

## CIVIL AVIATION AND THE ENVIRONMENT

### NOISE

Aviation generates noise emissions too. However, the number of people exposed, in relation to other transport carriers, is rather low.

Exceeding the emission limit value pursuant to LSV:

Transport Carrier	Exposed population over IGW <sup>1)</sup>	
	Day	Night
Road	1'200'000	700'000
Railroad	70'000	140'000
Aviation	35'000	40'000

The noise-exposed area <sup>2)</sup> around Zurich Airport has decreased over the last 20 years by two thirds, despite an increase in flight movements. At the same time, the population in the affected areas increased by 83%.

### ENERGY / CO<sub>2</sub>

Around 2% of worldwide fossil energy consumption is assignable to civil air transport. This results in a share of about 2% of man-made CO<sub>2</sub> output. <sup>3)</sup> Air transport contributes with approximately 12% of worldwide CO<sub>2</sub> emissions within the entire transport industry. Considering transport carriers in Switzerland, around 20% of all consumed fuel is used for continental and intercontinental flights. <sup>4)</sup> During an intercontinental flight a modern airliner consumes within a range of 100 km around 3 litres of fuel per passenger carried.

### CLIMATE

According to the report „Aviation and the Worldwide Atmosphere“ of UNEP and WMO (IPCC 1999) <sup>5)</sup>, the worldwide air traffic contributes with 3.5% <sup>6)</sup> to the man-made greenhouse effect. With increasing air traffic that share could grow up to 5% by 2050. The state of scientific research on the impact of nitric oxides and water vapour arising from aircraft engines on the greenhouse effect still shows significant uncertainties. In the long-run the climatic influence will be dominated by the CO<sub>2</sub> emission. The latest scientific studies assume that based on an assessment period of 100 years these materials strengthen the greenhouse effect of CO<sub>2</sub> by the factor 1.35 <sup>7)</sup>. CO<sub>2</sub> emissions at cruise altitude have the same effect as ground-level emissions (e.g. road traffic, industry or heating). Approximately one third of the nitrogen oxide at cruising level originates from shipped ground-level emissions, from aircraft or has natural origins (thunderstorm).

<sup>1)</sup> IGW – imission limit value (aircraft noise: night-time > 50 dB(A) Leq)

<sup>2)</sup> 60 dB(A) Leq day-time noise (IGW ES II)

<sup>3)</sup> Metz, B., Davidson, O. R., Bosch, P., Dave, R., & Meyer, L. 2007. *Climate change 2007: Mitigation of climate change. Working group III contribution to the fourth assessment report of the IPCC*

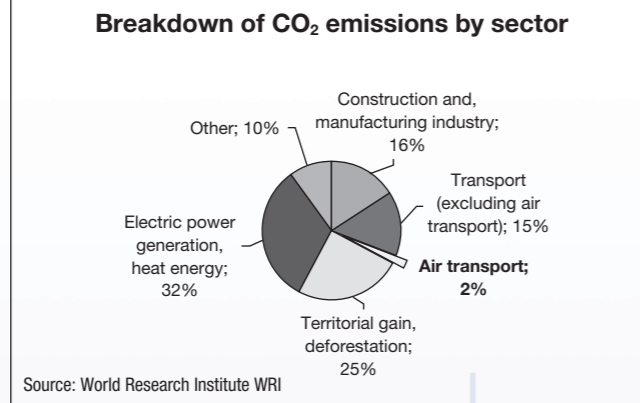
<sup>4)</sup> Overall energy statistics of the Federation

<sup>5)</sup> IPCC is the scientific body of UNEP (United Nations Environmental Program) and WMO (World Meteorological Organisation).

<sup>6)</sup> Besides the impact of CO<sub>2</sub>, further effects such as nitric oxides and condensation trails related to emissions released to date are included herein.

<sup>7)</sup> D.S. Lee et al. Transport impacts on atmosphere and climate/Aviation Atmospheric Environment 44 (2010) 4678–4734

## CIVIL AVIATION AND THE ENVIRONMENT



The global aviation industry is engaged to further mitigate greenhouse gas emissions.

