Long-term economical and ecological impact of the inclusion of international aviation into the EU CO_2 emissions trading scheme

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Agenda

- Political Background
- Recent Developments
- Modelling Approach
- Modelling Results
- Outlook
- Summary

Political Background

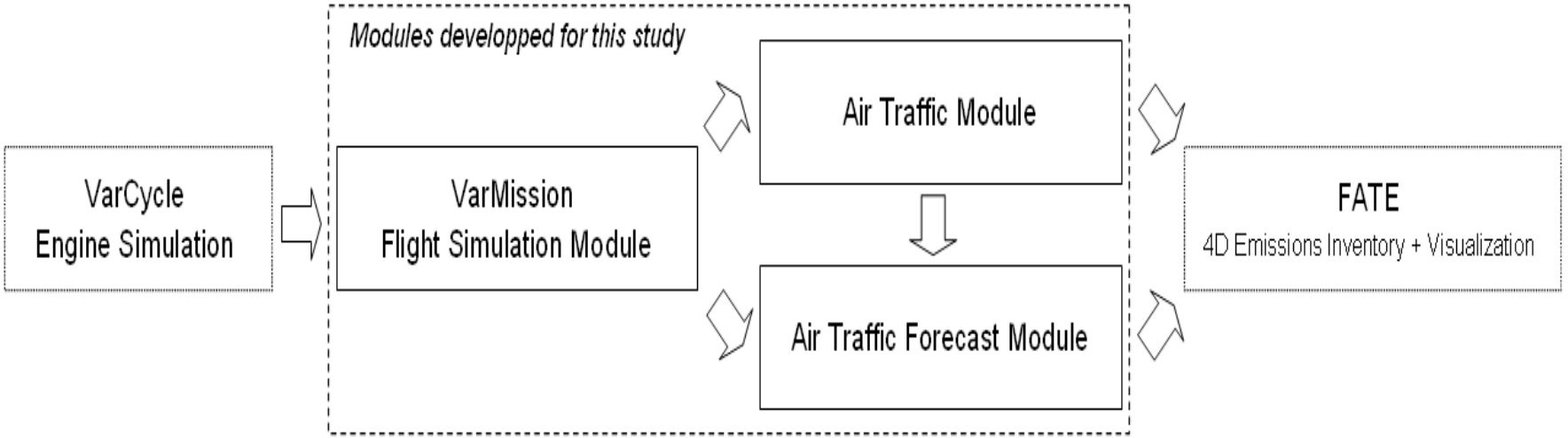
- Introduction of emissions trading scheme for all flights to/from airports in the European Union decided in 2009 (Directive 2008/101/EC)
- Emissions cap in 2012: 97% of historical emissions (2004-2006 average), cap from 2013 onwards 95% of historical emissions
- Compliance instruments: EUA, CER and ERU
- CER/ERU use capped at 15% in 2012 and 1.5% from 2013 onwards
- Exemption of carriers with less than two arrivals/departures per day in the EU, PSOs with less than 30,000 seats annually
- Potential exclusion of flights to/from countries having implemented “equivalent measures”

Recent Developments

- New CO_2 reduction target agreed upon by ICAO in 2009/2010: 2% fuel efficiency improvement until 2020 and an aspirational fuel efficiency improvement goal of 2% from 2021 to 2050
- Establishment of a process to develop market-based measures on ICAO level
- Outcome of the climate summit in Cancun (December 2010): Need for action to limit climate change is recognized, but no immediate action on state level taken
- Controversial reception of EU Directives: several non-EU ICAO contracting states believe that EU-ETS can only be introduced when mutually agreed upon
- Air Transport Association of America (ATA) and three US airlines sued the UK as administering member state
- UK court referred case to European Court of Justice
- Latest news of 6th October 2011 – advocate general takes the view that EU-ETS is compatible with international law

