

## 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. 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>3)</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>4)</sup>, the worldwide air traffic contributes with 3.5%<sup>5)</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>6)</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)

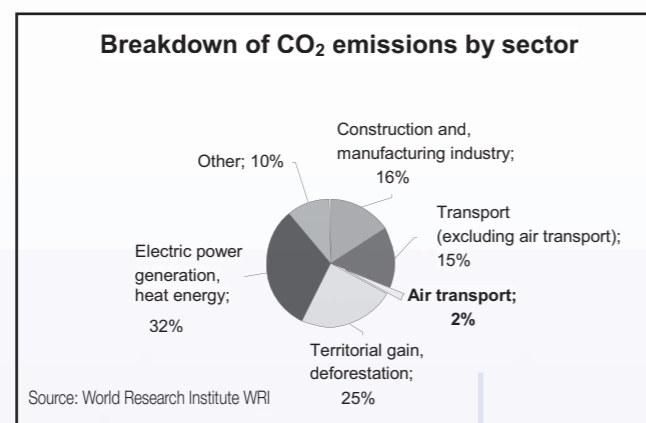
<sup>3)</sup> Overall energy statistics of the Federation

<sup>4)</sup> IPCC is the scientific body of UNEP (United Nations Environmental Program) and WMO (World Meteorological Organisation)

<sup>5)</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>6)</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)

### EMMISSION 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 135 MEMBERS (as at 30<sup>th</sup> April 2014)

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  
 A + I aviation insurance, Glarus u. Partner AG, Thun  
 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  
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 ALPAR Flug- und Flugplatzges. AG, Belp  
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 Aviasuisse, Zurich  
 Aviation Experts Group, Eglisau  
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 Breitling SA, Grenchen  
 BTEE SA Environnement & Sécurité/AIRTRACE, Geneva  
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 Cargologic AG, Zurich-Airport  
 Cat Aviation AG, Zurich-Airport  
 Cessna Zurich Citation Service Center, Zurich-Airport  
 CGS Corporate Group Service AG, Zurich-Airport  
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COREB Communauté régionale de la Broye, Payerne  
 Custodio AG, Zurich-Airport  
 Darwin Airline SA, Lugano  
 Dasnair SA, Geneva-Airport  
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 Dufry International AG, Basel  
 Easyjet Switzerland SA, Geneva-Airport  
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 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  
 Flegerschule Birrfeld AG, Birr-Lupfig  
 FLUBAG Flugbetriebs AG, Neudorf  
 Flughafen Zürich AG, Zurich-Airport  
 Flugschule Basel, 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  
 Global Aerospace Underwriting Managers Ltd., Zurich  
 Great Circle Services AG, Horw  
 groWING of Switzerland GmbH, Hünenberg  
 H. Bodmer & Co. AG, Zurich  
 Helvetic Airways AG, Zurich-Airport  
 HLF Aviation, Kloten  
 Holly Ballon AG, Bremgarten  
 Horizon Swiss Flight Academy Ltd., Kloten  
 Howald Kurt, Honorary member, Muri b.Bern  
 Huber + Suhner AG, Pfäffikon

## AEROSUISSE

IG AirCargo, Zurich-Airport  
 IG Berner Luftverkehr, Bern  
 IG Flughafen Zürich, Zurich-Airport  
 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  
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 Lantal Textiles, Langenthal  
 Legendair Ltd., Reinach  
 Lightwing Aircraft AG, Stans  
 Lions Air AG, Zurich-Airport  
 Lugano Airport, Agno  
 Marengo Swisshelicopter AG, Niederurnen  
 Mathys Aviation Ltd., Grenchen  
 Mecaplex AG, Grenchen  
 MEGGITT SA, Freiburg  
 Meyer Avocats, Geneva  
 Moreillon Dr. Pierre, Honory President, Lausanne  
 Motorfluggruppe Thurgau, Lommis  
 Motorflug-Veteranen des AeCS, Corcelles-près-Payerne  
 The Nuance Group AG, Glattbrugg  
 Pilatus Flugzeugwerke AG, Stans  
 Premium Jet AG, Zurich  
 Piora Facility Management AG, Zurich-Airport  
 Proventavia LLC, Gross  
 Rabbit-Air, Bachenbülach  
 Rega Schweiz. Rettungsflugwacht, Zurich-Airport  
 Regionalflugplatz Jura-Grenchen AG, Grenchen  
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 RUAG Schweiz AG, RUAG Aviation, Emmen