This engagement is based on four pillars:

- **1<sup>st</sup> pillar: improved technology** (e.g. lower-emission engines, lighter aircraft equipment, alternative fuels from renewable resources)
- **2<sup>nd</sup> pillar: operational measures** (e.g. shorter and more direct air routes, fuel-saving start and landing procedures)
- **3<sup>rd</sup> pillar: more efficient infrastructure** (e.g. better use of airspace and airports)
- **4<sup>th</sup> pillar: economic measures** (e.g. voluntary CO<sub>2</sub>-offset, emission trading)

### EMISSION TRADING

In 2012, the EU introduced the Emission Trading System (ETS). Airlines must compensate a part of their CO<sub>2</sub> emissions by the acquisition of CO<sub>2</sub>-Emission Certificates. This requirement should have applied to all flights starting from or landing in an EU-country, thereby including non-European airlines too. On account of international opposition against the extra-territorial legal effect of the EU ETS and a framework agreement at level of the international civil aviation organisation ICAO, the EU announced in spring 2014 that EU ETS should only be applicable on inner-European flights for the time being.

The aviation industry postulates the introduction of global market-based measures in terms of the reduced CO<sub>2</sub> emissions at ICAO level. Regional measures like the EU ETS are rejected by the aviation industry. These may lead to distortions of competition and induced diversionary traffic via hubs outside Europe.

## AEROSUISSE

### LIST OF ITS 140 MEMBERS (as at 30<sup>th</sup> April 2015)

Aero-Club of Switzerland, Lucerne  
Aero Insurance Service AG, Zurich-Airport  
Aerolite Max Bucher AG, Ennetbürgen  
Aéroport de Neuchâtel SA, Colombier  
Aéroport de Sion, Sion  
Aéroport Régional Les Eplatures SA, La Chaux-de-Fonds  
AFS all-financial-solutions gmbh, Lupfig  
Aircraft Service Grenchen, Grenchen  
Air-Espace Sàrl, Colombier  
Airline Assistance Switzerland AG, Zurich-Airport  
Airport Altenrhein AG, Altenrhein  
Airport Buochs AG, Stans  
Air Service Basel GmbH, Basel-Airport  
Albinati Aeronautics, SA, Geneva-Airport  
Alp-Air Bern, Belp  
Alpine Air Support GmbH, Brütten  
Amac Aerospace Switzerland AG, Basel  
AOPA Switzerland, Zurich  
AutoGyro AG, Zurich-Airport  
Avex Aviation Experts AG, Wallisellen  
Aviasuisse, Zurich  
Aviation Experts Group, Eglisau  
Aviation Media AG, Teufen  
AviSwiss GmbH, Zollikon  
Belair Airlines AG, Glattbrugg  
Breitling SA, Grenchen  
BTEE SA Environnement & Sécurité/ AIRTRACE, Geneva  
Caminada & Partner AG, Zug  
Cargologic AG, Zurich-Airport  
Cat Aviation AG, Zurich-Airport  
Cessna Zurich Citation Service Center, Zurich-Airport  
CGS Corporate Group Service AG, Zurich-Airport  
Clemessy Switzerland AG, Basel  
Clin d'Ailes, Musée de l'Aviation Militaire, Payerne  
COREB Communauté régionale de la Broye, Payerne  
Custodio AG, Zurich-Airport  
Darwin Airline SA, Lugano

Dasnair SA, Geneva-Airport  
ddPConcepts GmbH, Ennetbürgen  
Dnata Switzerland AG, Kloten  
Dufry International AG, Basel  
Easyjet Switzerland SA, Geneva-Airport  
E-Aviation Swiss Sagl, Agno  
Ecole de parachutisme de Château d'Oex, Le Vaud  
EFOS Flight Charter AG, Kloten  
Engadin Airport AG, Samedan  
Ermini AG, Zurich  
EuroAirport Basel-Mulhouse-Freiburg, Basel-Airport  
European Business Aviation Association EBAA (Switzerland), Zollikon  
ExecuJet Europe AG, Zurich-Airport  
Fliegerschule Birrfeld AG, Birr-Lupfig  
FLUBAG Flugbetriebs AG, Neudorf  
Flughafen Bern AG, Belp  
Flughafen Zürich AG, Zurich-Airport  
Flugschule Basel AG, Basel-Airport  
Flugschule Eichenberger AG, Buttwil  
Franke Industrie AG, Aarburg  
Gate Gourmet Switzerland GmbH, Zurich-Airport  
General Aviation Genossenschaft Basel, Basel-Airport  
Genève Aéroport, Geneva-Airport  
Glausen u. Partner AG, Thun  
Global Aerospace Underwriting Managers Ltd., Zurich  
Great Circle Services AG, Horw  
groWING of Switzerland GmbH, Hünenberg  
Helvetic Airways AG, Zurich-Airport  
HLF Aviation, Kloten  
Holly Ballon AG, Bremgarten  
Horizon Swiss Flight Academy Ltd., Kloten  
Howald Kurt, Honory member, Muri b.bern  
Huber + Suhner AG, Pfäffikon  
IG AirCargo, Zurich-Airport  
IG Berner Luftverkehr, Bern  
IG Flughafen Zürich, Zurich-Airport

