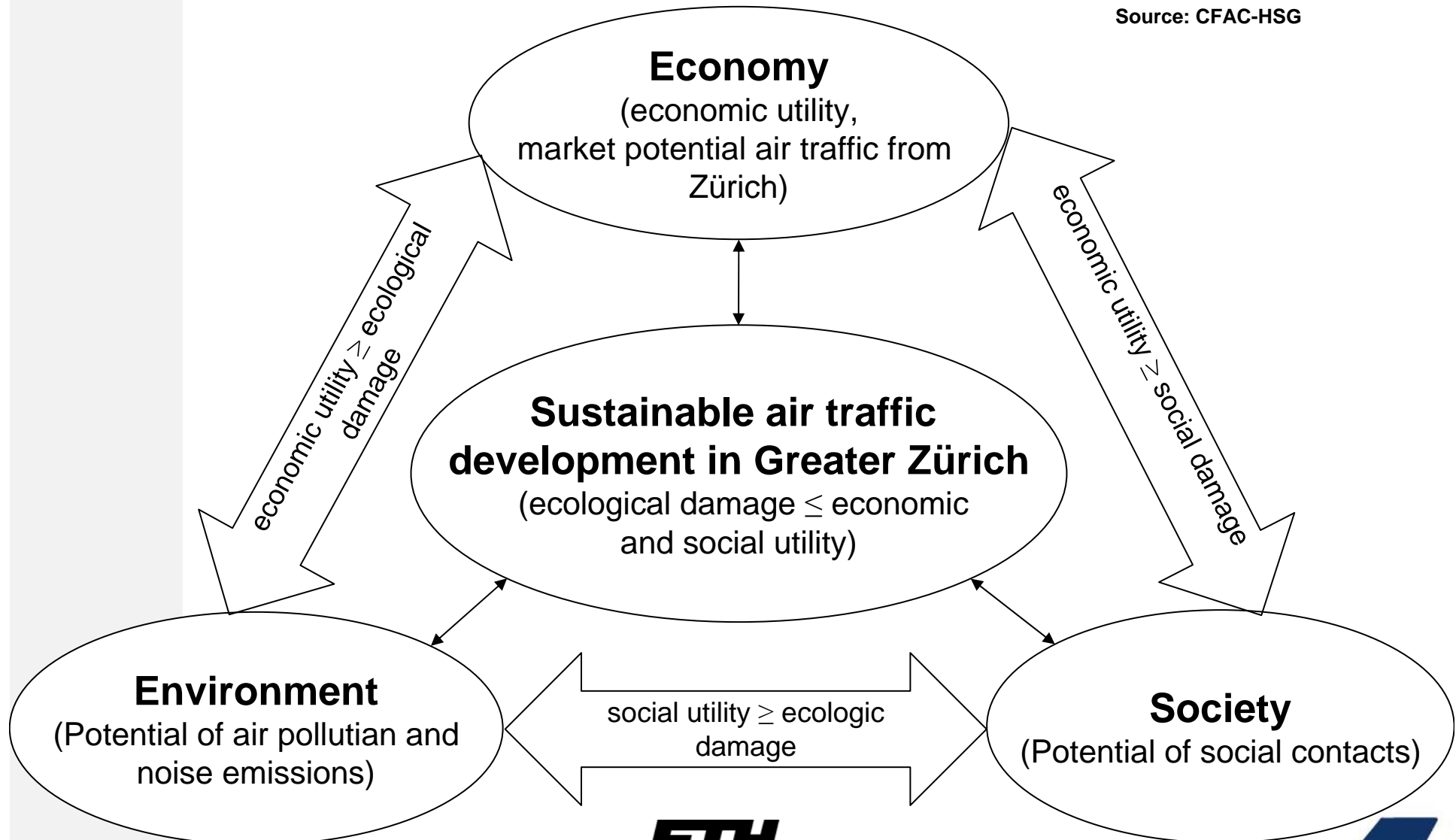


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Sustainability framework

Source: CFAC-HSG



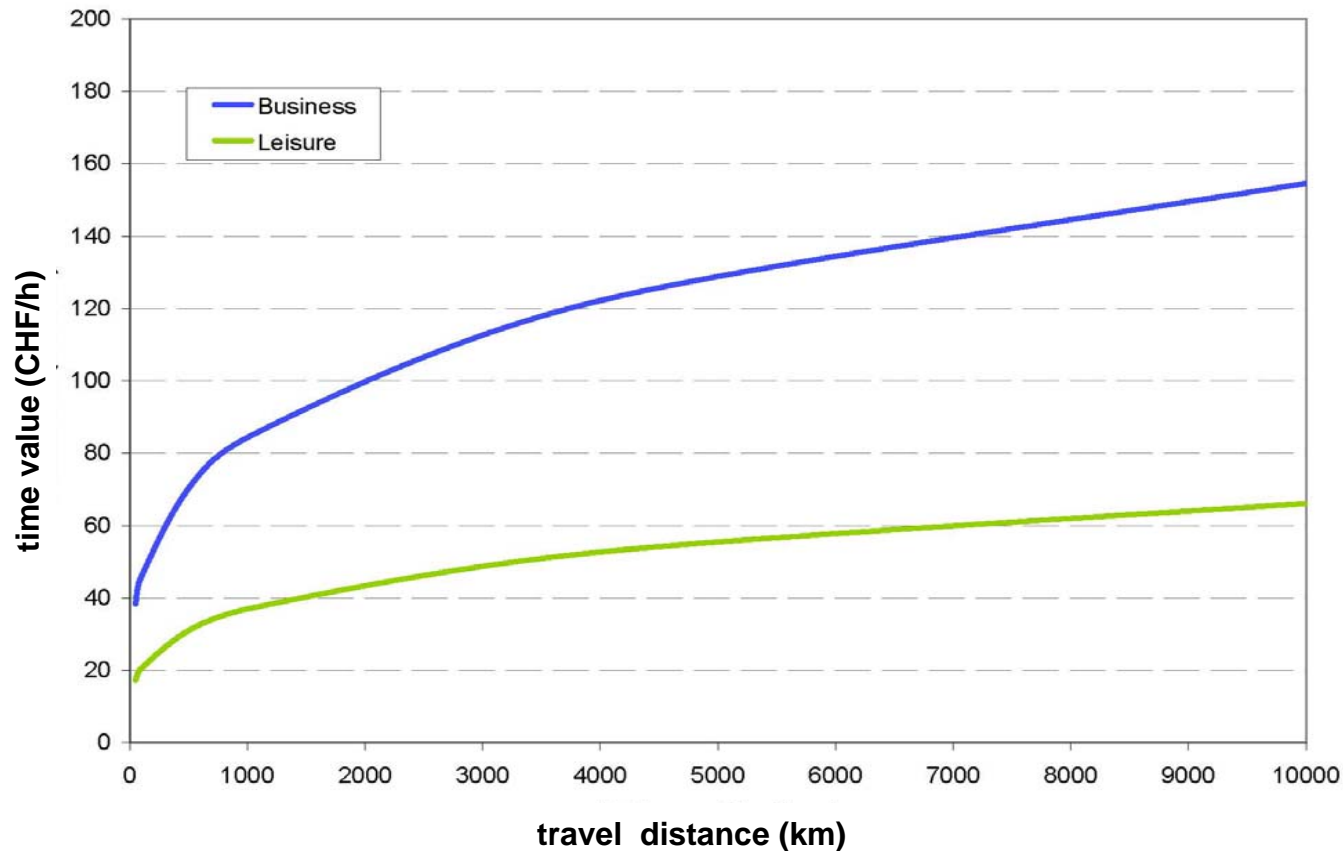
Central questions of the study

- How do changes in air traffic affect a sustainable development in the greater area of Zürich on the base of economy, environment and society?
- When does the system tilt under an economical orientated utility development towards an exceeding burden of environment and society?

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Time value for business and leisure travel based on travel distance



Assumptions on the base of literatur and studies:

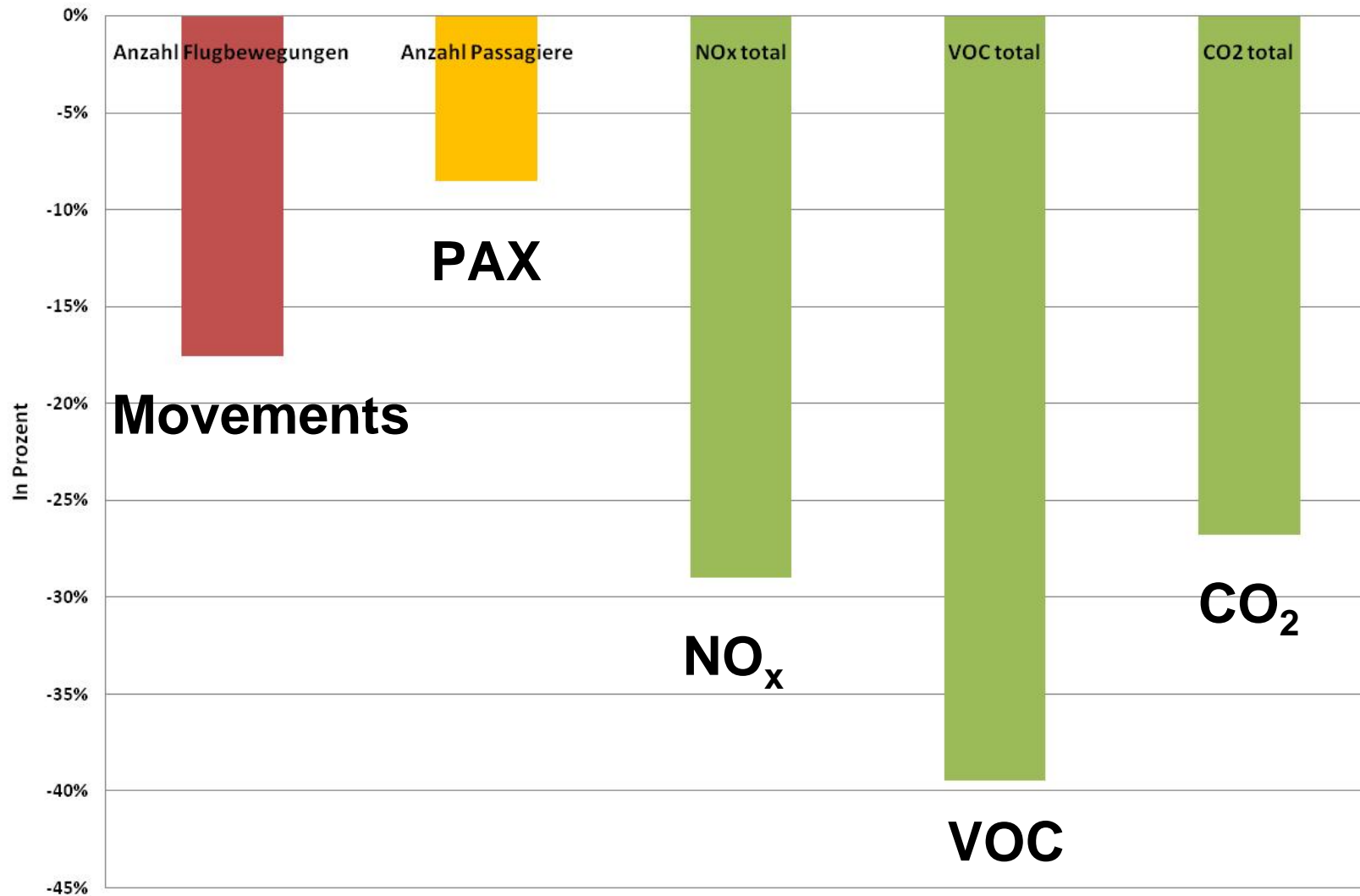
- Average flight time: 4,2 hours
- Average travel: 3000 km
- 40 % Business / 60 % Leisure

