

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 ¹⁾	
	Day	Night
Road	1'200'000	700'000
Railroad	70'000	140'000
Aviation	27'000	57'000

The noise-exposed area ²⁾ 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 / CO₂

Around 2% of worldwide fossil energy consumption is assignable to civil air transport. This results in a share of about 2% of man-made CO₂ output. ³⁾ Air transport contributes with approximately 12% of worldwide CO₂ emissions within the entire transport industry. Considering transport carriers in Switzerland, around 20% of all consumed fuel is used for continental and intercontinental flights. ⁴⁾ 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) ⁵⁾, the worldwide air traffic contributes with 3.5% ⁶⁾ 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 CO₂ emission. The latest scientific studies assume that based on an assessment period of 100 years these materials strengthen the greenhouse effect of CO₂ by the factor 1.35 ⁷⁾. CO₂ 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).

¹⁾ IGW – imission limit value (aircraft noise: night-time > 50 dB(A) Leq) Principles: Zurich 2013, Geneva 2012

²⁾ 60 dB(A) Leq day-time noise (IGW ES II)

³⁾ 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*

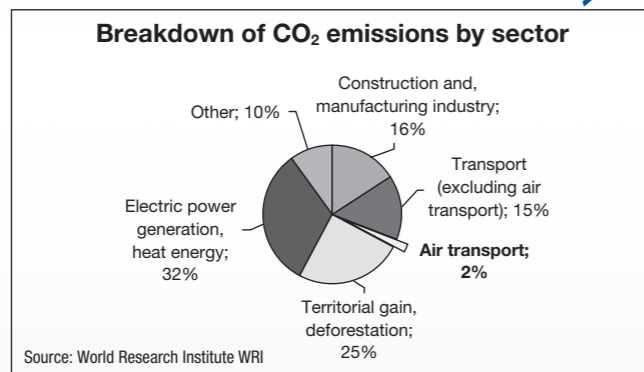
⁴⁾ Overall energy statistics of the Federation

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

⁶⁾ Besides the impact of CO₂, further effects such as nitric oxides and condensation trails related to emissions released to date are included herein.

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

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

This engagement is based on four pillars:

- **1st pillar: improved technology** (e.g. lower-emission engines, lighter aircraft equipment, alternative fuels from renewable resources)
- **2nd pillar: operational measures** (e.g. shorter and more direct air routes, fuel-saving start and landing procedures)
- **3rd pillar: more efficient infrastructure** (e.g. better use of airspace and airports)
- **4th pillar: economic measures** (e.g. voluntary CO₂-offset, emission trading)

EMISSION TRADING

In 2012 aviation became subject to the European Emission Trading System (EU ETS) by the EU. Thereby airlines are required to compensate all their CO₂ emissions by purchasing emission rights. A part of is a free entitlement (free allocation based on the benchmark and their revenue kilometers data of 2010), whereas any surplus to be compensated by means of acquired emission rights. According to the EU Directive, the requirements of EU ETS shall apply to all flights to and from destinations in Europe. Hence this regulation would apply to even non-European airlines. Based on international opposition against the extraterritorial legal effect of EU ETS and a framework agreement on the level of the International Civil Aviation Organization (ICAO), the EU announced in spring 2014 that EU ETS shall be imposed only on domestic (intra-European) flights until the year end of 2016. Following ICAO's General Assembly in autumn 2016, the EU will decide on the basis of obtained results about the continuation of EU ETS from 2017 onwards.

Aviation demands the introduction of a global market-based measure to reduce CO₂ emissions at the level of ICAO. Regional measures such as EU ETS are rejected by the aviation industry as it will lead to distortions of competition and may induce detour traffic through hubs outside of Europe.