## AEROSUISSE

IG Luftverkehr Vereinigung  
Pro EuroAirport, Basel  
ISS Aviation AG, Zurich-Airport  
Japat AG / Novartis International AG, Basel  
Jet Aviation Management AG, Zurich-Airport  
Jordi AG – Das Medienhaus, Belp  
Ju-Air, Dübendorf  
Kessler Consulting & Co. AG., Zurich  
Lantal Textiles, Langenthal  
Legendair Ltd., Reinach  
Lightwing Aircraft AG, Stans  
Lions Air AG, Zurich-Airport  
Lugano Airport, Agno  
Malbuwit AG, Belp  
Marengo Swisshelicopter AG, Niederurnen  
Mecaplex AG, Grenchen  
MEGGITT SA, Freiburg  
Meyer Avocats, Geneva  
Moreillon Dr. Pierre, Honory President, Lausanne  
Motorfluggruppe Thurgau, Lommis  
Motorflug-Veteranen des AeCS, Grandcour  
The Nuance Group AG, Glattbrugg  
Pilatus Flugzeugwerke AG, Stans  
Pratt&Whitney Aero Engines International GmbH, Lucerne  
Premium Jet AG, Zurich  
Priora Services AG, Zurich-Airport  
Proventavia LLC, Gross  
Rabbit-Air, Bachenbülach  
Rega Schweiz. Rettungsflugwacht, Zurich-Airport  
Regionalflygplatz Jura-Grenchen AG, Grenchen  
Revue Thommen AG, Waldenburg  
RUAG Schweiz AG, RUAG Aviation, Emmen  
Schweiz. Gletscherpiloten-Vereinigung SGPV, Hergiswil  
Sirius AG, Zurich-Airport  
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Sky Jet AG, Zurich-Airport

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### SOURCES

– Aero-Club der Schweiz, Lucerne  
– ATAG, Geneva  
– BAZL Bundesamt für Zivilluftfahrt, Bern  
– BFS Bundesamt für Statistik, Neuchâtel  
– BAUF Bundesamt für Umwelt, Bern  
– Deutsche Forschungsanstalt für Luft- und Raumfahrt, Oberpfaffenhofen (D)  
– Flughafen Zürich AG, Zurich-Airport  
– IATA International Air Transport Association, Geneva  
– IDT Institut für öffentliche Dienstleistungen und Tourismus, St.Gallen  
– INFRAS, Zurich

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– Luftfahrtpolitischer Bericht des Bundesrates vom 10. Dezember 2004  
– Rega Schweizerische Rettungsflugwacht, Zurich  
– RUAG Schweiz AG, RUAG Space, Zurich  
– Schweizerischer Hängegleiter-Verband, Zurich  
– Schweiz Tourismus, Zurich  
– SIAA Swiss International Airports Association, Zurich  
– skyguide, swiss air navigation services ltd., Geneva  
– Swiss International Air Lines AG, Basel  
– Verband öffentlicher Verkehr, Bern

# AEROSUISSE

## VADEMECUM 2015

English Version

## SWISS CIVIL AVIATION IS OF OUTSTANDING IMPORTANCE FOR THE NATIONAL ECONOMY <sup>1)</sup>



VALUE ADDED AND LABOUR FORCE OF CIVIL AVIATION 2008 <sup>2)</sup>

Effects <sup>3)</sup>	Value Added <sup>4)</sup> in billion CHF	GDP <sup>4)</sup> %	Occupation FTE <sup>5)</sup>
Direct	7.0		35'600
Indirect	2.7		16'800
<b>Economic significance in a narrower sense</b>	<b>9.7</b>	<b>1.8</b>	<b>52'400</b>
Induced	11.6		71'200
Passenger-driven catalysis	9.0		55'300
<b>Economic significance in a broader sense</b>	<b>20.6</b>	<b>3.8</b>	<b>126'500</b>
<b>Sum of all effects <sup>6)</sup></b>	<b>30.3</b>	<b>5.6</b>	<b>178'900</b>