**Average time value:
CHF 74.30 / hour**

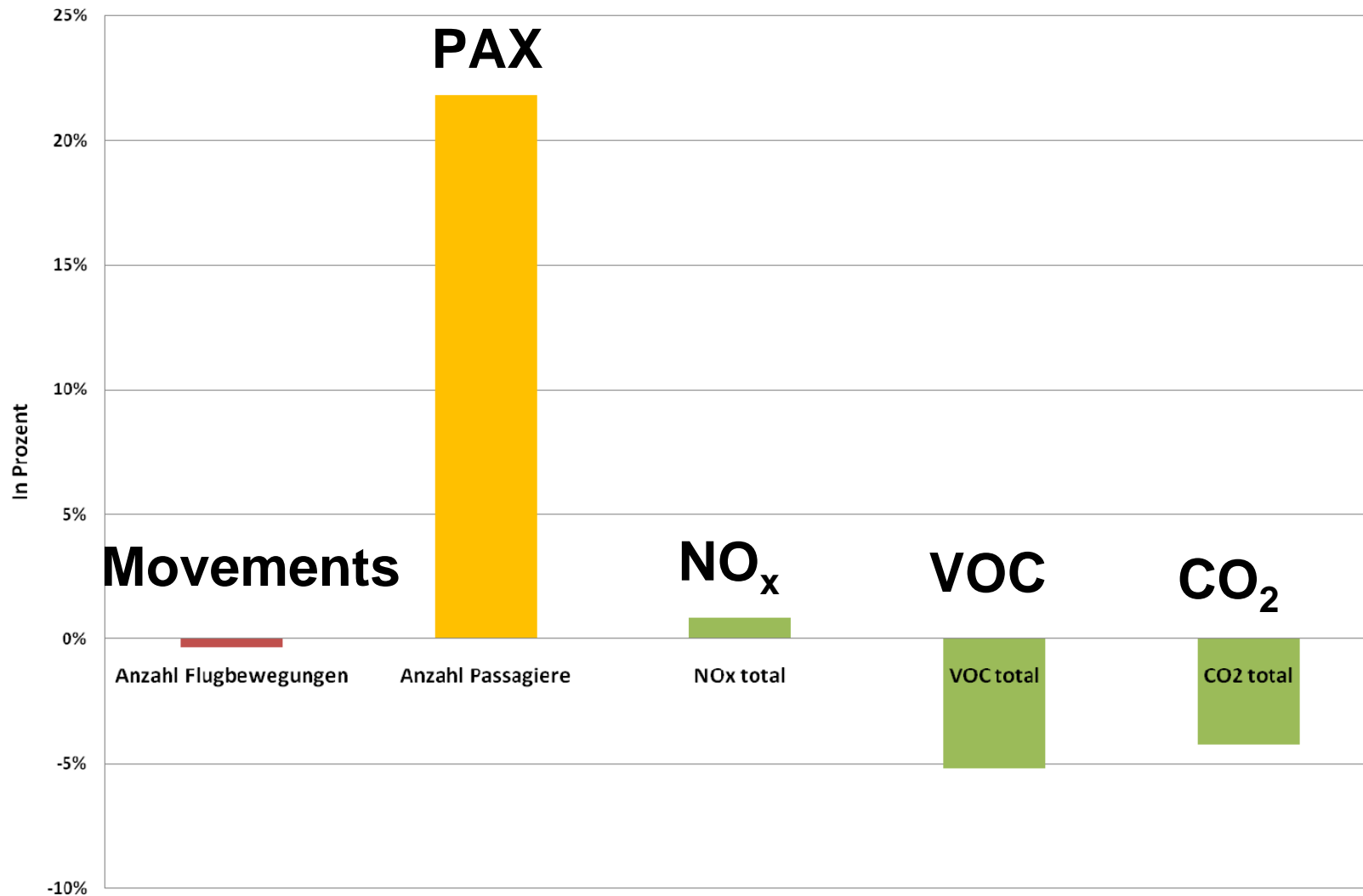
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