AEROSUISSE

LIST OF ITS 143 MEMBERS (as at 30th April 2016)

Aero-Club of Switzerland, Lucerne
Aero Insurance Service AG, Zurich-Airport
Aerolite 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, Buochs
Air Service Basel GmbH, Basel-Airport
Albinati Aeronautics, SA, Geneva-Airport
Alp-Air Bern, Belp
Altran AG, Lausanne
Amac Aerospace Switzerland AG, Basel
AOPA Switzerland, Zurich
AutoGyro AG, Hildesheim (D)
Avex Aviation Experts AG, Wallisellen
Aviasuisse, Zurich
Aviation Experts Group, Eglisau
Aviation Media AG, Teufen
AviMall GmbH, Zurich
Avionix GmbH, Winterthur
AviSwiss GmbH, Zollikon
Belair Airlines AG, Glattbrugg
BGI Bertil Grimme AG Insurance Broker, Zug
Breitling SA, Grenchen
BTEE SA Environnement & Sécurité/ AIRTRACE, Geneva
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

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., Beinwil am See
Lightwing Aircraft AG, Stans
Lions Air AG, Zurich-Airport
Lugano Airport, Agno
Malbuwit AG, Belp
Marengo Swisshelicopter AG, Pfäffikon
Mecaplex AG, Grenchen
Meyer Avocats, Geneva
Moreillon Dr. Pierre, Honory President, Lausanne
Mohler Burkhard Partner AG, Basel
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-Airport
Proventavia LLC, Gross
Rabbit-Air, Bachenbülach
Rega Schweiz. Rettungslugwacht, Zurich-Airport
Regionalflugplatz Jura-Grenchen AG, Grenchen
Great Circle Services AG, Hildisrieden
groWING of Switzerland GmbH, Hünenberg
Helvetic Airways AG, Zurich-Airport
HLF Aviation, Kloten
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
IG Luftverkehr Vereinigung Pro EuroAirport, Basel

SPAS Seaplane Pilots Association Switzerland, Lutry
SR Technics Switzerland, Zurich-Airport
SSIG Swiss Space Industries Group, Zurich
Super Constellation Flyers Association, Neuenkirch
Swiss Aerodromes, Zurich
Swiss Aerospace Cluster, St. Gallen
Swiss Aircraft Maintenance Association SAMA, Basel
Swiss Air Force, Dübendorf
SWISS ASD The Aeronautics, Security and Defence Division of Swissmem, Zürich
Swiss Association of Aeronautical Sciences, Emmen
Swiss Aviation Training Ltd., Zurich-Airport
Swiss Federation of Civil Drones, Bern
Swiss Hanggliding & Paragliding Association SHPA, Zurich
Swiss International Air Lines AG, Basel
Swiss Helicopter Association, Bern
Swiss Jet Ltd., Zurich-Airport
Swiss Museum of Transport, Lucerne
Swiss Oil Association, Zurich
Swissport International Ltd., Zurich-Airport
Swiss PSA Pilot School Association, Meisterschwanden
Swiss Space Systems Holding SA, Payerne
TAG Aviation SA, Geneva-Airport
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Thommen Aircraft Equipment AG, Waldenburg
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Travcon AG, Oberuzwil
Tschudi Christian P., Honory member, Rüslikon
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Vulcanair SA, Vézenaz
Wegier Andreas, Hünibach
Zimex Aviation Ltd., Glattbrugg
Zürich Versicherungs-Gesellschaft, Zurich

AEROSUISSE

Established in 1968, AEROSUISSE as umbrella association aims to maintain the interests of the Swiss 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 143 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, Swiss Air Force, 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.

President: Paul Kurrus, ex-National Councillor, Arlesheim
Managing Director: Philip Kristensen, Bern

ADDRESS
AEROSUISSE
Umbrella Organisation of
Swiss Aerospace

Head office:
Kapellenstrasse 14
P.O. Box
3001 Bern
Tel. +41 (0)58 796 98 90
Fax +41 (0)58 796 99 03
www.aerosuisse.ch
info@aerosuisse.ch

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 2004

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- Aviation Policy Report of Federal Council, 2016
- 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 2016

