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Federal Roads Office FEDRO

FEDRO ANNUAL REPORT

ROADS AND TRAFFIC 2022/2023

Developments, facts and figures



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Cover photo

FEDRO's solar panel installation on the roof of the Sonnenhof tunnel on the A6 at Bern-Ostring (facing Thun). The new system operational since 2022 produces 424,000 kWh – four times more than the previous system from 2001 covering the same surface area.

Dear Reader,

2023 marks the 25th anniversary of the Federal Roads Office (FEDRO). It was created in 1998 when a reorganisation within the Federal Administration merged the Confederation's responsibilities in national highway construction and road traffic. Subsequently on 1 January 2008, FEDRO assumed responsibility from the cantons for construction and operation of the national highways network, as part of the new system of fiscal equalisation and division of tasks between the Confederation and the cantons (NFE). FEDRO has therefore now existed in its present form for the past 15 years.

Digitalisation – already impacting mobility today – will play an even greater role in the future. FEDRO intends to harness the potential of intelligent mobility to increase road safety and improve the flow of traffic on Swiss roads. For example, new road safety legislation adopted by the Swiss parliament last spring is an important step towards intelligent road traffic management, paving the way for self-driving vehicles. The Federal Council now has a framework to enact more specific regulations at ordinance level.

The national highways network also presents much potential for solar energy. For many years now, FEDRO has been using photovoltaic systems to generate electricity for its own consumption, for example for tunnel lighting or motorway works depots. We are continuously expanding this means of producing electricity. In an initial phase, suitable areas not yet being used by FEDRO have been made available to interested third parties, for example at rest areas or on noise barriers. We are now working to transition to the next phase.



Another crucial part of our strategy is decarbonising road traffic. The future lies in electric, locally carbon-free mobility, but this calls for a massive expansion of the charging infrastructure. FEDRO is therefore promoting the installation of fast charging stations along the national highways network. By the end of the year, at least half of the country's 100 national highway rest areas will offer fast charging stations for electric vehicles. In the future, we also plan to make areas available for fast charging hubs outside the network itself, for example near motorway junctions.

FEDRO has also been testing new road markings on the Brünig pass in a pilot project to improve motorcycle safety. Having proved effective, these circle markings are set to be used on other roads in the future.

When transporting dangerous goods, safety is the number one priority. A series of strict and detailed rules govern the requirements for drivers, transport vehicles, substances and quantities and for all companies involved in transport and storage. This is of utmost importance, given the large volume of dangerous goods being moved on Swiss roads every day. Surprisingly, even some of the most common household products, such as hairsprays, can pose a risk: the danger lies in the vast quantities being transported at once.

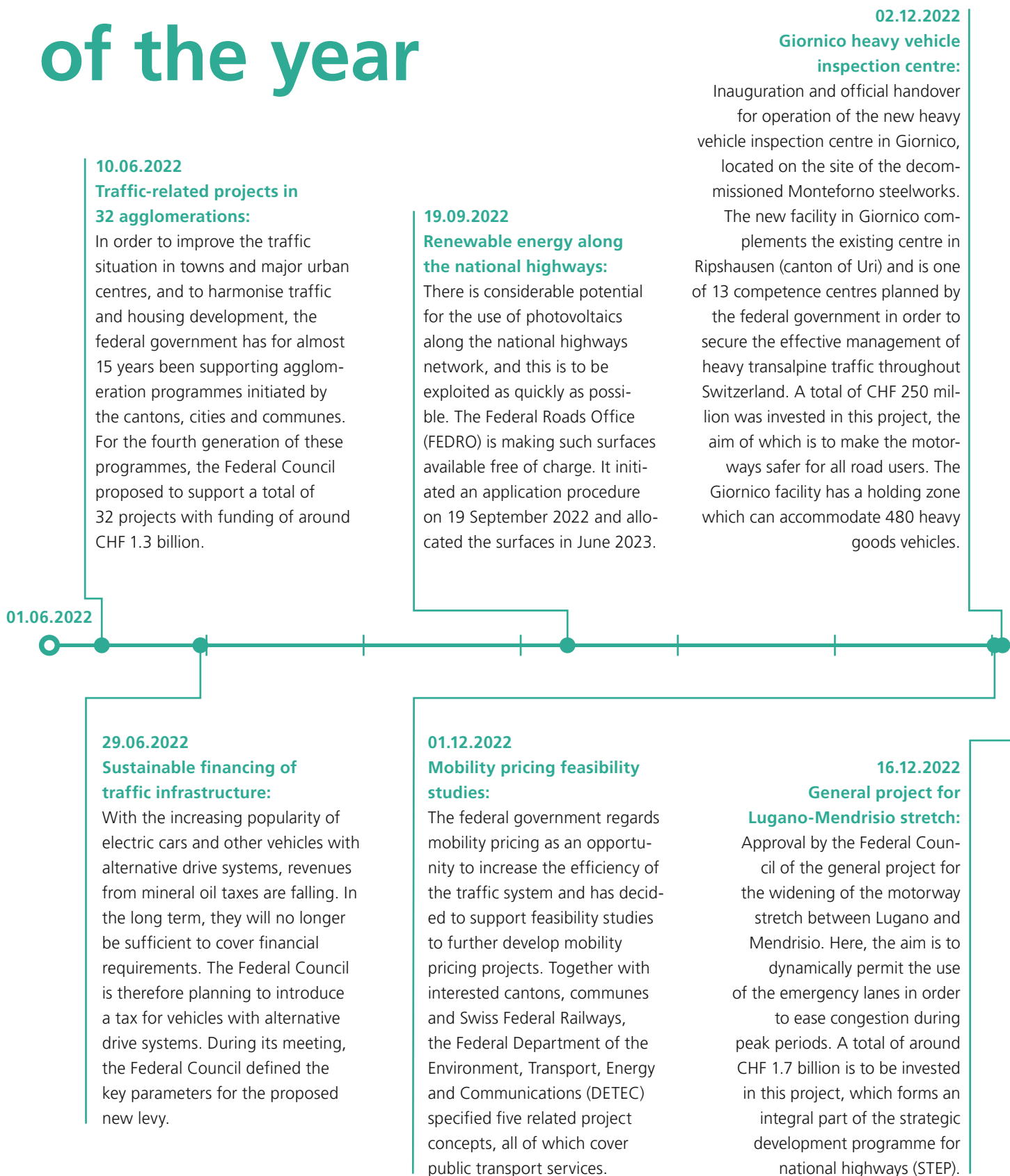
On 1 January 2023, the Cycle Routes Act came into force – an important step towards promoting cycling. The federal government and the cantons are now required to plan and install a safe and attractive network of cycle routes. FEDRO is already working on this: in the Bernese Jura above Biel/Bienne, we have built a lane alongside the A16 for non-motorised traffic only. This separation of traffic is a great safety improvement and makes cycling through the Taubenloch gorge a far more pleasant experience.

More details on these and other topics as well as background statistics on national highways and transportation can be found in this 2022/2023 issue of 'Roads and Traffic'. I trust you will enjoy reading it.

A handwritten signature in black ink, which appears to read 'J. Röthlisberger'.

Jürg Röthlisberger
Director of the Federal Roads Office (FEDRO)

Overview of the year



10.06.2022

Traffic-related projects in 32 agglomerations:

In order to improve the traffic situation in towns and major urban centres, and to harmonise traffic and housing development, the federal government has for almost 15 years been supporting agglomeration programmes initiated by the cantons, cities and communes. For the fourth generation of these programmes, the Federal Council proposed to support a total of 32 projects with funding of around CHF 1.3 billion.

19.09.2022

Renewable energy along the national highways:

There is considerable potential for the use of photovoltaics along the national highways network, and this is to be exploited as quickly as possible. The Federal Roads Office (FEDRO) is making such surfaces available free of charge. It initiated an application procedure on 19 September 2022 and allocated the surfaces in June 2023.

02.12.2022

Giornico heavy vehicle inspection centre:

Inauguration and official handover for operation of the new heavy vehicle inspection centre in Giornico, located on the site of the decommissioned Monteforno steelworks. The new facility in Giornico complements the existing centre in Ripshausen (canton of Uri) and is one of 13 competence centres planned by the federal government in order to secure the effective management of heavy transalpine traffic throughout Switzerland. A total of CHF 250 million was invested in this project, the aim of which is to make the motorways safer for all road users. The Giornico facility has a holding zone which can accommodate 480 heavy goods vehicles.

01.06.2022

29.06.2022

Sustainable financing of traffic infrastructure:

With the increasing popularity of electric cars and other vehicles with alternative drive systems, revenues from mineral oil taxes are falling. In the long term, they will no longer be sufficient to cover financial requirements. The Federal Council is therefore planning to introduce a tax for vehicles with alternative drive systems. During its meeting, the Federal Council defined the key parameters for the proposed new levy.

01.12.2022

Mobility pricing feasibility studies:

The federal government regards mobility pricing as an opportunity to increase the efficiency of the traffic system and has decided to support feasibility studies to further develop mobility pricing projects. Together with interested cantons, communes and Swiss Federal Railways, the Federal Department of the Environment, Transport, Energy and Communications (DETEC) specified five related project concepts, all of which cover public transport services.

16.12.2022

General project for Lugano-Mendrisio stretch:

Approval by the Federal Council of the general project for the widening of the motorway stretch between Lugano and Mendrisio. Here, the aim is to dynamically permit the use of the emergency lanes in order to ease congestion during peak periods. A total of around CHF 1.7 billion is to be invested in this project, which forms an integral part of the strategic development programme for national highways (STEP).



The fast charging station at the Apfelwuhr-Nord motorway rest area near Landquart (canton of Graubünden).

01.01.2023

Entry into force of the Cycle Routes Act:

The new Federal Act on Cycle Routes (Cycle Routes Act) ensures the provision of better and safer cycle lanes in that it requires the cantons to plan and implement bicycle route networks, and also requires the federal government to do the same on the roads for which it is responsible. The new legislation entered into force on 1 January 2023.

22.02.2023

Ongoing development of the national highways network:

Up until 2030, the Federal Council aims to initiate expansion projects on the national highways network costing a total of around CHF 11.6 billion. The aim here is to improve traffic flow on the network. The Federal Council's dispatch to Parliament cites a financial outlay of around CHF 8.8 billion for maintenance, operation and modifications of the existing network for the period from 2024 to 2027.