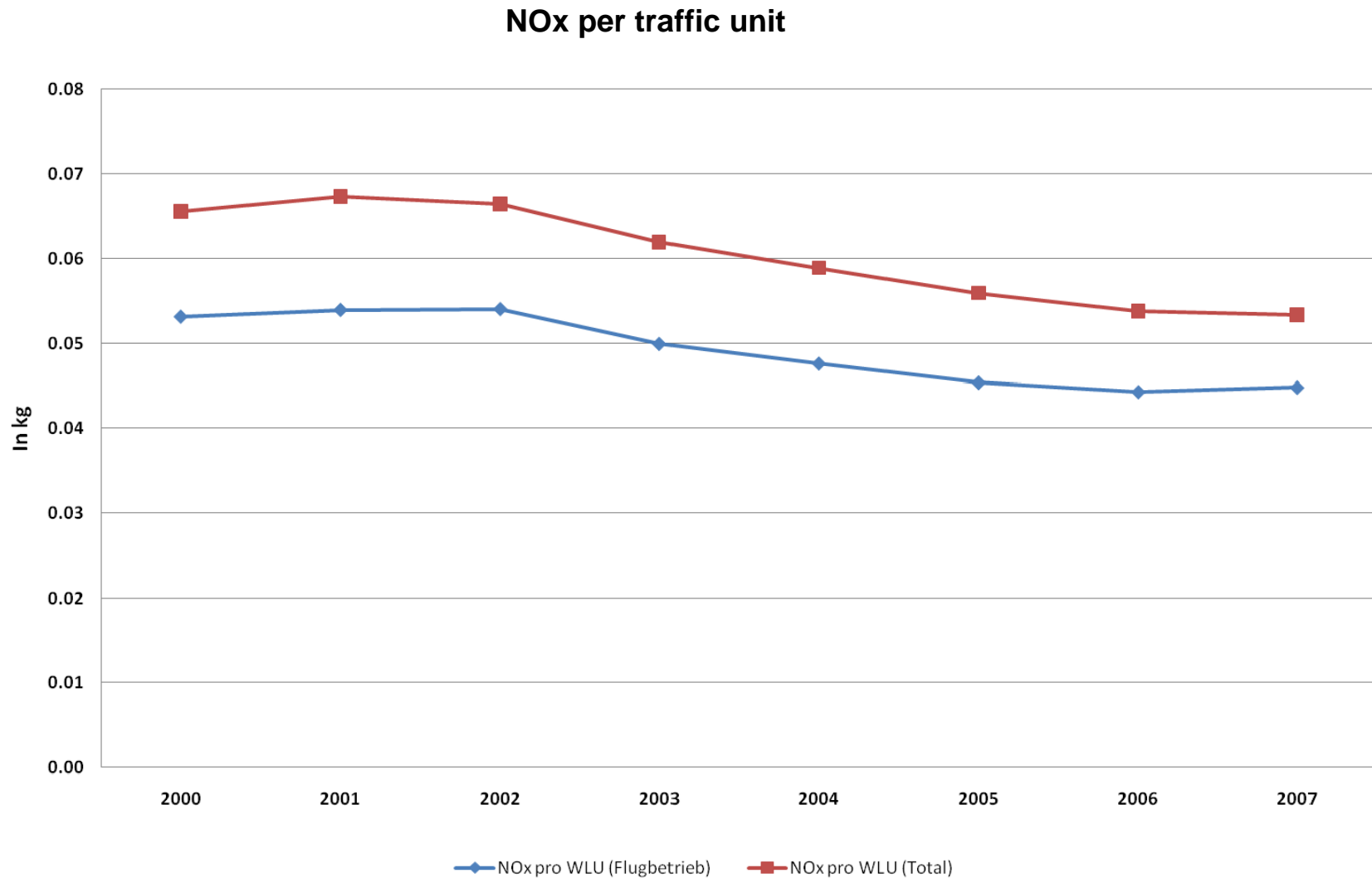
Development of air movements, passengers and Emissions from 2000 to 2007