Modelling Approach

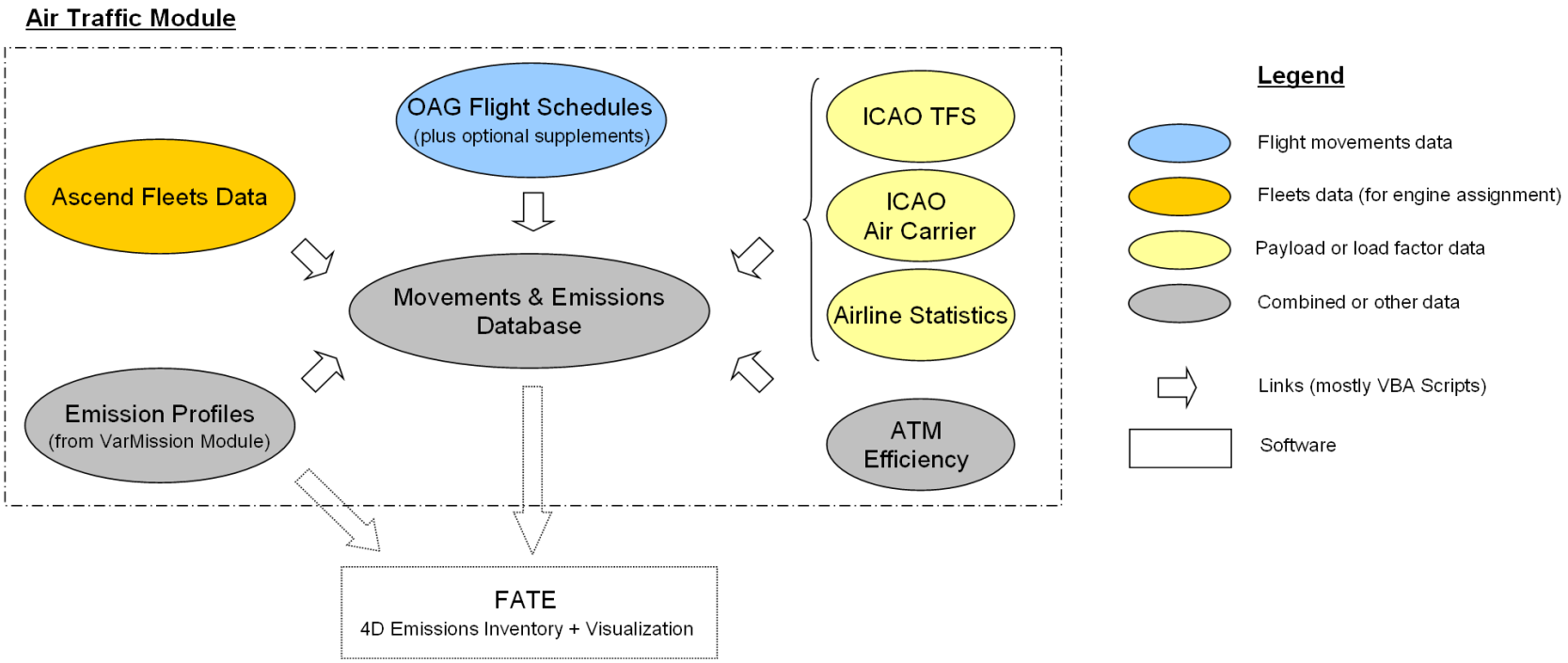
- Objective: estimation of long-term costs for the aviation industry
- Modelling system:



Source: Schaefer (2011).