01.04.2023

Exemptions for confiscated driving licences:

To minimise the risk of job losses, the authorities responsible for the confiscation of driving licences may allow drivers whose licence has been withdrawn for minor traffic offences to make journeys that are necessary for them to carry out their professional activities.

01.06.2023

25.01.2023

General project for Witen (St Gallen) junction:

Approval by the Federal Council of the general project for the construction of the Witen junction with access road to the A1 motorway in St Gallen. This junction will enable the direct connection of the Rorschach region to the A1 motorway. Cost: around CHF 100 million.

03.03.2023

Vernier South junction project:

Approval by the Federal Council of the construction of the Vernier South junction on the A1 motorway. As a supplementary measure the Federal Council recommends the permanent use of the emergency lane to the south of the new junction. These measures will improve access to northwest Geneva. At the same time, this project will improve traffic flow on the existing Meyrin and Vernier junctions, and through the Vernier tunnel.

23.05.2023

2,785 procurements:

In 2022, the Federal Roads Office (FEDRO) carried out a total of 2,785 procurements with a total value of more than CHF 2.5 billion. Of these contracts, 90 per cent were awarded on the basis of competitive tenders. Contractors from all regions of the country were awarded contracts by FEDRO. In terms of value, the biggest contracts were awarded to bidders in the cantons of Bern, Aargau, Zurich, Ticino and Lucerne.

Merger of road construction and traffic authorities in 1998 to form the Federal Roads Office

The Federal Roads Office (FEDRO) was formed in 1998 following a reorganisation of the Federal Administration. FEDRO currently comprises seven divisions. Jürg Röthlisberger was appointed director in 2015.



FEDRO has been based in this building on the DETEC campus at Pulverstrasse 13 in Ittigen since 2020.

Redistribution of financial responsibility

In the framework of the new system of fiscal equalisation and division of tasks between the Confederation and the cantons (NFE), a complete revision of the equalisation of financial resources and burdens entered into force at the beginning of 2008. The aim here was to strengthen the financial autonomy of the cantons and avoid inequalities. As a consequence of this development, the ownership of the national highways was transferred from the cantons to the federal government.

Until 2008, the Federal Roads Office was solely a construction body comprising three divisions: Infrastructure, Planning and Management. In 2008, FEDRO was additionally assigned ownership of and responsibility for the development of the national highways. Since then, the federal government has borne full responsibility for the national highways network. This has eased the burden on the cantons. However, in order to maintain the continuity of construction activities, the cantons retained responsibility for new construction projects within the scope of the completion of the network. Since then, FEDRO has assumed responsibility for all areas relating to private transport: people, vehicles, infrastructure, financing and data.

Over the years, FEDRO has continuously responded to the increasing demands placed on the national highways and the traffic situation. FEDRO currently employs 639 people (as at end-2022). In the past few years it has undergone major development, especially in the areas of mobility and IT. In addition, the former Infrastructure division, which is responsible for construction projects in five regional offices throughout the country, has been divided into two separate units in order to keep pace with present-day requirements.

FEDRO has also had to increasingly focus its activities on automated driving and the associated technical and legal challenges. Demands associated with digitalisation have also increased enormously. In response, FEDRO has created a Digital Services division. Here, the most recent major projects include a new construction costs management system (2022), a new vehicle and driver registration system (2018) and the further development of the traffic data platform.

Amalgamation of road traffic and road construction sections

FEDRO was established in summer 1998 following the merger of the existing road construction and road traffic sections to form a single unit. This move made good sense in that the new federal office now encompassed both road construction and motorised individual transport. One of the main discussions concerned the naming of the new federal office, because it was now responsible for both road construction and road traffic. In the end it was decided to call it the Federal Roads Office and leave out any reference to 'construction' or 'traffic'.

Nine locations

FEDRO operates at nine locations. At its head office in Ittigen (canton of Bern) it supports the political and official affairs of the Federal Council and Parliament. Other activities here include the long-term planning of the national highways and also matters concerning financing, legislation, mobility, vehicle technology, and various IT services. FEDRO also operates five regional offices: Bellinzona (canton of Ticino) with an external section in Thusis (canton of Graubünden), Estavayer-le-Lac (canton of Fribourg), Thun (canton of Bern), Winterthur (canton of Zurich), and Zofingen (canton of Aargau). These regional offices directly manage construction projects on the national highways. FEDRO's eighth location is in Emmenbrücke (canton of Lucerne), where it operates the national traffic management centre.



History of the Federal Roads Office

From 1848 on, all construction activity was allocated to the former Post Office and Construction departments. Their main task at that time was river course adjustment.

In 1870, in view of the increasing challenges and lack of the necessary expertise within the Federal Department of Home Affairs, a special technical authority for construction activity was created: the Federal Superstructure Inspectorate. All the associated technical competencies relating to the supervision of roads and bridges were also assigned to this new body.

In 1921, 'Road Traffic' was established under federal control. The Federal Office for Police Matters held responsibility for this area until the merger that created FEDRO in 1998.

On 21 June 1960, the title Superstructure Inspectorate was annulled following the entry into force of the National Highways Act. The authority was now renamed the Federal Office for Road and River Engineering.

In 1979, the River Engineering section was transferred to the Federal Office for Hydrology, and the Federal Office for Road and River Engineering was renamed the Federal Office for Road Construction.

In 1998, various other reorganisations took place at the federal level. The Federal Council decided to transfer the former Road Traffic section from the Federal Department of Justice and Police to the Federal Roads Office. At that time, the latter belonged to the Federal Department of Energy and Economics – the predecessor of today's Federal Department of the Environment, Energy, Transport and Communications (DETEC).

Directors:

Federal Superstructure Inspectorate

1871–1891:	Adolf von Salis
1891–1918:	Albert von Morlot
1918–1927:	Leo Bürkli
1927–1939:	Alexander von Steiger
1940–1954:	Walter Schurter
1955–1956:	Arnold de Kalbermatten

From 1960, Federal Office for Road and River Engineering

1957–1970:	Robert Ruckli
1970–1984:	Jules Jakob (deceased during his term of office)
1985–1996:	Kurt Suter

From 1998, Federal Roads Office (FEDRO)

1997–2003:	Olivier Michaud
2003–2015:	Rudolf Dieterle
Seit 2015:	Jürg Röthlisberger

Past heads of Road Traffic:

As part of the Police division

1922–1928:	Prof. Ernst Delaquis
1928–1954:	Dr Heinrich Rothmund
1954–1957:	Dr Robert Jezler
1958–1979:	Oscar Schürch

As part of the Federal Office for Police Matters

1979–1980:	Oscar Schürch
1980–1993:	Dr Peter Hess
1993–1995:	Prof. Lutz Krauskopf
1995–1998:	Dr Anton Widmer

As a separate division

1951–1961:	Robert Plumez
1961–1969:	Alois Pfister
1969–1982:	Robert André Messerli
1982–1992:	Dr Lorenz Zünd
1992–1997:	Albert Ramseyer



The FEDRO Management Board (from left): Manfred Jungo, Valentina Kumpusch, Petra Ebener, Erwin Wieland (Deputy Director), Jürg Röthlisberger (Director), Vivian Welten, Guido Biaggio, Christian Kellerhals and Lorenzo Cascioni.

Changes of location

FEDRO has operated from several locations over the course of the years. **Until 1997**, after several moves, Road Traffic was based in Wabern, and subsequently in Ittigen.

Prior to 1998, the Federal Office for Road and River Engineering was located on Monbijoustrasse in Bern, within the premises of the Federal Customs Administration.

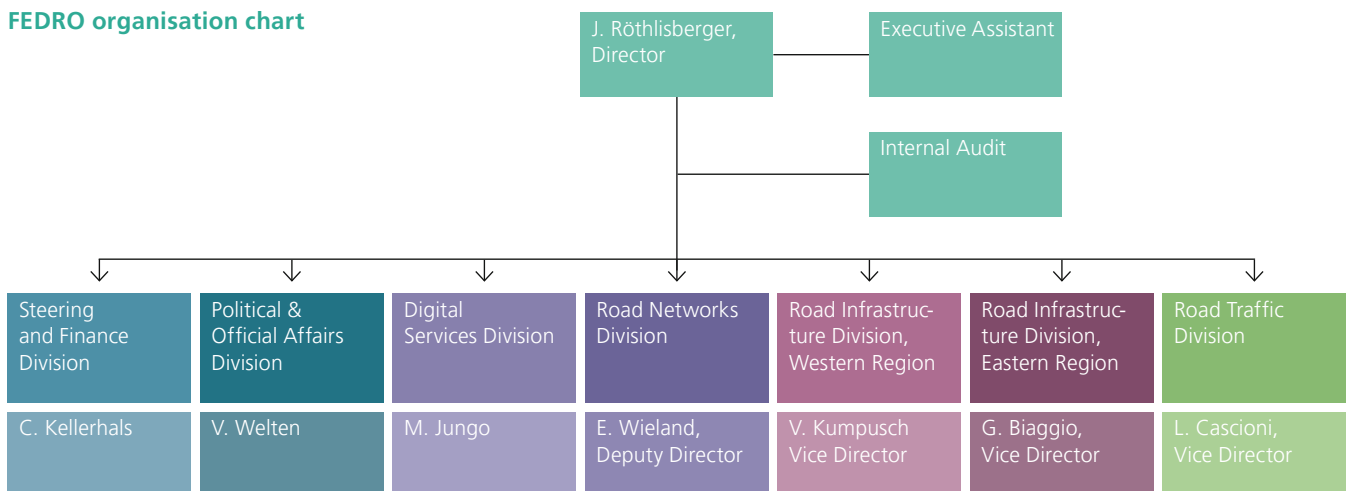
In **1998**, FEDRO moved to a building in Bern known as the Titanic in view of its shape (today it houses the Federal Office of Information Technology, Systems and Telecommunication).

In **2001**, FEDRO moved to new premises on Worblentalstrasse, Ittigen, near Bern.

In **2005**, FEDRO operated from premises on the DETEC campus on Mühlestrasse, Ittigen, which it shared with the Swiss Federal Office of Energy (SFOE), the Federal Office of Transport (FOT) and the Federal Office of Civil Aviation (FOCA).