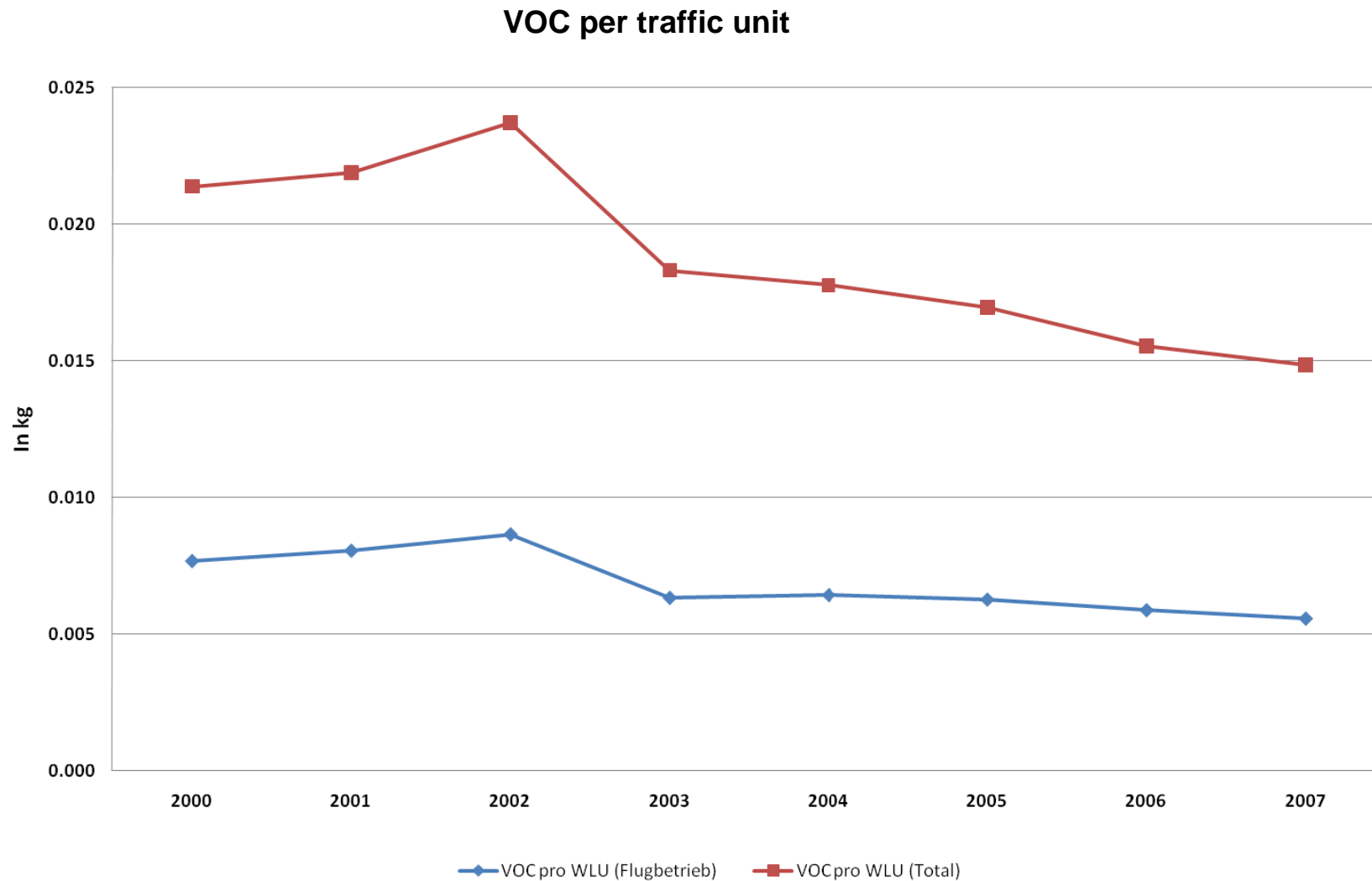
Development of air movements, passengers and Emissions from 2003 to 2007



