

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 output³⁾. Air transport contributes with approximately 12% of worldwide CO₂ emissions within the entire transport industry. Considering transport carriers in Switzerland, around 25% 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 less than 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 1.35⁷⁾. 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*

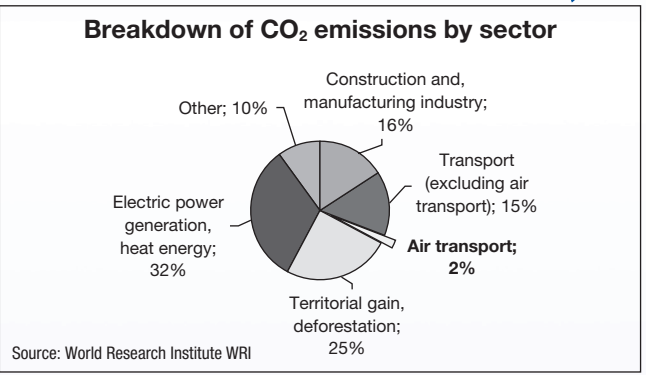
⁴⁾ Overall energy statistics of the Federation

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

CIVIL AVIATION AND THE ENVIRONMENT



- 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. low-emission engines, lighter aircraft equipment, alternative fuels from waste and 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. CO₂- offset, emission trading)

EMISSION TRADING

The Federal Council intends to subordinate Swiss aviation under the European Emission Trading System (EU ETS). A corresponding agreement was signed by the end of 2017. Its ratification is currently in the parliamentary consultation. It shall take effect from 1 January 2020 at the earliest. Similar to the existing regulation at European level all domestic flights and those within the European Economic Area (EEA) and Switzerland would be interlinked in this system.

ICAO decided at its most recent General Assembly to introduce the Carbon Offsetting and Reduction Schemes (CORSIA) that shall commit aviation to compensate for any CO₂ emissions exceeding the level of 2020.

Aviation generally supports the introduction of CORSIA. Regional measures such as EU ETS is rejected by the industry as they lead to competitive distortion and induced detour traffic outside of Europe.

AEROSUISSE

LIST OF ITS 148 MEMBERS (as at 30th April 2018)

Zassistu GmbH, Brugg
Aero-Club of Switzerland, Lucerne
Aéroport de Neuchâtel SA, Colombier
Aéroport de Sion, Sion
Aéroport Région Lausannoise
La Blécherette SA, Lausanne
Aéroport Régional Les Eplatures SA, La Chaux-de-Fonds
AFS all-financial-solutions gmbh, Lupfig
Air-Espace Flight Academy, Colombier
Airline Assistance Switzerland AG, Zurich-Airport
AIRNAV CONSULTING, Zurich
Airport Altenrhein AG, Altenrhein
Airport Buochs AG, Buochs
Air Service Basel GmbH, Basel-Airport
Albinati Aeronautics, SA, Geneva-Airport
Alljets AG, Zurich-Airport
alpaviation ag, Belp
Altran AG, Lausanne
Amac Aerospace Switzerland AG, Basel
AOPA Switzerland, Zurich
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Aviasuisse, Zurich
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AviMall GmbH, Zurich
AviSwiss GmbH, Zollikon
Belair Airlines AG, Glattbrugg
BGI Bertil Grimme AG Insurance Brokers, Zug
Board of Airline Representatives in Switzerland B.A.R., Zurich-Airport
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
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ddpConcepts GmbH, Ennetbürgen
Dnata Switzerland AG, Kloten
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E-Aviation Swiss Sagl, Agno
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Engadin Airport AG, Samedan
Ermini AG, Zurich
EuroAirport Basel-Mulhouse-Freiburg, Basel-Airport
ExecuJet Europe AG, Zurich-Airport
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FLUBAG Flugbetriebs AG, Neudorf
Flughafen Bern AG, Belp
Flughafen Zürich AG, Zurich-Airport
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Flugschule Basel AG, Basel-Airport
Flugschule Eichenberger AG, Buttwil
Franke Industrie AG, Aarburg
gategroup Holding AG, Zurich-Airport
gatesocial.com, Altendorf
General Aviation Genossenschaft Basel, Basel-Airport
Genève Aéroport, Geneva-Airport
Germania Flug AG, Glattbrugg
Glausen + Partner AG, Thun
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Great Circle Services AG, Hildisrieden
groWING of Switzerland GmbH, Hünenberg
Helvetic Airways AG, Zurich-Airport
Horizon Swiss Flight Academy Ltd., Kloten
Howald Kurt, Honory member, Muri b. Bern
Huber + Suhner AG, Pfäffikon
IBC Insurance Broking & Consulting Zurich AG, Zurich
IG AirCargo, Zurich-Airport
IG Berner Luftverkehr, Bern
IG Flughafen Zürich, Zurich-Airport
IG EUROAIRPORT, Basel
Ingold Aviation LLC, Zurich