English Version

CIVIL AVIATION IS OF OUTSTANDING IMPORTANCE FOR SWITZERLAND¹⁾



VALUE ADDED AND LABOUR FORCE OF CIVIL AVIATION¹⁾²⁾

Effects ³⁾	Value added ⁴⁾ in billion CHF	GDP ⁴⁾ %	Occupation VTE ⁵⁾
Direct ¹⁾	8.2		44'280
Indirect ¹⁾	3.9		22'670
Economic significance in a narrower sense¹⁾	12.1	1.8	66'950
Induced ¹⁾	12.4		71'500
Economic significance in a broader sense¹⁾	24.5	3.8	138'450
Catalytic ²⁾	9.0		55'300
Sum of all effects⁶⁾	33.5	5.6	190'000

BREAKDOWN OF DIRECT EMPLOYMENT EFFECTS²⁾

	No. of employees
Zurich	20'100
Geneva	7'700
Basel	5'900
Bern	290
St. Gallen-Altenrhein	150
Lugano	260
Sion	150
Airports with airline movements⁶⁾	34'550

Regional airports without airline traffic	340
Airfields and miscellaneous (flying schools etc.)	550
Heliports	110
Airports without airline movements⁶⁾	1'000

Aviation industry (maintenance, fitting, sub-components)¹⁾

Operation of a short- / medium-haul aircraft	40 – 120
Operation of a long-haul aircraft	210
Per million flight passengers ⁷⁾	750 – 2'000

¹⁾ Aviation Policy Report of Federal Council, 2016

²⁾ Economic significance of aviation in Switzerland, 1 June 2011, INFRAS

³⁾ 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 catalytic effect illustrates, which further, causally less narrow, economic linkages aviation exhibits with the rest of the economy.

⁴⁾ Incl. exports of aviation industry

⁵⁾ Full Time Equivalents

⁶⁾ Including aviation industry

⁷⁾ Direct and indirect effects

CIVIL AVIATION IN THE PUBLIC INTEREST



In its report dated 24 February 2016 considering Swiss aviation policy, the Federal Council particularly emphasizes the great significance of civil aviation in Switzerland as well as the optimal international air traffic connections.

The airline traffic is explicitly recognised as part of the public transport.¹⁾

On a value basis, up to 40% of all exports is forwarded by air freight.¹⁾

30–35% of foreign tourists visit Switzerland by air.¹⁾

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)

	2014	2015
Total expenditures federal government	64'000	65'243
whereof transport	8'429	8'322
whereof aviation ²⁾	155	167

The confederation's expenditures in favour of civil aviation are with 0.24% in 2014 and 0.26% 2015 in relation to the overall expenditures extremely modest.

With few exceptions no federal funds flow into the aviation sector.¹⁾

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.

	2013	2014	2015
Revenue in CHFM	438	449	450
Employees (Full Time Equivalents)	1'391	1'397	1'412

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.

¹⁾ Aviation Policy Report of Federal Council, 2016

²⁾ 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



	2013	2014	2015
FLIGHT PASSENGERS (on SIAA airports) ¹⁾			
Zurich	24'865'138	25'477'622	26'281'228
Geneva	14'436'149	15'152'915	15'771'271
Basel	5'880'858	6'523'874	7'061'059
Bern	260'555	192'846	190'032
Lugano	151'629	145'521	165'984
St. Gallen-Altenrhein	97'265	94'070	101'092
Total	45'691'594	47'586'848	49'570'666

FLIGHT MOVEMENTS (on national and regional airports)

Zurich	262'227	264'970	265'095
Geneva	188'768	187'596	188'829
Basel	87'322	89'474	94'359
Birrfeld	70'223	69'378	72'807
Grenchen	73'331	74'075	70'870
Bern	54'666	54'356	51'144
Sion	38'204	39'941	41'016
Lausanne-Blécherette	40'378	46'112	37'821
St. Gallen-Altenrhein	29'304	29'731	27'288
Lugano	20'242	20'263	21'275
Samedan	15'795	14'284	16'007
Écuwillens	18'392	15'391	15'201
Les Éplatures	11'082	11'943	11'941
Bressaucourt	7'695	8'311	8'095
Total	917'629	925'825	921'748