Development of Nox per WLU 2000 – 2007

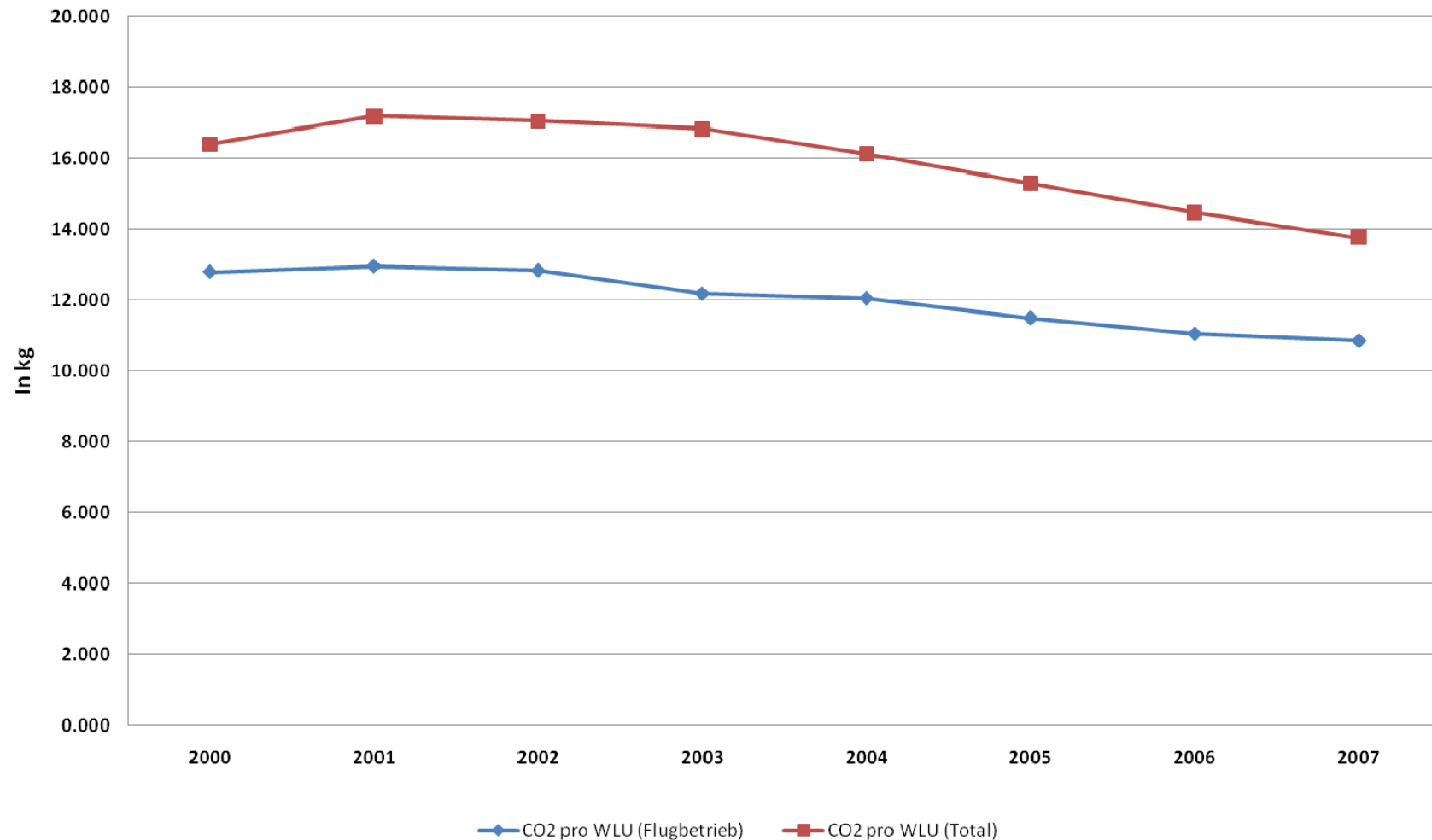


Development of VOC per WLU 2000 – 2007



Development of CO2 per WLU 2000 – 2007

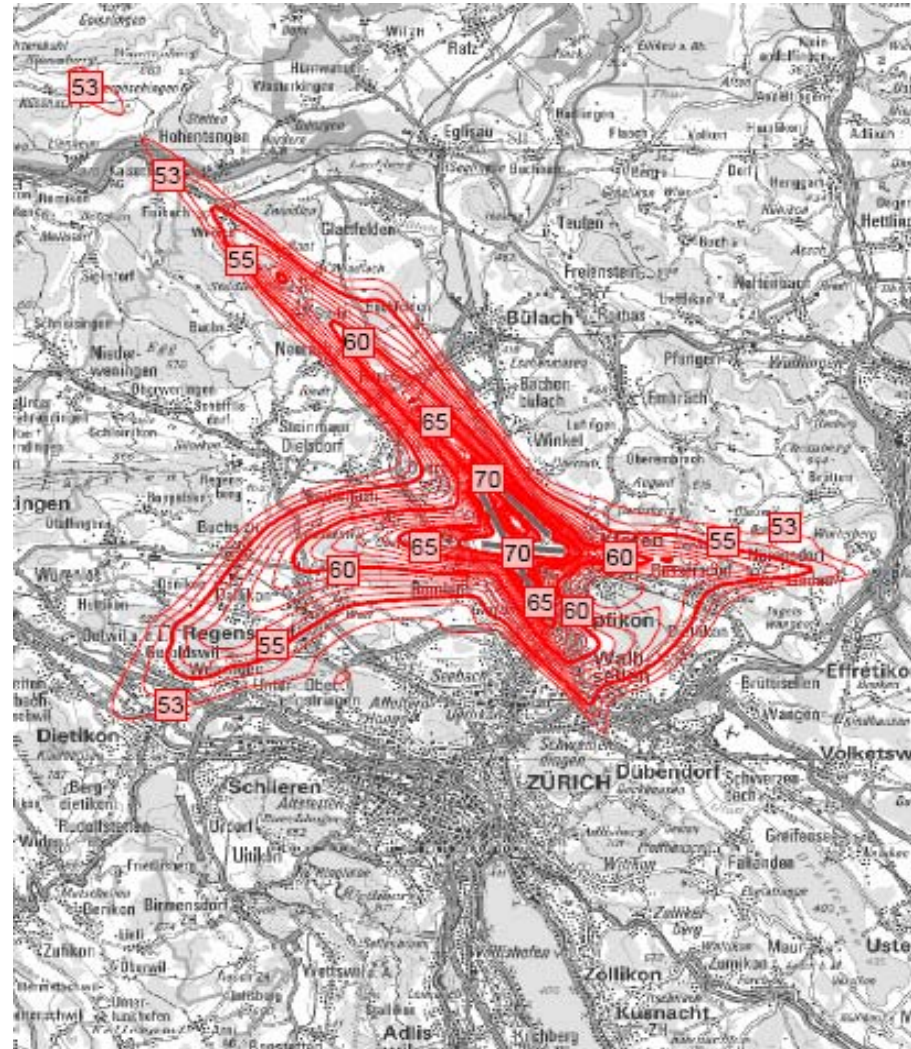
CO2 per traffic unit



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Noise from aviation around Zurich 2007



Quelle: EMPA 2007

Noise marginal costs of the three scenarios within the 55 dB noise curve

Scenario	Total persons inside 55 dB the curve	Change persons	Total noise costs (CHF)	Differential costs (CHF) marginal costs
Reduction	60'090	87.7%	99.1 Mio.	14,0 Mio.
Status quo	68'556	100.0%	113.1 Mio.	
Growth	78'705	114.8%	129.9 Mio.	16.7 Mio.



**Costs per dB per person during day time
(6 – 22 Uhr): CHF 30**

Source: Own calculation together with Unique

Noise marginal costs on the basis of the forecasted noise protection costs of Zurich Airport

Scenario	Total persons inside 55 dB the curve	Change persons	Noise marginal costs (760 Mio. / 25 years)
Reduction	9'409	82.4 %	25'049'600
Status quo	11'412	100 %	30'400'000
Growth	14'842	130.1 %	39'550'400

- Total costs for noise protection (Unique): CHF 760 Mio.
- Depreciation time: 25 years

Source: Own calculation together with Unique

Taking the whole flight into account (not only ZRH –up to 950 meters)

Average flight distance from Zurich:	3000 km per Pax
MyClimate value of 3000 km per leisure Pax:	CHF 20
MyClimate value of 3000 km per business Pax:	CHF 30
40% business Pax / 60% leisure Pax	

Scenario +15%:

Marginal leisure Pax:	1'866'520 Pax
Marginal business Pax:	1'244'347 Pax
Marginal costs for leisure Pax:	CHF 37'330'400
Marginal costs for business Pax:	CHF 37'330'410
Total marginal costs:	CHF 74'660'810

Scenario -10%:

Marginal leisure Pax:	1'244'347 Pax