BREAKDOWN OF DIRECT EMPLOYMENT EFFECTS 2008 <sup>2)</sup>

	No. of employees
Zurich	20'100
Geneva	7'700
Basel	5'900
Bern	290
St. Gallen-Altenrhein	150
Lugano	260
Sion	150
<b>Airports with airline movements <sup>6)</sup></b>	<b>34'550</b>
Regional airports without airline traffic	340
Airfields and miscellaneous (flying schools etc.)	550
Heliports	110
<b>Airports without airline movements <sup>6)</sup></b>	<b>1'000</b>
<b>Aviation industry (maintenance, fitting, sub-components)</b>	<b>12'900</b>
Operation of a short-/medium-haul aircraft	40 – 120
Operation of a long-haul aircraft	210
Per million flight passengers <sup>7)</sup>	750 – 2'000

<sup>1)</sup> Aviation Policy Report of Federal Council, 2004

<sup>2)</sup> Economic significance of aviation in Switzerland, 1 June 2011, INFRAS

<sup>3)</sup> The sum of direct and indirect effect corresponds to the (causally narrow) economic significance of aviation in Switzerland (incl. exports of aviation industry). The induced and passenger-driven catalytic effect illustrates, which further, causally less narrow, economic linkages aviation exhibits with the rest of the economy.

<sup>4)</sup> Incl. exports of aviation industry

<sup>5)</sup> Full Time Equivalents

<sup>6)</sup> Including aviation industry

<sup>7)</sup> Direct and indirect effects

## CIVIL AVIATION IN THE PUBLIC INTEREST



The state government specifically highlights in its Aviation Policy Report of the Federal Council dated 10 December 2004 the outstanding economic importance of aviation and air transport connections from Switzerland to key destinations in Europe and overseas.

The airline traffic is explicitly recognised as part of the public transport.

On a value basis, one third of all exports is processed by air freight.

Each third foreign tourist approaches Switzerland by air.

Per capita basis, Switzerland is one of the countries with the most condensed air navigation demand in the world.

THE CONFEDERATION'S CIVIL AVIATION EXPENDITURES IN COMPARISON (CHFM)

	2013	2014
Total expenditures federal government	63'700	64'000
whereof transport	8'224	8'429
whereof aviation <sup>1)</sup>	156	155

The confederation's expenditures in favour of civil aviation are with 0.24% in 2013 and 2014 in relation to the overall expenditures extremely modest.

Neither the infrastructure nor aircraft operations are subsidised.

AIR TRAFFIC CONTROL

Skyguide, the Swiss incorporated limited company for civil and military air traffic control, coordinates and directs the air traffic of Switzerland and parts of neighbouring airspace. Skyguide is an enterprising and customer oriented private limited company owned by the federal government.

Its running costs are covered by route and landing charges as well as statutory contributions of the federal government.

	2012	2013	2014
Revenue in CHFM	440	438	449
Employees (Full Time Equivalents)	1'376	1'391	1'397

Airports where Skyguide is in charge: Alpnach, Bern, Buochs, Dubendorf, Emmen, Geneva, Grenchen, Locarno, Lugano, Meiringen, Payerne, Sion, St. Gallen-Altenrhein und Zurich. On the regional airport Les Éplatures the local air navigation service is delegated to the airport operator.

<sup>1)</sup> Expenditures for international organisations of civil aviation, certain security tasks, supervision (FOCA), education, aircraft procurement, payments to Skyguide, contributions of mineral oil tax money

## FIGURES ON SWISS CIVIL AVIATION



	2012	2013	2014
FLIGHT PASSENGERS (on SIAA airports) <sup>1)</sup>			
Zurich	24'802'400	24'865'138	25'477'622
Geneva	13'899'422	14'436'149	15'152'915
Basel	5'354'284	5'880'858	6'523'874
Bern	271'111	260'555	192'846
Lugano	177'415	151'629	145'521
St. Gallen-Altenrhein	120'000	97'265	94'070
<b>Total</b>	<b>44'625'022</b>	<b>45'691'594</b>	<b>47'586'848</b>

FLIGHT MOVEMENTS (on national and regional airports)

Zurich	270'027	262'227	264'970
Geneva	192'944	188'768	187'596
Basel	87'356	87'322	89'474
Grenchen	79'260	73'331	74'075
Birrfeld	68'963	70'223	69'378
Bern	59'669	54'666	54'356
Lausanne-Blécherette	33'013	40'378	46'112
Sion	41'276	38'204	39'941
St. Gallen-Altenrhein	30'000	29'304	29'731
Lugano	21'672	20'242	20'263
Écuwillens	15'011	18'392	15'391
Samedan	14'855	15'795	14'284
Les Éplatures	11'836	11'082	11'943
Bressaucourt	9'115	7'695	8'311
<b>Total</b>	<b>934'993</b>	<b>917'629</b>	<b>925'825</b>