Modelling Approach

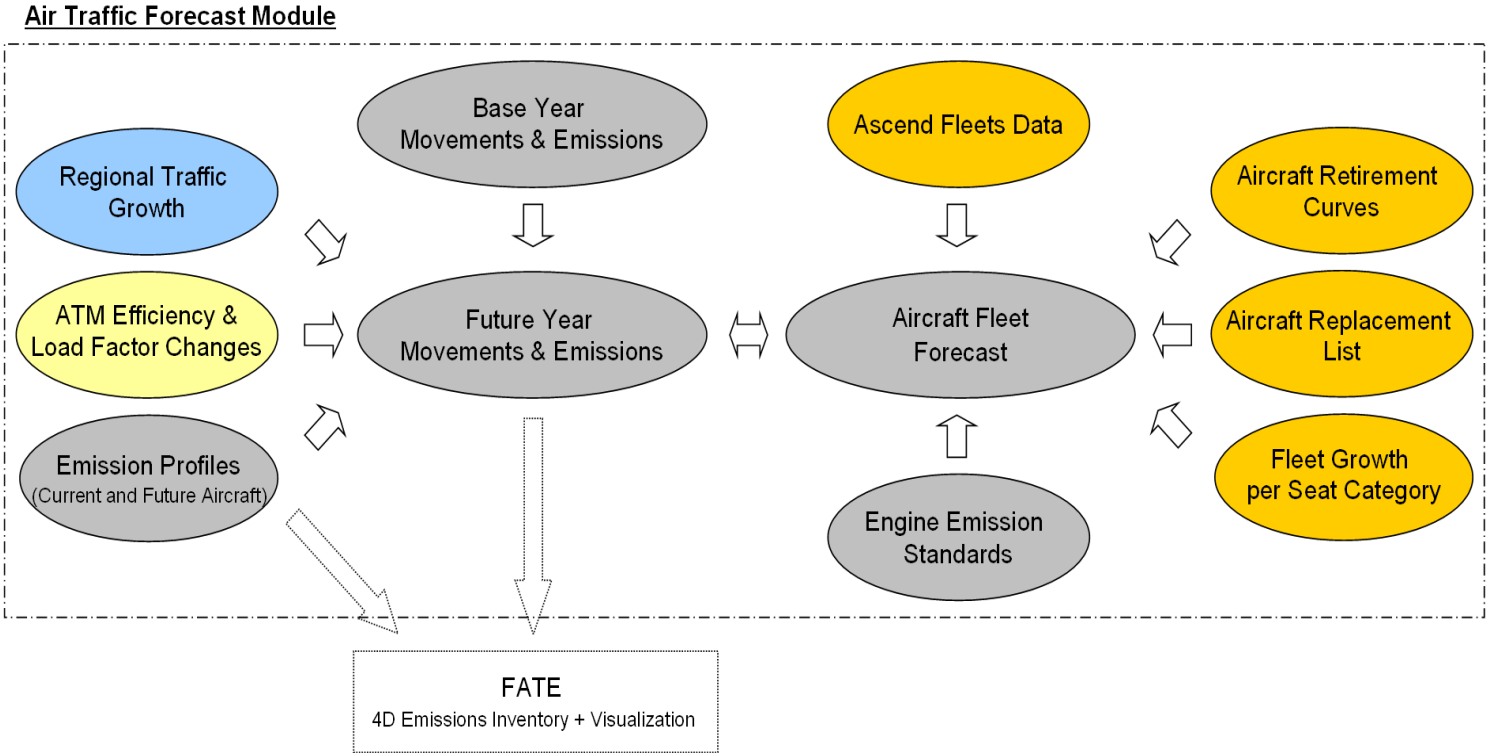
- Air traffic module as part of the modelling system



Source: Schaefer (2011).

Modelling Approach

- Air traffic forecast module as part of the modelling system



Source: Schaefer (2011).

Modelling Results

- Estimation of benchmark, needed allowances and costs for airlines requires modelling of revenue ton kilometers / CO_2 emissions from 2004 onwards

Year	RTK in billion (modelled)*	CO_2 emissions in million tonnes (modelled)
2004	178.1	170.1
2005	198.1	184.0
2006	209.0	191.7
2007	226.4	202.9
2008	229.8	208.6
2009	209.7	196.4
2010	227.9	204.4

Source: DLR model results. * assuming a passenger weight of 90 kg, according to ICAO (2009b).

Modelling Results

- Relatively high discrepancy between modelled historical emissions (181.9 million tons) and published value by the European Commission (219 million tons). Possible reasons?
  - Assumptions on ATM (in)efficiency?
  - Impact of weather conditions on trip fuel consumption?
  - APU fuel use?
  - Gaps in flight schedules?
  - Influence of lobbyists on EC?
- Good fit in the estimation of the benchmark (EC Decision: 0.679 kg CO_2 per RTK in 2012 / modelled value: 0.610 kg CO_2 per RTK
- More generous benchmark published by EC leads to the conclusion that relatively generous modelling parameters have been used (e.g. APU fuel)

Modelling Results

- Development of EU ETS key determinants in the timeframe 2012-2020, in million tons:

Year	CO_2 emissions	Allowances created for aviation	Free allocation of allowances*	Auctioned allowances	Allowances purchased from other sectors
2012	227.9	176.5	150.0	26.5	51.4
2013	240.4	172.8	146.9	25.9	67.6
2014	253.2	172.8	146.9	25.9	80.4
2015	262.9	172.8	146.9	25.9	90.1
2016	272.8	172.8	146.9	25.9	100.0
2017	282.8	172.8	146.9	25.9	110.0
2018	292.7	172.8	146.9	25.9	119.9
2019	302.9	172.8	146.9	25.9	130.1
2020	313.7	172.8	146.9	25.9	140.9