ISS Aviation AG, Zurich-Airport
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Lugano Airport, Agno
Maritime Aerospace AG, Staad
Mecaplex AG, Grenchen
Meyer Avocats, Geneva
Moreillon Dr. Pierre, Honory President, Lausanne
Motorfluggruppe Thurgau, Lommis
Motorflug-Veteranen des AeCS, Grandcour
My Sky Switzerland SA, Lausanne
NOMAD Aviation AG, Kloten
The Nuance Group AG (Dufry Group), Glattbrugg
Pilatus Aircraft Ltd., Stans
Pratt & Whitney Aero Engines International GmbH, Lucerne
Premium Jet AG, Zurich-Airport
proventavia GmbH, Schindellegi
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Rega Swiss Air Rescue, Zurich-Airport
Regionalflugplatz Jura-Grenchen AG, Grenchen
Renz & Partners, Bern
RUAG Schweiz AG, RUAG Aviation, Emmen
Schellenberg Wittmer SA, Geneva
Schweiz. Gletscherpiloten-Vereinigung SGPV, Hinwil
ShAir AG, Zurich
skyguide, swiss air navigation services ltd., Geneva
Sky Jet AG, Zurich-Airport
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, Zurich
Swiss Aerospace Cluster, St. Gallen
swiss aeropole SA, Payerne
Swiss Aircraft Maintenance Association SAMA, Kloten
Swiss Air Force, Bern
SWISS ASD The Aeronautics, Security and Defence Division of Swissmem, Zurich
Swiss Association of Aeronautical Sciences, Menziken
Swiss Business Aviation Association, Zurich-Airport
Swiss Federation of Civil Drones, Bern
Swiss Flight Services SA, Cortaillod
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Swiss Helicopter Association, Bern
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Swiss Museum of Transport, Lucerne
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Swissport International Ltd., Zurich-Airport
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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 148 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: Thomas Hurter, National Councillor, Schaffhausen
Managing Director: Philip Kristensen, Bern

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 - Flughafen Zürich AG, Zurich-Airport
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 - Rega Swiss Air Rescue, Zurich-Airport
 - RUAG Schweiz AG, RUAG Space, Zurich
 - Swiss Hanggliding & Paragliding Association SHPA, Zurich
 - Switzerland Tourism, Zurich
 - SIAA Swiss International Airports Association, Zurich
 - skyguide, swiss air navigation services ltd., Geneva
 - Swiss International Air Lines Ltd., Zurich-Airport
 - Verband öffentlicher Verkehr, Bern

VADEMECUM 2018

English Version

CIVIL AVIATION IS OF OUTSTANDING IMPORTANCE FOR SWITZERLAND¹⁾



VALUE ADDED AND LABOUR FORCE OF CIVIL AVIATION ¹⁾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 sense ¹⁾	12.1	1.8	66'950
Induced ¹⁾	12.4		71'500
Economic significance in a broader sense ¹⁾	24.5	3.8	138'450
Catalytic ²⁾	9.0		55'300
Sum of all effects ⁶⁾	33.5	5.6	190'000
BREAKDOWN OF DIRECT EMPLOYMENT EFFECTS			No. of employees
Zurich			27'100
Geneva			11'000
Basel			6'200
Bern			500
St. Gallen-Altenrhein			400
Lugano			300
Sion			200
Airports with airline movements ^{6/7)}			45'700
Regional airports without airline traffic			340
Airfields and miscellaneous (flying schools etc.)			550
Heliports			110
Airports without airline movements ^{2/7)}			1'000
Aviation industry (maintenance, fitting, sub-components) ¹⁾			16'220
Operation of a short- / medium-haul aircraft		40 –	120
Operation of a long-haul aircraft			210
Per million flight passengers ⁸⁾		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⁾ Head Count SIAA and Sion Airport
⁷⁾ Including aviation industry
⁸⁾ 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)

	2016	2017
Total expenditures federal government	66'261	68'288
whereof transport	9'104	9'053
whereof aviation ²⁾	185	178

The confederation's expenditures in favour of civil aviation are with 0.28% in 2016 and 0.26% 2017 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.

	2015	2016	2017
Revenue in CHFM	450	455	470
Employees (Full Time Equivalents)	1'412	1'426	1'419

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, contri- butions of mineral oil tax money

FIGURES ON SWISS CIVIL AVIATION



	2015	2016	2017
FLIGHT PASSENGERS (on SIAA airports) ¹⁾			
Zurich	26'281'228	27'666'428	29'396'094
Geneva	15'771'271	16'532'690	17'351'816
Basel	7'061'059	7'314'265	7'888'725
Bern	190'032	183'320	182'917
Lugano	165'984	176'688	144'087
St. Gallen-Altenrhein	101'092	108'413	124'588
Total	49'570'666	51'981'804	55'088'227

FLIGHT MOVEMENTS (on national and regional airports)