Transit flights within the Swiss airspace	690'253	672'165	684'372
Destination / countries <sup>2)</sup>	178/54	180/55	185/56
Airlift Rega by helicopter	10'250	10'205	10'802
Airlift Rega by jet aircraft	1'215	1'148	1'170
Freight and post (t)	401'869	403'249	410'633

<sup>1)</sup> SIAA Swiss International Airports Association

<sup>2)</sup> operated by Swiss domiciled airlines

## FIGURES ON SWISS CIVIL AVIATION



	2012	2013	2014
AIRPORTS			
National airports	3	3	3
Regional airports	11	11	11
Airfields	48	48	48
Heliports	24	24	24
COMPANIES			
Airline operators	8	8	8
Commercial operators (non-airline)	70	70	67
Maintenance and repair shops	89	91	85
Flight schools	142	142	138
Hang-gliding schools with SHV label	63	67	67
other hang-gliding schools	56	57	57
Parachute schools	14	14	14
Manufacturers	16	18	19

DEVELOPMENT OF THE AIRCRAFT PORTFOLIO

Airplanes (fixed wing)	1'922	1'924	1'880
Helicopter (rotor wing)	326	312	321
Engine-powered gliders	255	255	258
Gliders	767	745	720
Hang-gliders	14'957	15'386	15'452
Balloons	377	373	366
Airships	10	11	11

SWISS TRAFFIC NETWORK

	2014
Line network of Swiss-domiciled airlines	444'813 km
Roadways (in Switzerland)	71'528 km
Railways (in Switzerland)	5'239 km

EXPOSED TERRAIN

	Area	Area per capita
Land area of Switzerland	41'285 km <sup>2</sup>	5'034 m <sup>2</sup>
Airports <sup>1)</sup>	30 km <sup>2</sup>	3.65 m <sup>2</sup>
Sealed land area in respect of:		
Roadways	741 km <sup>2</sup>	90.36 m <sup>2</sup>
Railways	95 km <sup>2</sup>	11.58 m <sup>2</sup>
Airports <sup>1)</sup>	8 km <sup>2</sup>	0.97 m <sup>2</sup>

<sup>1)</sup> National and regional airports

## FIGURES OF SWISS CIVIL AVIATION



TRAINING CENTRES IN SWITZERLAND

Airfields across the entire country offer various opportunities getting trained in aviation activities and practice aviation sports. This task is provided by 138 flight training schools, 124 hang-gliding flight schools and more than 400 clubs.

Many dynamic companies offering qualified employment and access to several vocational training are located at domestic airfields.

LICENCES

	2012	2013	2014
Private Pilot	5'604	5'146	4'904
Commercial Pilot	1'136	1'133	1'107
Airline Transport Pilot	2'362	2'470	2'478
Multi-Crew Pilot License (MPL/A)	84	69	94
Helicopter Pilot	1'003	976	1'025
Glider Pilot	2'116	1'832	1'729
Balloonist	334	303	278
Hang-Glider	35'018	35'900	36'700
Parachutist	1'572	1'600	1'590
Recognition of foreign permits	25	11	15
On-Board Engineer	1	1	3
On-Board Radio Operator	4	2	4
Aircraft Maintenance Mechanic	3'025	2'950	2'991

## Swiss Space Industry



As a founding member of ESA (European Space Agency), Switzerland has been able to contribute to the European space activities from the very beginning. Therefore the Swiss space industry is an important partner in many European space projects. Not less than eleven companies from Switzerland participated for example in the Rosetta mission during which, eleven years after its launch, the lander Philae was deployed on the surface of comet Churyumov-Gerasimenko.

Today, Switzerland is participating with about CHF 165 million per year on the budget of ESA. The emphasis of the Swiss space industry lies on the development and manufacturing of subsystems that become applicable in space. The range of products is broad and extends from payload fairings and structures to optical, mechanical and electronic components as well as scientific instruments and ground equipment.

Thanks their extensive expertise and technologies, Swiss aerospace companies are meanwhile also successful in commercial space projects outside from European markets too. Swiss made Carbon fibre structures for instance are not only used on European launchers such as Ariane 5 and Vega, the American missile manufactures United Launch Alliance is increasingly relying on these structures too. Even products for satellites like mechanisms, atomic clocks and other instruments are demanded from non-European markets.

In the aggregate, the Swiss space companies achieve an annual turnover of ca. CHF 270 million. Among the over 900 people being employed in space-related companies, the majority has above-average qualifications. Around the half of all in space employed manpower has a university degree.