Schweiz. Gletscherpiloten-Vereinigung SGPV, Naters  
 Sirius AG, Zurich-Airport  
 skyguide, swiss air navigation services ltd., Geneva  
 Sky Jet AG, Zurich-Airport  
 Sky Work Airlines AG, Belp  
 Slot Coordination Switzerland, Zurich-Airport  
 SPAS Seaplane Pilots Association Switzerland, Lutry  
 SR Technics Switzerland, Zurich-Airport  
 SSIG Swiss Space Industries Group, Zurich  
 Super Constellation Flyers Association, Basel  
 Swiss Aerodromes, Bern  
 Swiss Aerospace Cluster, Greppen  
 Swiss Aircraft Maintenance Association SAMA, Basel  
 Swiss ASD, Sursee  
 Swiss Association of Aeronautical Sciences, Emmen  
 Swiss Hanggliding & Paragliding Association SHPA, Zurich  
 Swiss International Air Lines AG, Basel  
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 Swiss Museum of Transport, Lucerne  
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 Zürich Versicherungs-Gesellschaft, Zurich

## AEROSUISSE

Established in 1968, AEROSUISSE as umbrella association aims to maintain the interests of the Swiss civil aerospace sector and to ensure its means of existence. It takes influence on the formation of the legal framework in the domain of aviation and space. Today, AEROSUISSE represents about 140 companies and organisations including scheduled and charter airlines, international and regional airports, airfields, fixed base operators, air traffic control, maintenance shops, aircraft and subcomponents manufacturers, companies within the space industry, flight training schools as well as all influential aviation associations and other companies being related to aerospace in a broader sense.

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### SOURCES

- Aero-Club der Schweiz, Lucerne
- ATAG, Geneva
- BAZL Bundesamt für Zivilluftfahrt, Bern
- BFS Bundesamt für Statistik, Neuchâtel
- BAFU 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
- 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 2014

**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
Lugano	260
St. Gallen-Altenrhein	150
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)

	2012	2013
Total expenditures federal government	61,736	63,700
whereof transport	8,130	8,224
whereof aviation <sup>1)</sup>	160	156

The confederation's expenditures in favour of civil aviation are with 0.26% in 2012 and with 0.24% in 2013 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.

	2011	2012	2013
Revenue in CHFM	427	440	438
Employees (Full Time Equivalents)	1,330	1,376	1,391

Airports where skyguide is in charge: Alpnach, Bern, Buochs, Dubendorf, Emmen, Geneva, Grenchen, Locarno, Lugano, Meiringen, Payerne, Sion, St. Gallen-Altenrhein and 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**



	2011	2012	2013
FLIGHT PASSENGERS (on SIAA airports) <sup>1)</sup>			
Zurich	24,337,954	24,802,400	24,865,138
Geneva	13,130,222	13,899,422	14,436,149
Basel	5,053,643	5,354,284	5,880,771
Bern	184,339	271,111	260,555
Lugano	175,348	177,415	151,629
St. Gallen-Altenrhein	108,000	120,000	97,265
<b>Total</b>	<b>42,989,506</b>	<b>44,625,022</b>	<b>45,691,507</b>

FLIGHT MOVEMENTS (on national and regional airports)

Zurich	279,001	270,027	262,227
Geneva	189,121	192,944	188,768
Basel	87,583	87,356	87,319
Grenchen	76,211	79,260	73,331
Birrfeld	76,254	68,963	70,223
Bern	61,507	59,669	54,666
Lausanne-Blécherette	38,878	33,013	40,378
Sion	44,036	41,276	38,204
St. Gallen-Altenrhein	28,753	30,000	29,304
Lugano	24,392	21,672	20,242
Écuvillens	18,177	15,011	18,392
Samedan	18,732	14,855	15,795
Les Éplatures	15,407	11,836	11,082
Bressaucourt	5,225	9,115	7,695
<b>Total</b>	<b>963,277</b>	<b>934,993</b>	<b>917,626</b>