In **2020**, FEDRO transferred within the DETEC campus from Mühlestrasse, Ittigen, to a new building on Pulverstrasse.

FEDRO organisation chart





Modern legislation for future mobility

As of spring 2023, Switzerland has one of the most advanced road traffic legislative instruments in the world. Parliament has created the legal bases for automated driving. The ordinance is due to come into force in March 2025.



This allows the Federal Council to exploit the potential of intelligent mobility to improve traffic flow and safety.

The increasing digitalisation in the mobility sector is opening up a great deal of potential for making better use of existing road infrastructure preventing congestion. It is also contributing towards marked improvements in road safety. On 17 March 2023, Parliament specified the framework conditions for automated driving in the revised Road Traffic Act, meaning that Switzerland now has one of the most advanced road traffic legislative instruments in the world. With the revised Road Traffic Act it will be possible to quickly introduce ongoing and future developments relating to automated driving on Switzerland's roads. The Federal Council will incorporate these new legal provisions into a corresponding ordinance.

In future, under clearly defined conditions, drivers will no longer be required to exercise control over their vehicle if their automated driving system is activated. For example, it will be possible to use an automated lane-keeping system on motorways, and vehicles fitted with a corresponding system will be able to park autonomously in specially designated and monitored parking zones.



Driverless vehicles such as shuttle buses will be able to carry out journeys on designated stretches if they are monitored. Smaller slow vehicles such as delivery robots can be used without the designation of specified stretches.

In addition, FEDRO may license new trials for vehicles equipped with automated driving systems. This includes trials for vehicles that can travel everywhere without human support.

Automated vehicles on our roads

Currently, automated vehicles may only be operated on public roads if a corresponding special licence has been granted. Since 2015, 16 trials have been licensed for delivery robots, passenger cars and shuttle buses. The most recent trials were initiated in December 2022 in Ebikon and in March 2023 in Schaffhausen.

In Ebikon, a remote-controlled delivery vehicle operated by LOXO AG delivers goods to customers. In the initial stage, for safety reasons the vehicle still travels with an accompanying person on board. In stage 2, the vehicle can travel without accompaniment and has to be remotely monitored. Then in stage 3 it can travel in fully-automated mode. This trial is taking place on a less-frequented public road and the vehicle is licensed to travel at up to 30 km/h.

In Schaffhausen, a retrofitted standard minibus equipped with dual operating mode is being used as part of a public transport service and is licensed to travel at up to 30 km/h. An accompanying person who can intervene at any time is always on board. The vehicle may be operated without any restrictions relating to weather or road conditions.

National highways as renewable electricity sources

FEDRO is using the potential of photovoltaic facilities for the production of renewable electricity on its buildings and surfaces. By 2035 its target is to produce 47 GWh for the operation of its own systems. It also plans to place the surfaces that it will not be using for its own photovoltaic facilities at the disposal of third parties.

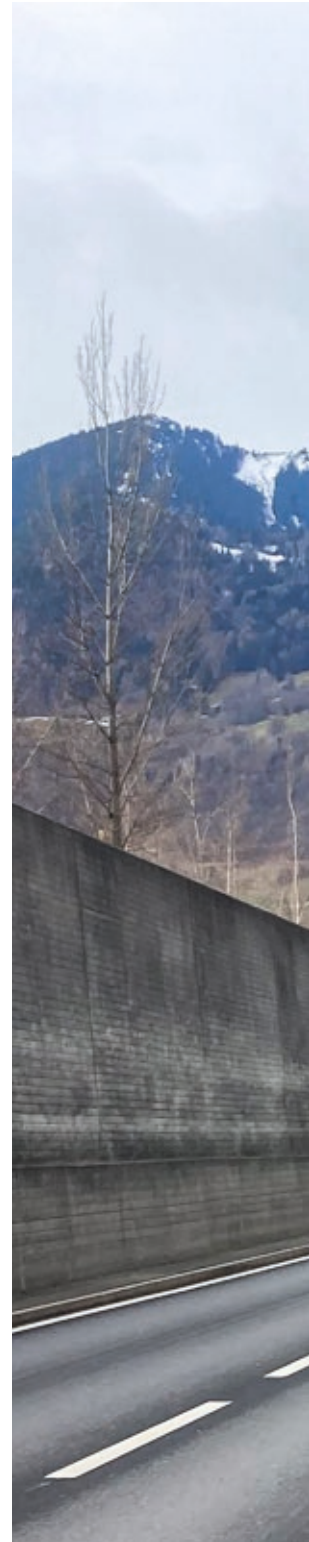
FEDRO meets its entire electricity requirement from renewable energy. For the operation of its road infrastructure it procures electricity exclusively from such sources. It also produces electricity itself from photovoltaic installations. Here it uses photovoltaic facilities for the production of renewable electricity on its buildings and surfaces. For this purpose, works depots are ideal in that they provide large surfaces for the installation of these systems.

In 2022, FEDRO produced slightly more than 1 GWh. Its target is to produce 47 GWh for its own use by 2035. To accomplish this it will equip works depots and tunnel operating centres, as well as enclosed stretches and noise abatement barriers, with photovoltaic systems.

For legal reasons, FEDRO is only allowed to use the electricity it produces to meet its own requirements. In view of this, it aims to produce as much electricity as possible at locations where it is needed for its own purposes. If more electricity is produced at a given location than FEDRO directly consumes, the surplus will be fed into a federal sub-balance group. It will then be used for supplying electricity to a tunnel at another location on the national highways network.

FEDRO will place the surfaces that it will not be using for its own photovoltaic facilities at the disposal of third parties and so encourage the installation of new systems on noise abatement barriers and at rest areas. According to an analysis carried out by FEDRO, the poten-

tial exists to produce around 77 GWh. Facilities planned by third parties have to meet the applicable legal and safety-relevant requirements, and these entities have to sell the electricity generated themselves.





The solar panel installation at the eastern portal of the Karlihof tunnel on the N28 near Landquart (canton of Graubünden).

Impacts of an electricity supply shortage

Last winter, the threat of an electricity supply shortage appeared to be very real. Even though the situation has now eased, the possibility of an electricity supply shortage still exists, and its impacts on the operation of the national highways network would be considerable.



Brighter surfaces, such as here in the Belchen relief tunnel (Basel-Landschaft/Solothurn), can help save energy in tunnel lighting.

The operation of the national highways network requires a total of approximately 154 GWh of electricity per annum. Tunnels account for by far the highest proportion (82 per cent), followed by open stretches (12 GWh, or 8 per cent), while works depots account for the remaining 10 per cent.

An electricity supply shortage would have a major impact on the operation of tunnels more than 500 metres long. The normal safe operation of a tunnel is not possible without electricity, because the systems are not designed to handle lengthy power outages. The following precautionary measures would be conceivable, however:

- The level of lighting could be reduced. In this case, the speed limit would also have to be reduced to 60, 80 or 100 km/h, depending on the type of tunnel.
- At night, the maximum permissible traffic-related lighting reduction could be implemented. This would not require an additional reduction of the speed limit.

Enhancing energy efficiency

While FEDRO's electricity requirement increased by around 10 per cent between 2001 and 2012, its consumption level has since remained constant. Any further increases in its electricity requirements have been offset thanks to improved energy efficiency. For example, in order to save electricity, tunnels are to be equipped with LED lighting by 2030. This will reduce electricity consumption by around 10 per cent. Other measures aimed at reducing the energy requirement for tunnel lighting include painting tunnel walls white and using a light-coloured road surface. This will allow lower intensity LED lighting to be used, thus further reducing electricity consumption.

Works depots, too, will be constructed in accordance with the latest standards. Here, no new fossil-fuel heating systems will be installed. New infrastructure will be constructed energy-efficiently on the basis of the Minergie standard.

- Ventilation systems in safety galleries only maintain a continual high level of air pressure during the day.
- In tunnel operating centres, the room temperature could be adjusted and the necessary air pressure could be reduced to a minimum level.

However, fire ventilation systems in tunnels cannot be adjusted: if they can no longer function due to a power outage, the tunnels concerned have to be closed to traffic for safety reasons. The same applies if the air pressure ventilation system in a safety gallery no longer functions. This is due to the fact that safety galleries have to be kept permanently under pressure in order to keep the shafts free of smoke and gases in the event of a fire, and thus to enable the safe opening and closing of the access doors for rescue crews and people escaping from the tunnel.

The impacts on open stretches would be less severe. Power outages would not automatically lead to road closures, but there would nonetheless still be certain consequences. Some control installations such as signalling systems, speed and warning systems, guidance facilities on stretches on which the emergency lane is used as a traffic lane, traffic management systems, etc. all require a power supply. In the event of a power outage, these facilities can no longer directly influence traffic flow.

FEDRO analysed which tunnels and road sections would have to be closed in the event of a power shortage, taking into account a range of different scenarios (e.g. level of reduction requirements).

Creation of fast charging stations on the national highways

Electric mobility is set to play a major role in decarbonising road transport. FEDRO is promoting the construction of fast charging stations in rest areas on motorways. It also plans to provide space for fast charging hubs along national highways.

The installation of fast charging stations in motorway rest areas represents an important step as part of the roadmap. However, the federal government is not the operator of these charging stations. This is the responsibility of private sector investors. FEDRO is responsible for providing the power supply up to and including the transformer stations, and for covering the associated costs, which the operating companies repay in the form of a progressive annual compensation scheme.

The transport sector accounts for more than a third of Switzerland's overall energy consumption, and passenger cars account for more than 70 per cent of the country's CO₂ emissions. Thus, electric vehicles could make a significant contribution towards the reduction of CO₂ emissions in the medium term. FEDRO is therefore promoting the use of vehicles with alternative drive mechanisms, including the development of an efficient network of fast charging stations along the national highways.

FEDRO entered into this commitment in favour of electric mobility in 2018 when it signed the 2022 Electric Mobility Roadmap. Its goal was to increase the proportion of registered electric vehicles to 15 per cent by 2022 – a target that it had in fact already achieved ahead of that deadline. For the next stage, FEDRO has now defined new ambitious targets: one of these is to increase the proportion of newly registered plug-in vehicles (electric cars as well as hybrids) to 50 per cent by 2025. To achieve this goal, it will be necessary to provide an attractive charging infrastructure. Thus the aim is to have 20,000 publicly accessible charging stations in place by the end of 2025.