Zurich	265'095	269'160	270'453
Geneva	188'829	189'840	190'778
Basel	94'359	95'545	95'610
Grenchen	70'870	66'854	68'559
Birrfeld	72'807	71'127	66'388
Bern	51'144	50'207	47'659
Sion	41'016	37'119	41'921
Lausanne-Blécherette	37'821	38'127	38'717
St. Gallen-Altenrhein	27'288	26'382	28'774
Lugano	21'275	19'577	18'673
Samedan	16'007	14'961	16'108
Écuvillens	15'201	14'842	14'899
Les Éplatures	11'941	12'015	11'199
Bressaucourt	8'095	8'072	8'343
Total	921'748	913'828	918'081

Transit flights within the Swiss airspace	703'037	716'159	751'946
Destination / countries ²⁾	185/55	187/56	197/57
Airlift Rega by helicopter	11'186	11'055	11'774
Airlift Rega by jet aircraft	1'167	1'249	1'281
Freight and post (t)	404'632	431'141	488'613

¹⁾ SIAA Swiss International Airports Association
²⁾ operated by Swiss domiciled airlines

FIGURES ON SWISS CIVIL AVIATION



	2015	2016	2017
AIRPORTS			
National airports	3	3	3
Regional airports	11	11	11
Airfields	48	48	51
Heliports	24	24	25

COMPANIES

Airline operators	9	8	8
Commercial operators (non-airline)	66	62	53
Maintenance and repair shops	84	85	84
Flight schools	140	141	141
Hang-gliding schools with SHV label	67	65	69
other hang-gliding schools	60	67	49
Parachute schools	14	14	14
Manufacturers	18	18	20
Ground Handlers	4	4	4

DEVELOPMENT OF THE AIRCRAFT PORTFOLIO

Airplanes (fixed wing)	1'850	1'823	1'786
Helicopter (rotor wing)	326	337	335
Engine-powered gliders	253	249	249
Gliders	696	658	625
Hang-gliders	15'281	15'780	16'129
Drones		10'280	15'000
Balloon	358	339	329
Airships	11	8	9

SWISS TRAFFIC NETWORK

	2017
Line network of Swiss-domiciled airlines	475'480 km
Roadways (in Switzerland)	71'540 km
Railways (in Switzerland)	5'323 km

EXPOSED TERRAIN

	Area	2017
Land area of Switzerland	41'285 km ²	Area per capita
Airports ¹⁾	30 km ²	4'904.00 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 141 flight training schools, 118 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

	2015	2016	2017
Private Pilot	4'872	4'777	4'695
Commercial Pilot	1'050	1'083	1'050
Airline Transport Pilot	2'571	2'492	2'490
Multi-Crew Pilot License (MPL/A)	87	70	52
Helicopter Pilot	1'043	1'068	1'036
Glider Pilot	1'715	1'766	1'675
Balloonist	255	247	242
Hang-Glider	37'755	38'661	39'640
Drone Pilot		145	225
Parachutist	1'664	1'669	1'745
Recognition of foreign permits	11	8	10
On-Board Engineer	2	3	1
On-Board Radio Operator	4	5	6
Aircraft Maintenance Mechanic	2'992	2'887	2'901

THE SWISS AVIATION INDUSTRY¹⁾

The aviation industry is the basis of an efficient aviation sector. It comprises development, manufacturing and maintenance companies overall employing around 12'850 people. The aviation industry's value added (direct effect) amounts up to CHF 1.9 billion. Including suppliers (indirect effect) staff number is increasing to 18'200 generating a value added of over CHF 2.8 billion. The aviation industry also includes ground handling and catering companies.

The largest direct economic value is achieved by the 60 EASA Part 21 and EN9100 manufacturing companies, which generate well over CHF 1 billion. They all manufacture and supply extremely innovative and technically demanding aircraft as well as systems, subassemblies and aircraft components in order to prevail towards foreign competitors.

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 the European Space Agency (ESA), Switzerland was able to contribute to the European space activities from the very beginning. The Swiss space industry is an important partner in many European space projects.

The launch vehicles Ariane and Vega, the Satellite programmes Galileo, MetOp and Electra, the Space-Astronomy-Mission Cheops or the Sentinel-Satellites for Copernicus being Europe's global environmental and safety monitoring system, are just a few examples of important space projects in which Swiss manufacturers participate. In fact, there is hardly any current European mission that does not contain some kind of Swiss technology. To date, Switzerland is contributing to the ESA budget with ca. CHF 170 million per year. A large number of Swiss companies, universities and research institutes is engaged in ESA's earth observation programmes. The most important objectives from a Swiss perspective is the development of technological and industrial competencies in the field of sensor and instrument manufacturing as well as promotion of operational application of earth observation data. The emphasis of the Swiss space industry lies on the development and manufacturing of sub-systems 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. The payload fairings for the European launch vehicles Ariane 5 and Vega also originate from Switzerland as well as those for Ariane 6 and Vega C. Thanks to their extensive expertise and technologies, Swiss aerospace companies are successful in commercial space projects outside of European markets too. In the aggregate, the members of Swiss Space Industries Group (SSIG) achieve an annual turnover of ca. CHF 290 million. This corresponds to approximately 85% of revenues of the entire Swiss sector. Of the over 960 people being employed in space-related organisations, the majority has above-average qualifications. Around the half of all employed manpower in space has a university degree.