Transit flights within the Swiss airspace	672'165	684'372	703'037
Destination / countries ²⁾	180/55	185/56	185/55
Airlift Rega by helicopter	10'205	10'802	11'186
Airlift Rega by jet aircraft	1'148	1'170	1'167
Freight and post (t)	403'249	410'633	404'632

¹⁾ SIAA Swiss International Airports Association

²⁾ operated by Swiss domiciled airlines

FIGURES ON SWISS CIVIL AVIATION



	2013	2014	2015
AIRPORTS			
National airports	3	3	3
Regional airports	11	11	11
Airfields	48	48	48
Heliports	24	24	24
COMPANIES			
Airline operators	8	8	9
Commercial operators (non-airline)	70	67	67
Maintenance and repair shops	91	85	84
Flight schools	142	138	140
Hang-gliding schools with SHV label	67	67	67
other hang-gliding schools	57	57	60
Parachute schools	14	14	14
Manufacturers	18	19	18

DEVELOPMENT OF THE AIRCRAFT PORTFOLIO

Airplanes (fixed wing)	1'924	1'880	1'850
Helicopter (rotor wing)	312	321	326
Engine-powered gliders	255	258	253
Gliders	745	720	696
Hang-gliders	15'386	15'452	15'281
Balloons	373	366	358
Airships	11	11	11

SWISS TRAFFIC NETWORK

Line network of Swiss-domiciled airlines	410'197 km
Roadways (in Switzerland)	71'553 km
Railways (in Switzerland)	5'304 km

EXPOSED TERRAIN

	Area	2015
Land area of Switzerland	41'285 km ²	Area per capita
Airports ¹⁾	30 km ²	5'034.00 m ²
Sealed land area in respect of:		3.65 m ²
Roadways	741 km ²	90.36 m ²
Railways	95 km ²	11.58 m ²
Airports ¹⁾	8 km ²	0.97 m ²

¹⁾ 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 140 flight training schools, 127 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

	2013	2014	2015
Private Pilot	5'146	4'904	4'872
Commercial Pilot	1'133	1'107	1'050
Airline Transport Pilot	2'470	2'478	2'571
Multi-Crew Pilot License (MPL/A)	69	94	87
Helicopter Pilot	976	1'025	1'043
Glider Pilot	1'832	1'729	1'715
Balloonist	303	278	255
Hang-Glider	35'900	36'700	37'755
Parachutist	1'600	1'590	1'664
Recognition of foreign permits	11	15	11
On-Board Engineer	1	3	2
On-Board Radio Operator	2	4	4
Aircraft Maintenance Mechanic	2'950	2'991	2'992
Ground Handlers	4	3	3

THE SWISS AVIATION INDUSTRY¹⁾

The aviation industry is the basis for a productive aviation. It comprises development, manufacturing and maintenance companies and employs ca. 10'850 people. The value added of the aviation industry (direct effect) amounts up to CHF 1.6bn. If suppliers are included, a workforce of 16'200 are contributing to a direct value added of CHF 2.5bn inclusively ground handling as well as catering companies.

The greatest direct economic value is achieved by the 18 EASA regulated manufacturing companies generating around CHF 1bn. All are providing innovative and technically highly demanding aircraft, structural components, airframe and aircraft components being able to keep pace with competition all around the world.

¹⁾ Aviation Policy Report of Federal Council, 2016

The Swiss manufacturing companies enjoy an excellent reputation and are largely growing in their niche markets in spite of the strong Swiss Franc. In the subcategories such as light aircraft as well as unmanned aircraft and alternative rotor wing concepts new companies have been established. In the maintenance business the competitive pressure due to high wage costs and the strong Swiss Franc remains.

The increasing regulatory density at European level confronts the entire aviation industry with new major challenges that can only be mastered through innovative products and process improvements.

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. In February 2016, ESA launched with Sentinel-3A the third satellite of series of missions that forms the space component of the European system for global earth observation 'Copernicus'. Sentinel-3A will collect data for measuring sea-surface topography. This will inter alia assist in determining surface temperature, marine ecosystems and pollution. No less than six Swiss companies across the country have contributed to the development of Sentinel-3A.

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 aerospace companies in Switzerland 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.