The fast charging station at the Aspholz rest area near Adliswil (canton of Zurich).



The fast charging station at a rest area near Riddes/Martigny in the canton of Valais.



As of the end of 2022, 26 rest areas were equipped with fast charging stations, and a further 28 will follow in 2023. The remaining 46 rest areas are scheduled to be equipped with fast charging stations by 2030.

FEDRO now wants to take the Electric Mobility Roadmap a step further and make additional areas along the national highways available for the installation of fast charging hubs. It invited interested companies to apply for the reservation of one or more locations. In the event of a successful application, a reservation agreement between FEDRO and the company concerned will be concluded for a term of three years. A project status report will be requested every six months. By the end of the three-year period, the company concerned has to have a finalised project ready for application for a construction permit.

The response to this call for applications was considerable: a total of 59 requests were received, resulting in the conclusion of a reservation agreement valid for a period of three years. In view of the large number of submitted requests, FEDRO decided to withdraw the call for applications for the time being, and is currently formulating a strategy for processing future application dossiers.

Special road markings with circles to improve road safety

Motorcyclists are more likely to suffer serious injuries in the event of an accident. In a pilot project initiated on the Bernese side of the Brünig pass, FEDRO carried out a study to determine the extent to which certain infrastructure measures could minimise the risk of injuries and fatalities.



Special circle markings to improve road safety on the Brünig pass.

At the end of 2021, FEDRO asked the Thun regional office to systematically analyse the Bernese side of the Brünig pass in a pilot project, and to identify potential measures to improve road safety for motorcyclists.

On the Bernese side of the pass, a total of 30 accidents involving motorcyclists occurred between 2011 and 2020. In an analysis carried out in 2021, FEDRO examined potential deficits in the existing infrastructure. This study also incorporated the results of a systematic road safety inspection carried out to identify any existing weak points. In this way a comprehensive catalogue of measures was produced with the aim of improving road safety for motorcyclists on the Brünig pass.

Unsurprisingly, the analysis showed that skidding or single-vehicle accidents in bends accounted for around two-thirds of the recorded incidents. It also determined that there was a high frequency of accidents in the Seil hairpin bend near the Soliwald tunnel. In the downhill direction, this bend has an increasingly narrow radius, which is not immediately apparent on approach. Around 80 per cent of road users approached this bend too fast and had to brake sharply when reaching the narrow section. So the decision was taken to add a series of circles on the road along the centre line in order to optically warn road users in advance about the narrowing radius of the bend. These special markings were added in September 2022 and are proving to be an effective measure. An initial analysis carried out a month later showed that only 4 per cent of motorcyclists and 14 per cent of other drivers had to brake after entering the bend – clearly a major improvement when compared with the previous figure of 80 per cent.



Non-slip manhole covers and underride protection

The special markings are undoubtedly the most notable measure, but this was not the only one to be implemented. For example, the skid resistance of manhole covers along the route was enhanced, signalisation was optimised, and underride guards were installed beneath some of the crash barriers. In addition, the sharp-edged supports of the numerous rockfall protection nets were covered over in order to minimise the risk of injury.

Findings for other stretches

The effectiveness of the above measures will continue to be monitored during the 2023 motorcycle season. The pilot project yielded important findings regarding ways in which road safety can be enhanced for motorcyclists with the aid of simple, inexpensive and quickly implementable measures. The pilot project will terminate at the end of 2023. The methodology and implemented measures can then be applied on similar stretches in order to increase road safety for motorcyclists.

Lengthening of exit lanes near Airolo and Göschenen

The waves of tourists during public holiday weekends and the summer holiday season frequently cause lengthy queues at the northern and southern portals of the Gotthard road tunnel. In an effort to discourage drivers from leaving the motorway prematurely, FEDRO is extending the two exit lanes on the hard shoulder at Göschenen (UR) and Airolo (TI) when the road over the pass is open.

This will make it easier for drivers who decide to travel via the Gotthard pass to exit the motorway. The eight-kilometre special lane near Airolo is called CUPRA (Corsia d'uscita preferenziale Airolo/Passi – special exit lane, Airolo/passes). Here the Airolo exit lane will be lengthened. This solution means that road users who want to travel over the Gotthard pass instead of through the tunnel in order to avoid lengthy waiting times at weekends, will be able to leave the motorway via the special exit lane without major delays. A successful trial was carried out in 2022. This solution will be reactivated in

2023-2025 as soon as the Gotthard pass is opened to traffic. Then from 2026 on it will be permanently implemented at weekends during the summer.

This measure was conceived by FEDRO in response to the fact that, due to the traffic jam situation, numerous road users were already leaving the motorway further down the valley, for example at the Verenzo/Quinto exit, thus causing additional traffic and danger in the nearby villages.



The extended exit lane on the Gotthard stretch near Göschenen (canton of Uri).



Advantages of CUPRA:

- Shorter queues before the tunnel.
- Reduced volume of traffic in the tunnel.
- Reduction of traffic volume on the cantonal road heading north and so in the villages south of Airolo.
- Road safety maintained in the villages concerned.
- Enhanced road safety on the Gotthard route.
- General improvement of traffic flow.

The extended exit lane at Airolo makes it easier to reach the route over the Gotthard pass when the motorway is congested.

Traffic in villages down by 50 per cent

The CUPRA trial phase was conducted at weekends from 16 July to 25 September 2022. The objective was to record traffic volumes in order to determine the effectiveness of CUPRA on traffic flow. The result was that, each day, between 2,000 and 3,000 vehicles used the special lane. From these figures the traffic management specialists and police deduced that the same number of vehicles no longer used the cantonal road through the villages, i.e. up to 50 per cent of the daily traffic volume.

Encouraged by this positive effect, FEDRO plans to continue to allow the temporary use of the special lane as required, until 2026. Thanks to an electronic traffic control system, this solution can be activated depending on the traffic situation.

Easing of traffic in Wassen (canton of Uri)

A similar measure is to be initiated from 2023 in Göschenen (canton of Uri) in the southerly direction when the Gotthard pass is open to traffic. To prevent traffic from travelling through Wassen in the direction of Andermatt and the Gotthard pass, a trial will be initiated involving the lengthening of the Göschenen A2 motorway exit to the Wassen junction. Drivers wishing to travel via the Gotthard pass will be able to use the extended exit lane instead of leaving the motorway via the Wassen exit. The existing Göschenen exit lane is around 1.7 kilometres long, and runs on the stretch between the Wassen entrance and the southern portal of the Naxberg tunnel. The temporarily lengthened Göschenen exit lane starts immediately after the Wassen entrance and will be around 3 km long. After the trial, the plan is to permanently install this solution in summer 2024.

Orange plates on vehicles transporting dangerous goods

Some of the most common everyday items – like paints and dyes, BBQ gas canisters, fireworks, hair sprays, etc. – are in fact classified as dangerous goods, and their transport is subject to special regulations.



Dangerous goods transport in Switzerland

Class of dangerous goods		in 1,000 tonnes	± % 2020/21
	In 2021		14,7
1	Explosive substances and items containing explosive substances (e.g. dynamite)	(34,0)	(99)
2	Gases (e.g. propane)	927,2	63,5
3	Flammable liquids (e.g. petrol, diesel)	10 088,1	17,0
4.1	Flammable solids, self-reactive substances, polymerising substances and desensitised explosive solids (e.g. matchsticks)	17,6	58,5
4.2	Substances liable to spontaneous combustion (e.g. cotton waste with an oil content)	(2,0)	(99)
4.3	Substances which, in contact with water, emit flammable gases (e.g. carbide)	(0)	(99)
5.1	Inflammatory (oxidising) substances (e.g. ammonium nitrate, hydrogen peroxide)	15,9	67,1
5.2	Organic peroxides
6.1	Toxic substances (e.g. arsenic)	46,6	86,1
6.2	Infectious substances (e.g. infectious waste)	27,7	55,9
7	Radioactive materials
8	Corrosive substances (e.g. hydrochloric acid)	552,8	38,2
9	Miscellaneous hazardous substances and items (e.g. lithium batteries)	1 302,2	40,6
Total		13 014,1	14,7
Transported non-hazardous goods		2 730 172,4	2,8