Marginal business Pax:	829'564 Pax
Marginal costs for leisure Pax:	CHF 24'886'940
Marginal costs for business Pax:	CHF 24'886'920
Total marginal costs:	CHF 49'773'860

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Growth + 15 %

- 15 % more flight movements
- Travel time savings: 2.6 Mio. hours
- Economic and social benefit: CHF 190.6 Mio.
- Additional costs of gas emissions Zürich regional: CHF 13.3 – 18.1 Mio.
- Additional costs of gas emissions on entire route: CHF 74.7
- Additional noise emission costs Zürich regional: CHF 16.7 – 39.5 Mio.



**Benefit of growth depending on approach:
at least CHF 76.4 - 133 Mio.**



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Reduction -10 %

- 10 % less flight movements
- Additional travel time: 2.6 Mio. hours
- Economic and social costs: CHF 193.3 Mio.
- Decrease gas emission costs Zürich regional: CHF 7.4 – 10.0 Mio.
- Decrease gas emission costs on entire route: CHF 49.8 Mio.
- Decrease noise emission costs: CHF 14.0 – 25.0 Mio.

 **Loss through reduction depending on approach:
at least CHF 118.5 – 158.3 Mio.**

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Conclusions

- CO₂ emissions account for the largest part of the gas emissions.
- The increase of travel time costs with decreasing movements is larger than the decrease of emission costs.
- The gain of travel time with increasing movements is larger than the increase of gas emission costs.
- Noise costs are substantial but are financially covered.
- Substitution through other modes of traffic (train, road) is possible up to 3 hours but results in other emissions.
- With an increase of movements by 15 % air traffic is sustainable because ecologic marginal costs are lower than the economic marginal utility.