Transit flights within the Swiss airspace	712,830	690,253	672,165
Destination / countries <sup>2)</sup>	175/53	178/54	180/55
Airlift Rega by helicopter	10,797	10,250	10,205
Airlift Rega by jet aircraft	1,052	1,215	1,148
Freight and post (t)	394,423	401,869	403,249

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

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

**FIGURES ON SWISS CIVIL AVIATION**



	2011	2012	2013
AIRPORTS			
National airports	3	3	3
Regional airports	11	11	11
Airfields	45	48	48
Heliports	23	24	24
COMPANIES			
Airline operators	8	8	8
Commercial operators (non-airline)	77	70	70
Maintenance and repair shops	90	89	91
Flight schools	137	142	142
Hang-gliding schools with SHV label	62	63	67
other hang-gliding schools	59	56	57
Parachute schools	15	14	17
Manufacturers	13	16	18

DEVELOPMENT OF THE AIRCRAFT PORTFOLIO

Airplanes (fixed wing)	1,932	1,922	1,924
Helicopter (rotor wing)	334	326	312
Engine-powered gliders	254	255	255
Gliders	800	767	745
Hang-gliders	14,765	14,957	15,386
Balloons	379	377	373
Airships	10	10	11

SWISS TRAFFIC NETWORK

	2013
Line network of Swiss-domiciled airlines	431,620 km
Roadways (in Switzerland)	71,460 km
Railways (in Switzerland)	5,302 km

EXPOSED TERRAIN

	Area	Area per capita
Land area of Switzerland	41,285 km <sup>2</sup>	5,136 m <sup>2</sup>
Airports <sup>1)</sup>	30 km <sup>2</sup>	3.81 m <sup>2</sup>
Sealed land area in respect of:		
Roadways	741 km <sup>2</sup>	94.27 m <sup>2</sup>
Railways	114 km <sup>2</sup>	14.50 m <sup>2</sup>
Airports <sup>1)</sup>	8 km <sup>2</sup>	1.02 m <sup>2</sup>

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

**FIGURES ON 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 142 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

	2011	2012	2013
Private Pilot	5,565	5,604	5,146
Commercial Pilot	947	1,136	1,133
Airline Transport Pilot	2,201	2,362	2,470
Multi-Crew Pilot License (MPL/A)	63	84	69
Helicopter Pilot	1,208	1,003	976
Glider Pilot	2,324	2,116	1,832
Balloonist	346	334	303
Hang-Glider	34,245	35,018	35,900
Parachutist	1,550	1,572	1,600
Recognition of foreign permits	26	25	11
On-Board Engineer	1	1	1
On-Board Radio Operator	7	4	2
Aircraft Maintenance Mechanic	2,992	3,025	2,950

**SWISS SPACE INDUSTRY**



Switzerland shaped European space activities since its beginning.

Swiss Technology was already on-board of the first European satellite ESRO-1.

Switzerland is a founding member of ESA (European Space Agency) and participates in many programmes of the European space organisation. Switzerland participates in ESA budget with ca. CHF 155 million per annum and is thus the eighth largest contributor.

The main focus of Swiss space industry is based on the development and manufacture of subsystems for the use in space. The product portfolio is broad and extends from payload claddings and structures up to optical, mechanical and electronic components as well as scientific instruments and ground equipment.

Thanks to the sound competencies and technologies that could be acquired by the Swiss space industry in the context of ESA programmes, companies are meanwhile successful in commercial space projects too, e.g. in the European launch vehicle programme Ariane.

In total, Swiss space companies achieve an annual turnover of around CHF 230 million.

The majority of the approximately 800 individuals employed have above-average qualifications.

Half of the employed space-related workforce has a university degree.

Most space companies in Switzerland are represented in the Swiss Space Industries Group (SSIG) of Swissmem.