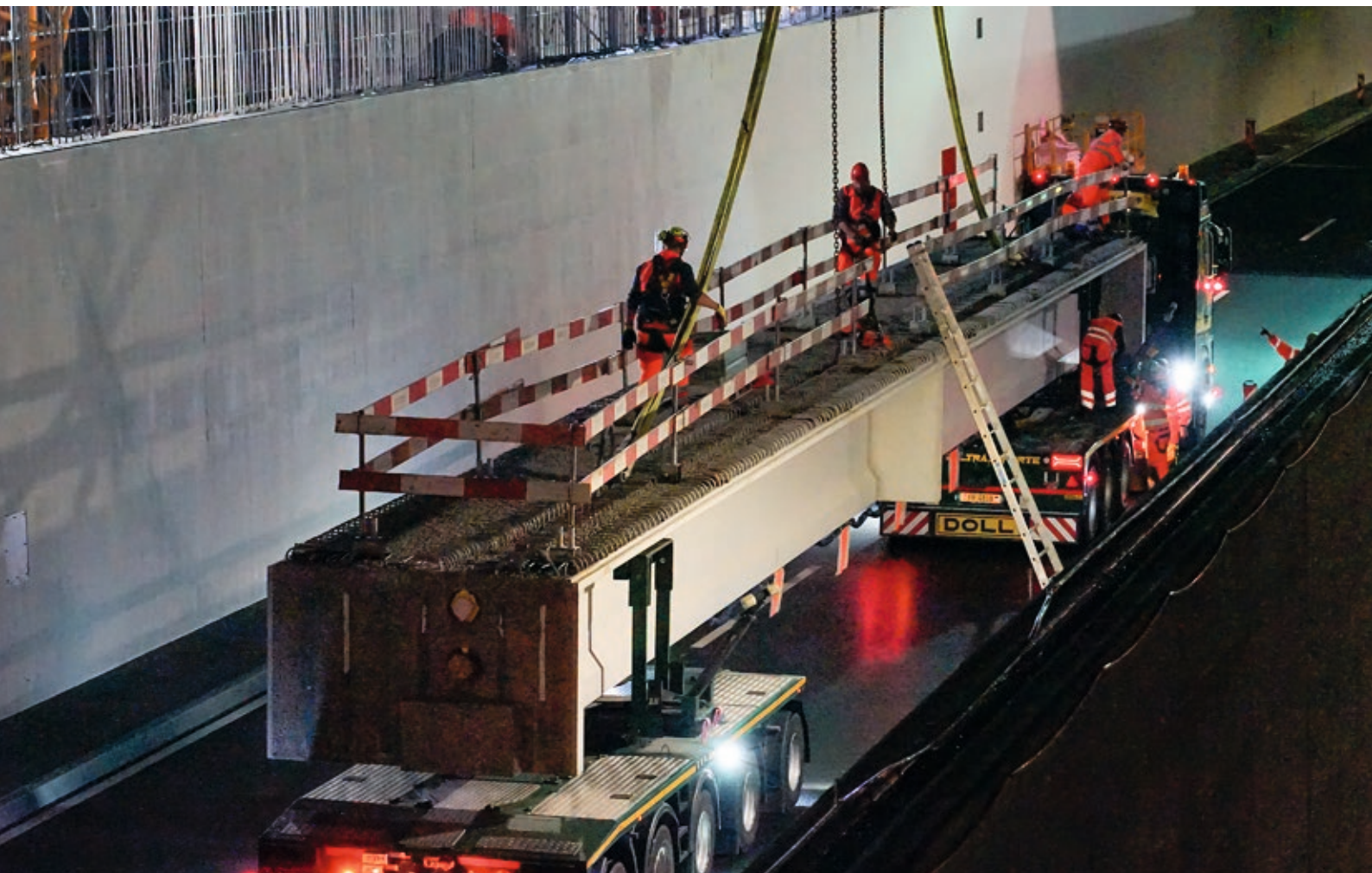
According to a clearly formulated definition, dangerous goods can be described as items that can have a broad variety of harmful effects on people, animals and the environment. We tend to pay little attention to the hazards associated with the use of such goods in households in quantities that can be purchased in retail outlets, and mostly ignore the corresponding regulations governing dangerous goods. Although large quantities of such goods are transported on our roads (cf. table), there is no real cause for concern regarding the risk of hazardous incidents.

This level of safety is assured thanks to the existence of extremely stringent regulations. On the one hand there is the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR – abbreviation of the French title: Accord relatif au transport international des marchandises dangereuses par route), which contains around 1,000 pages, and on the other hand Switzerland has its own Federal Ordinance on the Carriage of Dangerous Goods by Road, which comprises 50 pages.

Special instruction for drivers

If a dangerous goods transport is to be marked with an orange plate, the vehicle drivers must complete a course lasting several days followed by an examination. Vehicles carrying dangerous goods have to display orange plates on the front and rear. Plates without numbers are used for the carriage of smaller quantities such as barrels, canisters, crates, etc. Tankers are required to display plates at the front and rear. Here the upper figure indicates the type of hazard and the lower figure indicates the product or product code. These numbers enable emergency crews (fire service, police) to identify the type of transported dangerous goods and so take appropriate action in the event of an incident.

In 2021, 286 million tonnes of goods were transported on Switzerland's roads, of which around 13 million tonnes were classified as dangerous goods. A special permit is required for the transport of dangerous goods through the Gotthard or San Bernardino road tunnel (cf. page 24).



For the Schwamendingen motorway enclosure on the A1 (canton of Zurich), Element AG manufactured a total of 232 precast concrete beams: 178 at its plant in Tafers (canton of Fribourg) and 54 in Veltheim (canton of Aargau). The company needed a special permit for night-time transportation from August 2021 to June 2023. These concrete elements, which are up to 30 metres long and weigh up to 70 tonnes, serve as both a cover for the A1 near Schwamendingen and a base for the planned elevated park.

Special permits for three transport categories

Special transports by road require special permits. These are divided into three categories and are processed by the Gotthard tunnel fire and rescue service. In 2022, 23,133 such special permits were issued.



Exceptional transports and vehicles: many large structural elements and objects have to be transported by road, e.g. steel girders, concrete elements, even chalets or ships. These transports require a special single permit. In such cases the route has to be planned in exact detail by specialists. For safety reasons, transports of this nature are often carried out at night, accompanied by traffic police and technical specialists.

As a rule, it is mainly foodstuffs, medications and post office transports that are permitted **at night and on Sundays**. A special permit is granted if the transport of items such as vegetables has to be carried out at the weekend in view of their use-by date. Transports of this nature are mostly carried out on a regular basis and are granted a permit with a longer duration.

Transport of dangerous goods through tunnels: the transport of dangerous goods through the Gotthard and San Bernardino road tunnels is possible in exceptional cases, as long as a special permit has been granted. This applies in the event of supply shortages and if no alternative route exists.



Special permits for transport by road

	2017	2018	2019	2020	2021	2022
Total	27,194	27,739	29,023	28,168	28,105	23,122
Exceptional transports	26,828	27,287	28,561	27,655	27,595	22,509
<i>Single permits</i>	23,918	24,991	25,347	25,367	24,652	19,756
<i>Permanent permits</i>	2,910	2,296	3,214	2,288	2,943	2,753
Night-time and Sunday transports	239	238	239	257	294	345
<i>Single permits</i>	21	0	2	0	21	11
<i>Permanent permits</i>	218	238	237	257	273	334
Transport of dangerous goods	127	214	223	256	216	268
<i>Single permits</i>	25	58	43	53	48	51
<i>Permanent permits</i>	102	156	180	203	168	217

Step-by-step implementation of the Cycle Routes Act

The Cycle Routes Act entered into force on 1 January 2023. The federal government, the cantons and the communes are now required to plan and install a network of cycle routes. The federal government's duty is to provide information and official basic geodata.

The Federal Act on Cycle Routes is based on four pillars. Firstly, it obliges the relevant cantonal authorities to plan and install a bicycle route network. Secondly, it defines the planning principles for the network, which must be fully connected, safe, attractive and direct. However, the legislation grants the cantons sufficient leeway with regard to implementation. Thirdly, it requires the federal government, the cantons and communes to replace bicycle routes, or parts thereof, if they have to be done away with or if the requirements in terms of safety and attractiveness can no longer be met.

And finally, the legislation empowers the federal government to publish information and coordinated official basic geodata regarding the quality and availability of cycling infrastructure. This simplifies the planning and maintenance of cycle route networks and is a major support mechanism for the cantons and communes.

The federal government also organises conferences on this topic. At the end of 2023, FEDRO is to issue a special tool for cycle network planning concerning leisure-time and everyday traffic. This tool is intended to support the cantons and communes with their planning activities. The federal government is thus creating framework conditions and granting subsidies via the agglomeration programmes into which cycle routes can be integrated.

The aim behind the establishment of a cycle routes network is to separate cyclists from other road traffic and thus enhance their safety. In addition, the increased use of bicycles will ease the burden on the roads and railways.

There are also plans to update and harmonise regulations for bicycles, light motorbikes and motorbikes. In particular, this also involves establishing clear rules on the use of bicycle infrastructure. Bicycles, e-bikes with pedal assistance and purely electrically powered small vehicles are to be permitted on surfaces intended for bicycle traffic. The Federal Council is conducting a consultation on these and other changes from 28 June to 18 October 2023.



Conference on cycle routes

To support the activities of the planning authorities, the first conference on cycle routes was held on 29 March 2023 on the premises of FEDRO. More than 70 people from all the cantons and the major cities participated in this event. The discussion revealed that the foundation stone for the installation of safe and attractive cycle routes is already being laid in the plans. The greater the perception of hierarchies, leadership forms and planning standards, the more effective the connection of cycle routes beyond regional and cantonal boundaries will be, so that their installation will be self-explanatory and simplified. This coordination of the cycle route network is also important in terms of the exchange of geodata between the cantons, the federal government and third parties.

On 10 May, a follow-up webinar on this topic was organised, in which more than 200 specialists from public authorities and planning offices participated. FEDRO will organise these events each year in order to foster exchange between the federal government and specialists.



The new cycle route in the Bernese Jura near the Taubenloch gorge above Biel/Bienne.

Through a gorge in the Jura range and over a motorway

Examples of how the federal government intends to promote cycling in the future include the new Oberwies footpath and cycle lane over the A1 motorway near Wallisellen (canton of Zurich), the cycle route through the Taubenloch gorge in the Bernese Jura, and the planned separation of traffic near the Wankdorf motorway junction (canton of Bern).



The cycle and pedestrian overpass on the A1 motorway near Oberwies/Wallisellen (canton of Zurich).

The route through the Taubenloch gorge consists of a lane for human-powered mobility between Biel/Bienne (Bözingerfeld) and La Heutte in the Bernese Jura. The N16 stretch concerned belongs to the national highways network. The Taubenloch gorge forms a bottleneck along this route (according to legend, a turtle dove flew into the gorge in order to escape from the cruel knight Ingelram, and flew out again transformed into a white dove).

The stretch between Biel/Bienne North and La Heutte is also used by moped riders and cyclists. This dangerous traffic mix and the necessary adaptation of the engineering structures and drainage system to current standards are the reasons why this stretch is to be renovated. A separate lane for human-powered mobility

(pink line in the illustration below) has also been constructed, which separates cyclists, etc., from motorised traffic via a new route. For a suitable layout of this new lane between Frinwillier and Biel/Bienne, the necessary expansion costs amounted to around CHF 10 million. The new lane was officially opened on 29 May 2023.

Over the most highly-frequented motorway

The installation of a cycle lane in Oberwies, near Wallisellen (canton of Zurich) that passes over Switzerland's most highly frequented motorway is another example of how the federal government is installing its own high-quality facilities for cyclists. This project demonstrates how the federal government itself intends to implement the provisions of the Federal Bicycles Route Act. The overpass of the A1 motorway near Wallisellen has provided pedestrians and cyclists with a safe connection between Wallisellen and Zurich Schwamendingen since 1976. It crosses over the most highly frequented stretch of Switzerland's motorway network with a daily traffic volume of more than 130,000 vehicles.