Source: DLR model results

In 2020, more than half of aviation emissions will have to be purchased

Modelling Results

- Cost of allowance purchase for airlines:
  - In 2012, between 1.6 and 3.2 billion € (20 or 40 € per allowance)
  - Cumulatively from 2012 to 2020: 22.5 - 45 billion €
- Auction revenues for EU Member States
  - In 2012, between 530 and 1060 million € (20 or 40 € per allowance)
  - Cumulatively from 2012 to 2020: 4.7 - 9.4 billion €
- Value of free allowances created for aviation (windfall profit?)
  - In 2012, between 3 and 6 billion € (20 or 40 € per allowance)
  - Cumulatively from 2012 to 2020: 26.5 - 53.0 billion €

Outlook

- IATA Resolution A37-19, Art. 15 (October 2010): Exemption of airlines from contracting states with a share of less than 1% in global RTKs from any market based measures:

  "*Commercial aircraft operators of States below the threshold should qualify for exemption for application of MBMs that are established on national, regional and global levels"*

- Potential consequences for airline competition and ecological effectiveness:
  - Only airlines from ~20 contracting states have a share in global aviation of >1%

    ⇨ Airlines from about 160 states would be exempted (~15-20% of global aviation emissions)
  - Airlines from de-minimis countries compete with airlines from non-de-minimis countries on route and city pair level

    ⇨ Level playing field? Carbon leakage?

Conclusions

- About one third of global aviation emissions will be subject to regulation, once EU-ETS will be introduced in its current legal form
- In the long run, effectively all airlines need to purchase allowances, with very few exceptions of some cargo airlines, which have lower specific emissions than the (artificial) benchmark value
- Total cost to the aviation system: 22.5 to 45 billion €
- Application of ICAO Resolution A37-19, Art. 15 on exemption of airlines from contracting states with a share of <1% in global aviation would create potentially severe distortions of market based measures (competition issues, carbon leakage)

Thank you very much
for your attention!

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Back-up – global shares of ASKs by departure country

Position	Country/Territory of Departure	ASK in billion	Share
1	USA	3177.3	26.6%
2	China	1118.3	9.4%
3	United Kingdom	579.8	4.9%
4	Japan	529.6	4.4%
5	Germany	393.2	3.3%
6	Brazil	366.9	3.1%
7	France	349.9	2.9%
8	Australia	334.5	2.8%
9	India	332.9	2.8%
10	Canada	332.4	2.8%
11	United Arab Emirates	290.2	2.4%
12	Spain	245.3	2.1%
13	Hong Kong (SAR) China	228.6	1.9%
14	Russian Federation	220.4	1.8%
15	Singapore	220.0	1.8%
16	Italy	203.6	1.7%
17	Thailand	197.8	1.7%
18	Indonesia	187.2	1.6%
19	Republic of Korea	177.2	1.5%
20	Netherlands	171.0	1.4%
21	Mexico	147.3	1.2%
22	Malaysia	139.9	1.2%
23-225	Other 203 Countries/Territories	1998.1	16.7%
1-225	Total	11941.4	100%

Source: OAG (2010) and DLR. *ASK= available seat kilometre. Data bases July 2010.*

Back-up – global shares of ASKs by airline nationality

Position	Airline nationality	ASK in billion	Share
1	USA	3264.8	23.4%
2	China	1061.9	7.6%
3	United Kingdom	583.6	4.2%
4	United Arab Emirates	475.3	3.4%
5	Japan	424.5	3.0%
6	Germany	402.4	2.9%
7	France	364.7	2.6%
8	Canada	345.1	2.5%
9	India	335.1	2.4%
10	Brazil	309.6	2.2%
11	Singapore	285.5	2.0%
12	Australia	283.3	2.0%
13	Republic of Korea	245.6	1.8%
14	Hong Kong (SAR) China	243.1	1.7%
15	Russian Federation	222.6	1.6%
16	Thailand	194.6	1.4%
17	Netherlands	189.9	1.4%
18	Indonesia	183.8	1.3%
19	Malaysia	181.0	1.3%
20	Republic of Ireland	171.6	1.2%
21	Spain	161.7	1.2%
22-179	Other 158 Countries/Territories	2011.7	14.4%
1-179	Total	11941.4	100%

Source: OAG (2010) and DLR. *ASK= available seat kilometre. Data bases July 2010.*