Because some of the bridge elements were in poor condition, FEDRO decided to demolish the existing overpass and replace it. This resulted in greater safety and comfort for pedestrians and cyclists. The road surface of the new bridge is four metres wide (i.e. half a metre wider than the previous one). This means greater comfort and more space for users when they pass one another. The canton of Zurich contributed CHF 500,000 towards this improvement, while the federal government paid CHF 2 million.

Construction work hampered by global influences

Since June 2021, numerous Swiss construction companies have experienced difficulties due to the unexpected unavailability of building materials. Because of interruptions to the supply chain they have had to contend with deadline delays and price increases. This situation has also had an impact on FEDRO's construction projects.

Initially, it was the COVID-19 pandemic that played havoc with global supply chains. Then, due to the rapid economic recovery throughout the world, Swiss companies in Switzerland found themselves confronted with supply problems. The development of prices in Switzerland has varied considerably, depending on the type of construction material. While the prices for materials such as sand and gravel, bricks, cement and concrete remained fairly stable, the price of steel rose sharply. In the course of 2021, it increased by around 70 per cent.

Steel production cannot keep pace with the sharp increase in demand. For the companies concerned it is also difficult to predict the future development of steel prices. Due to the conflict in Ukraine and the global sanctions against Russia, these rose again in 2022.

From day to day

Work on enclosing the Schwamendingen section of the A1 motorway serves as an example of the problems associated with global supply shortages. In mid-2022, there was suddenly a shortage of the timber required for the shell of the enclosure. There were also shortages of plastic piping and especially of reinforcement steel, a large proportion of which is produced in Ukraine. In mid-2022, one of the four main importers of reinforcement steel completely discontinued deliveries to Swiss customers. This was followed by a shortage of cement on the Swiss market. In the case of the Schwamendingen enclosure, however, there were never any actual construction delays resulting from supply chain interruptions. Nonetheless, there was always some uncertainty as to whether the necessary material would be available on time. This posed an additional challenge for the complex and multi-layered planning of the construc-

tion work. In terms of obtaining the necessary materials from one week to the next, the companies concerned simply had to hope for the best. They received no prior confirmation of delivery of the reinforcing rods they had ordered.

Even for a major player such as FEDRO it was not possible to acquire large reserves in advance. Suppliers had to exercise restraint, and project managers simply had to accept the unpredictability of the situation. For the widening of the Zurich northern bypass project on the A1, for example, the delivery deadlines for semiconductor products suddenly increased from three to twelve months. Here it was the temporary closure of Shanghai Harbour and the blockage of the Suez Canal that caused the supply chain interruptions. In this case, thanks to early ordering it was possible to significantly limit (but not fully avoid) delays in supply.



The service duct for the third Gubrist tunnel tube: disruptions in supply chains for special materials may affect the installation and progress of the work.

7.4 million tonnes of excavated material at the Gotthard

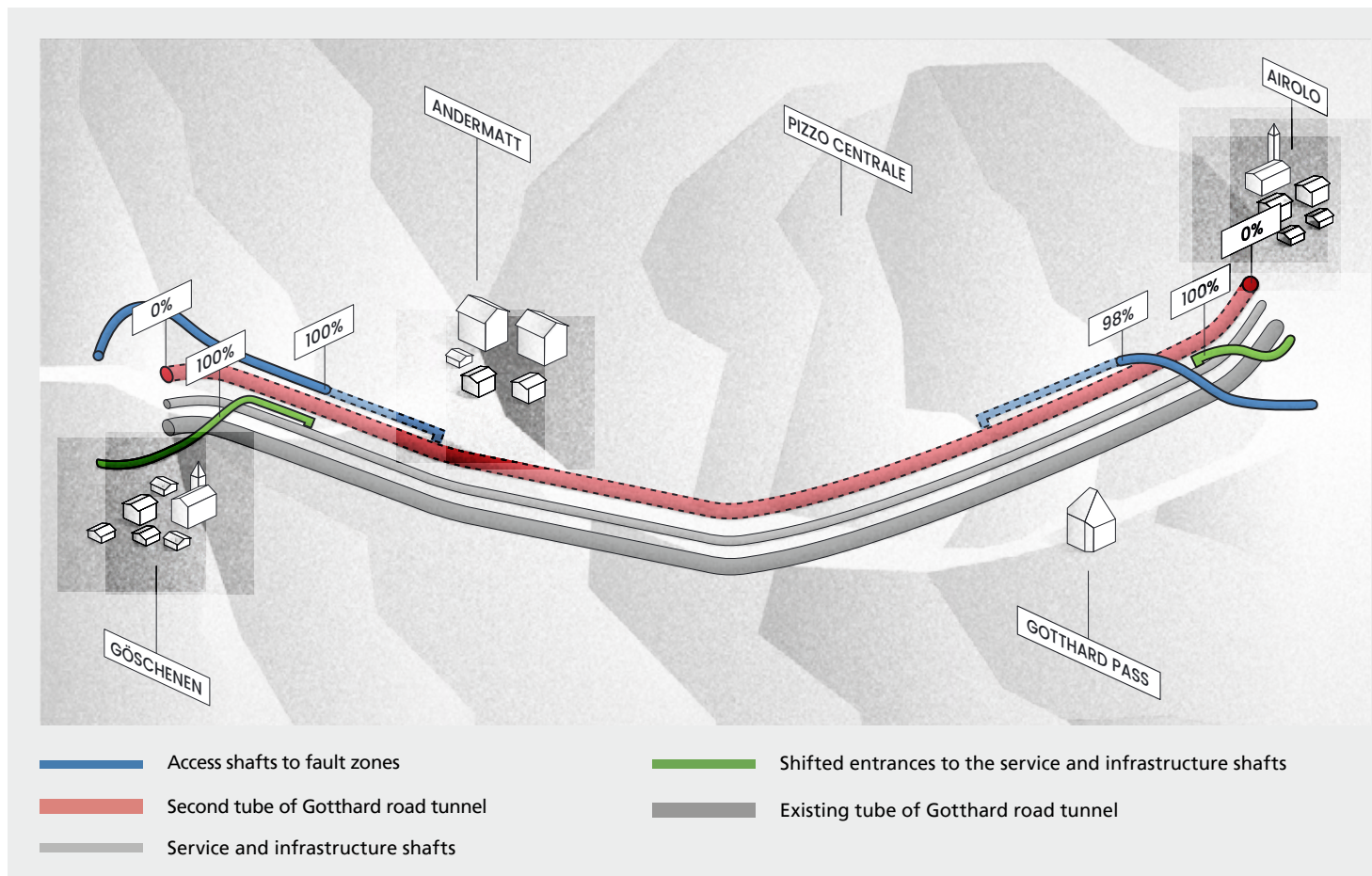
For the construction of the 16 km-long second Gotthard road tunnel tube, 7.4 million tonnes of material are being excavated from the mountain. Approximately 97 per cent of the excavated material is to be used for a variety of projects. Transporting and processing this material are challenging tasks.

Over a distance of around 2.5 kilometres, the conveyor belts run through the upper Leventina from Airolo to Stalvedro and back. The central material processing facility is located in Stalvedro, where most of the excavated material from both sides of the tunnel is processed. From Göschenen, the material is transported to Airolo by rail,

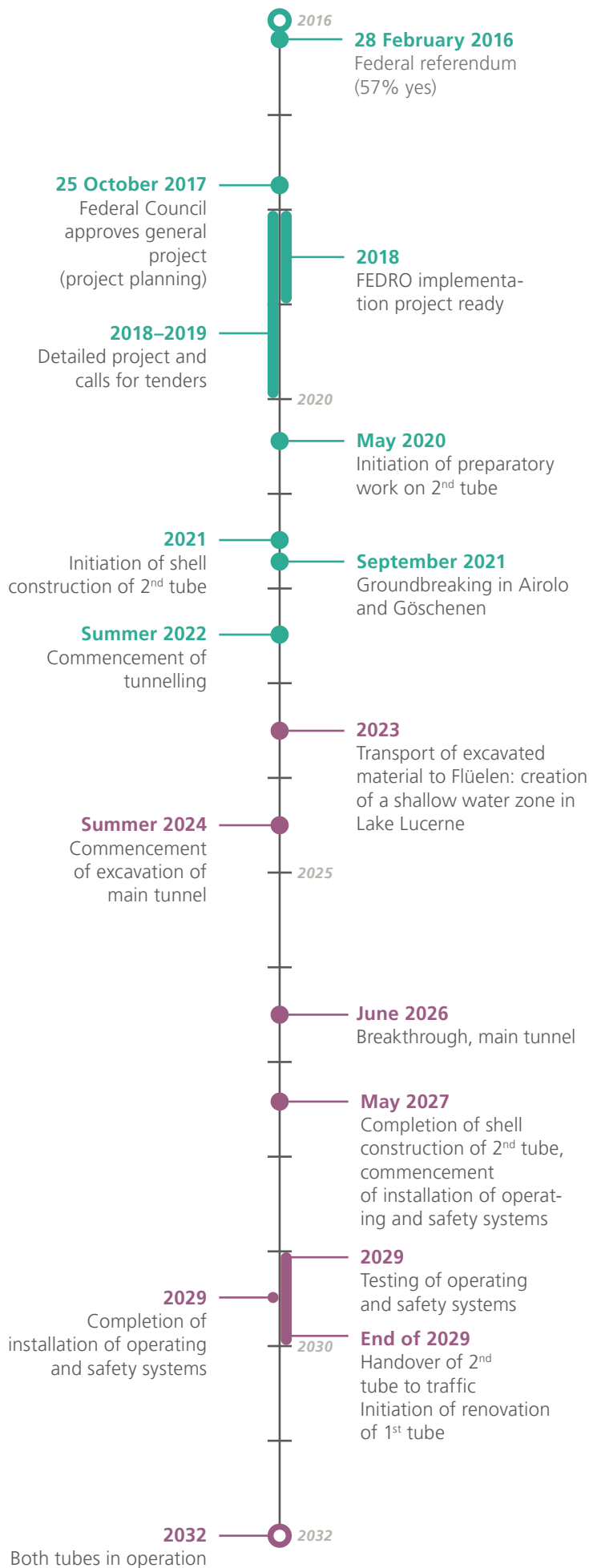
where it is then offloaded onto the conveyor belts for onward transport to Stalvedro.

Shallow water zone in Lake Uri

In Stalvedro, the material is cleansed, crushed and temporarily stored until it is used for a variety of purposes.



State of progress in building the second tube.



At the northern portal in Göschenen: the conveyor belt for the excavated material during construction of the second Gotthard road tunnel.

1.5 million tonnes of rock will be reused for the construction of the tunnel itself, while a further 0.3 million tonnes are to be used for the later renovation of the first tunnel tube. In Airolo, a stretch of the motorway will be covered in order to reduce the level of noise for residents in the neighbouring villages. 1.9 million tonnes will be used for this purpose. In addition, 3.5 million tonnes of rock will be used to create new shallow water zones in Lake Uri. This will provide habitats for flora and fauna. The first loads were transported to Flüelen in spring 2023.

Preparatory work for the excavation of the main tunnel

In order to initiate the excavation of the main tunnel in summer 2024, logistical preparations will be required, and access will have to be prepared for the two tunnelling machines. The preliminary cut at the northern portal, a vertical cavity in the narrow space between the existing road tunnel and the Steglau tunnel on the bypass to Andermatt, will be a particularly challenging task. At a later stage, the individual elements of the tunnelling machine will be lowered to the level of the second tube and assembled in a previously excavated gallery.



The third tube of the Gubrist tunnel near Zurich was opened in April 2023.

Third Gubrist tunnel tube opened to traffic in April

The two-lane third tunnel tube through the Gubrist was opened to traffic in April 2023. As of 3 July 2023, three lanes are open for traffic on the Zurich northern bypass towards Bern. The two existing tubes can now be renovated as planned.

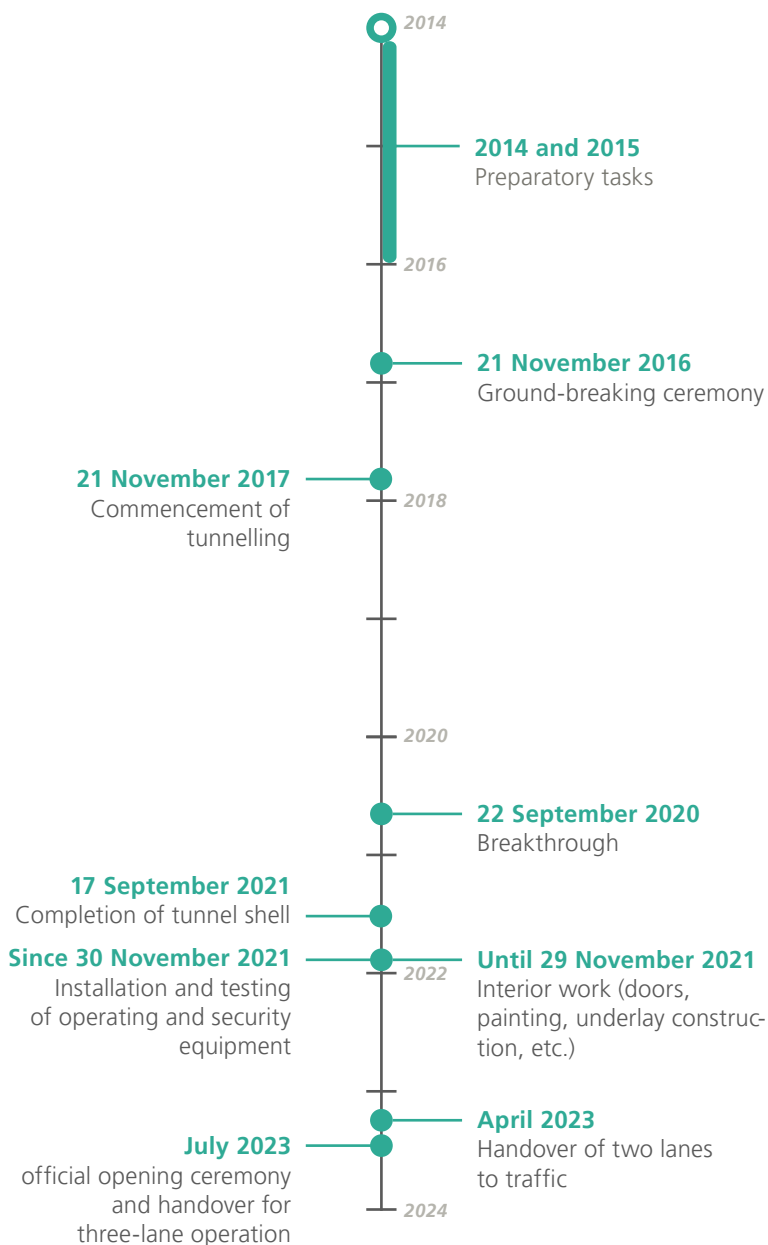
The construction of the third Gubrist tunnel tube took a total of 6.5 years. By way of comparison, the preceding planning period was more than twice as long (14 years). Late at night on 20 April 2023, silence reigned in the tunnel. The traffic signals on the ceiling, which had already been switched to green, were the only sign that the tunnel was ready to be opened to traffic. During the previous few hours the markings had been put in place at the portals, and the final series of tests had been carried out during the previous day. The third tube was now ready to be opened to traffic, though only two of the three lanes could be used for the time being.

Construction work still had to be carried out in Weiningen until the beginning of July. Here, the necessary work on the traffic lane could only be carried out after traffic had been diverted from the second to the third tube. The Weiningen exit had to be kept open throughout the entire construction period for the third tube. And because the exit lane crossed the new lane to be constructed, it was not possible to complete this task.

At 4 am on 20 April, traffic in Zurich-Affoltern was halted briefly, the pylons and signals were transferred to the new location and the left-hand lane was closed. Closing roads and diverting traffic on motorways are routine activities for the maintenance crews and cantonal police, but handing over a tunnel to traffic is something of a special occasion.

Widening of the Gubrist bottleneck

The third tube is by no means a conventional engineering structure. The 3.4km-long tunnel has the widest excavation diameter (16 metres) of any tunnel in Switzerland. 1.3 million tonnes of rock had to be excavated, and the rock material had to be removed by a total of 1,350 train journeys via a specially constructed railway line. Securing the excavation work and shell construction required 5,500 tonnes of reinforcing steel and 205,000 cubic metres of concrete. A total of 360 kilometres of cabling also had to be laid.



Third tube of the Gubrist tunnel

- Length: 3.4 kilometres
- Three lanes
- Width of carriageway: 11 metres
- Twelve lateral connections to the second tube, three of which are drivable
- Excavation diameter: almost 16 metres (largest in Switzerland)
- Excavated surface area: 180 square metres
- Excavated volume: 1.3 million tonnes of rock (transported away by 1,350 railway journeys from Regensdorf loading station, saving 160,000 HGV journeys)
- Tunnelling rate per day: 4 to 6 metres
- Materials: 5,500 tonnes of reinforcing steel, 145,000 cubic metres of in-situ concrete, 60,000 cubic metres of sprayed concrete, 360 kilometres of cabling
- Number of personnel at the construction site for the third tube: up to 120 a day
- Cost: approx. CHF 565 million

The carriageway is 11 metres wide and comprises three traffic lanes. Once the completed tunnel has been opened on 3 July 2023, three lanes will be available for traffic on the northern bypass in the direction of Bern. The easing of the congestion on the A1, on which traffic jams occur practically every day, will also please the residents of the nearby villages, since the smoother traffic flow will mean less diversion of traffic through these localities.

However, the project for the widening of the northern bypass has not yet been concluded. The two original tubes still have to be renovated, and this task is expected to take until the end of 2027. There will then be four lanes in the easterly direction and the Gubrist bottleneck will have been widened in both directions.



Federal Councillor Albert Rösti with FEDRO Director Jürg Röhliisberger.

Safety galleries along national highway tunnels

Switzerland's national highways network comprises 281 tunnels. For tunnels, special safety requirements apply. Safe escape routes lead to parallel safety galleries.

The last batch of rocks had landed on the ground and the tunnelling machine had done its job: on 28 September 2022, the breakthrough was celebrated of the new safety gallery for the Kerenzerberg tunnel in the canton of Glarus. When the construction of the parallel safety gallery is completed in 2024, the main tunnel will have an escape route and air extraction shaft. This means that, in the event of an incident in the tunnel, road users will be able to exit via a safe escape route.

CHF 1.6 billion for tunnel safety

As a consequence of the major fire disaster in the Gotthard road tunnel in 2001, more stringent tunnel safety requirements were introduced in Switzerland. All tunnels more than 600 metres long are now subjected to safety inspections. In order to enhance the safety of the tunnels on the national highways network, FEDRO will invest around CHF 1.6 billion in tunnel infrastructure up to 2025. This amount is to be spent on improvements to the signalisation and guidance facilities, the installation of new ventilation systems, and measures such as the construction of safety galleries. Improvements to the ventilation systems and signalisation facilities have already been implemented in numerous Swiss tunnels, but the construction of safety galleries is considerably more costly. This task requires more time for both planning and construction work.

FEDRO is currently constructing five new safety galleries, namely for the Cholfirst tunnel in Schaffhausen, the Kerenzerberg tunnel in the canton of Glarus, the Gei



tunnel in Misox (Ticino), the Leissigen tunnel on the A8 (along the Lake of Thun) and the Isla Bella tunnel near Rothenbrunnen (canton of Graubünden). In mid-2023, work is scheduled to commence on the construction of two more safety galleries on the section between Tavannes and Biel/Bienne-Bözingenfeld.

Air pressure in safety galleries

Safety galleries normally run parallel to the existing main tunnel, and are accessed via lateral connections. The latter are installed at intervals of 250 metres and are equipped with emergency exits and connecting doors. At each end of the gallery there is an exit to the outdoors. In the event of a fire, air pressure in the safety gallery prevents the penetration of smoke from the main tunnel. This means that both the gallery and the lateral connections remain free from smoke, even when the escape doors are open.

The design of each safety gallery differs from tunnel to tunnel, in terms of length, location and structure. While

the new safety gallery for the Crapteig tunnel near Thusis (canton of Graubünden), which was completed last year, has eight lateral connections, the Cholfirst tunnel (Schaffhausen) has six.

When is the use of a safety gallery necessary?

In the event of an incident such as a fire, the niches marked in green signal the location of the nearest escape route. When a tunnel runs deep under the ground, it is not possible for each escape route to lead to the surface. And this is where safety galleries come into play: they are connected to emergency exits and enable road users to escape from the tunnel.

However, not every tunnel needs a safety gallery. In tunnels with two tubes, the possibility exists of installing lateral connections to the neighbouring tube. These already meet the applicable safety requirements thanks to their design and structure. In the event of a fire in one tube, the second tube can be closed and serve as an escape and rescue gallery.



The safety gallery at the Milchbuck tunnel in Zurich.

CHF 11.6 billion for expansion projects until 2030

By 2030, the Federal Council aims to initiate expansion projects on the national highways network costing a total of around CHF 11.6 billion. In doing so, it wants to improve the flow of traffic on the national highways and continue to relieve the pressure on towns and communes. Moreover, targeted upgrading measures ensure the resilience of the national highways network, which is so important for public mobility.

The volume of traffic on the national highways network has increased by more than a factor of five over the past 60 years, and is likely to continue to do so until 2040. Traffic flow on the network is to be improved with the aid of targeted capacity increases.

The various projects are to be implemented within the scope of the strategic development programme for national highways (STEP). At its session on 22 February 2023, the Federal Council adopted its current STEP programme and submitted it to Parliament for debate. The programme encompasses short-term to long-term projects with a total investment volume of CHF 34.147 billion. This is earmarked for the following purposes:

- Projects totalling CHF 5.8 billion, which Parliament already approved in the previous programme.
- Projects totalling CHF 11.6 billion for implementation up to 2030, primarily in the agglomerations. These projects are intended to solve problems where there is the greatest need for action, and to increase the attractiveness of residential areas.
- Expenditure of around CHF 8.8 billion for maintenance, operation and modification of the existing network for the period from 2024 to 2027. Here the Federal Council aims to further increase the availability and safety of the network and thus improve the compatibility of road traffic. This will also ensure that the necessary resources can be invested to preserve the value of tunnels, bridges and road surfaces.

CHF 4 billion for 2023 expansion stage

In February 2023, the Federal Council petitioned Parliament for the release of the necessary funding for operation and maintenance and for the financing of the 2023 expansion stage. The most urgently required and advanced expansion projects are each allocated to an expansion stage.

The Federal Council requested Parliament to reassign (and definitively approve) five projects from the 2030 programme to the 2023 expansion stage. Work is expected to commence on these five projects, with total costs of around CHF 4 billion, during the next four years.

- A1 Wankdorf (Bern) – Schönbühl (Bern)
- A1 Schönbühl (Bern) – Kirchberg (Bern)
- A1 Rosenberg tunnel in St Gallen
- A2 Rhine tunnel in Basel
- A4 Fäsenstaub tunnel in Schaffhausen

For the realisation of these projects, the Federal Council has petitioned Parliament to grant a credit line of CHF 4.002 billion (gross costs as of 2020, excluding VAT and inflation). In addition, CHF 52 million will be required for the exchange of the route of the Brüttener tunnel railway project between rail and road (Glattal motorway) and CHF 300 million for the planning of the other expansion projects.

Preservation of the value of the existing network

To ensure the availability of a reliable infrastructure on the national highways, investments constantly have to be made in their operation, maintenance and modification. This entails coordinating and modernising operating and safety equipment, traffic management systems, heavy vehicle inspection centres and holding zones for heavy goods vehicles. In addition, snow and ice clearance services have to be secured, embankments and centre strips have to be maintained, and drains and rest areas have to be kept in good order. The funding is also used for enhancing road safety and protecting the environment. All this adds up to an annual financing requirement of around CHF 2.2 billion (i.e. CHF 8.8 billion for the period from 2024 to 2027).

Maintenance of the national highways and their technical installations accounts for around CHF 1.1 billion. Adapting facilities to the latest legal requirements, standards and guidelines calls for additional measures to be implemented on existing infrastructure (expansion in the sense of adaptations) at a cost of around CHF 570 million p.a. Operational maintenance accounts for the remaining CHF 450 million p.a.

Cancellation of N1/N3 Y-junction in Zurich

The structure of the national highways network was originally designed in 1960 in the framework of the federal resolution concerning the national highways network. Around 40 kilometres still have to be constructed in order for the network to be completed. The requirements concerning the routing and design of the network have changed significantly since the original planning was carried out in the 1960s. The federal resolution originally planned for the N1 and N3 to be connected in the centre of Zurich. However, this concept is no longer practical today and the originally proposed Y-junction in Zurich is now to be cancelled. This cancellation is to be debated in Parliament in 2023.



The A9 motorway near Chexbres (canton of Vaud) on Lake Geneva.

Development of traffic volume and threat of capacity problems

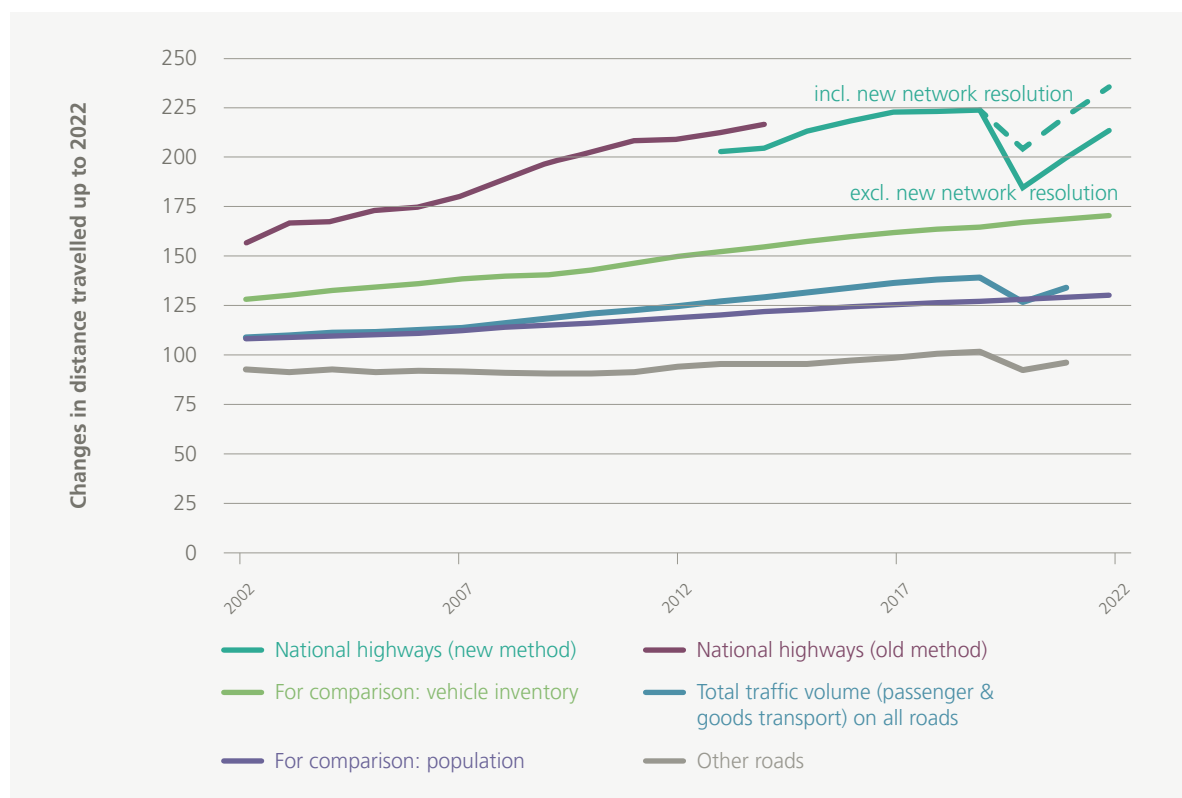
The national highways play a major role in the development of transport in Switzerland. They ease the burden on local roads and create space for public transport services and the use of bicycles, and thus enhance road safety. The federal government anticipates that, by 2040, around 453 kilometres (or around 20 per cent) of Switzerland's national highways network will be frequently congested unless appropriate countermeasures are taken. Every day, traffic jams and congestion occur for between two and four hours on around 170 kilometres of the network.

The major towns and agglomerations are the most heavily affected by bottlenecks. The threatening capacity problems are primarily to be eased by increasing the efficient use of the existing infrastructure. In addition to the overall optimisation of traffic, measures include the

increased use of speed coordination and warning systems, feed-in systems at junctions, and the use of emergency lanes as normal traffic lanes at certain locations. With the revision of the Road Traffic Act, the potentials of automated driving are to be exploited. Despite these measures, targeted capacity increases will be necessary on the most heavily frequented stretches in order to maintain the functionality of the network. For this purpose the Federal Council developed its strategic development programme for national highways (STEP). This programme is being constantly updated and has to be submitted to Parliament for approval every four years.

The national highways network is strategically important for road transport as well as the national economy: in 2019, the national highways accounted for around 40 per cent of the accumulated distance travelled by all private road transport, and 74 per cent of goods transport by road, even though the network only accounts for approximately 3 per cent of the total length of the country's overall road network.

Changes in distance travelled up to 2022



Facts, figures and statistics

674 employees

People



Tunnels: **281**

Construction projects: **842**

Connections: **481**

HGV inspection centres: **8**



Data

9 FEDRO locations

45 IT systems

Expenditure: **CHF 3.4 billion**

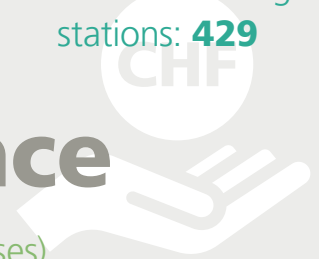
Traffic counting stations: **429**

Concluded contracts in 2022: **2,785**

Investment in infrastructure:

CHF 2.25 billion

Finance



Bridges: **4,400** (main axes and overpasses)

HGVs via main transalpine routes: **879,000**

Service areas (restaurants): **49** (ownership by cantons)



Infrastructure

Junctions: **52**

Rest areas (picnic): **122**

Vehicle kilometres on the network: **29 billion**

Drainage water treatment plants: **179**

Large-scale wildlife corridors: **45**

Vehicles



4,721,280 registered vehicles

2,258.9 kilometres Length of national highways network

Highest average daily traffic volume: **133,900 vehicles (Wallisellen)**

National highways network 4.4 kilometres longer

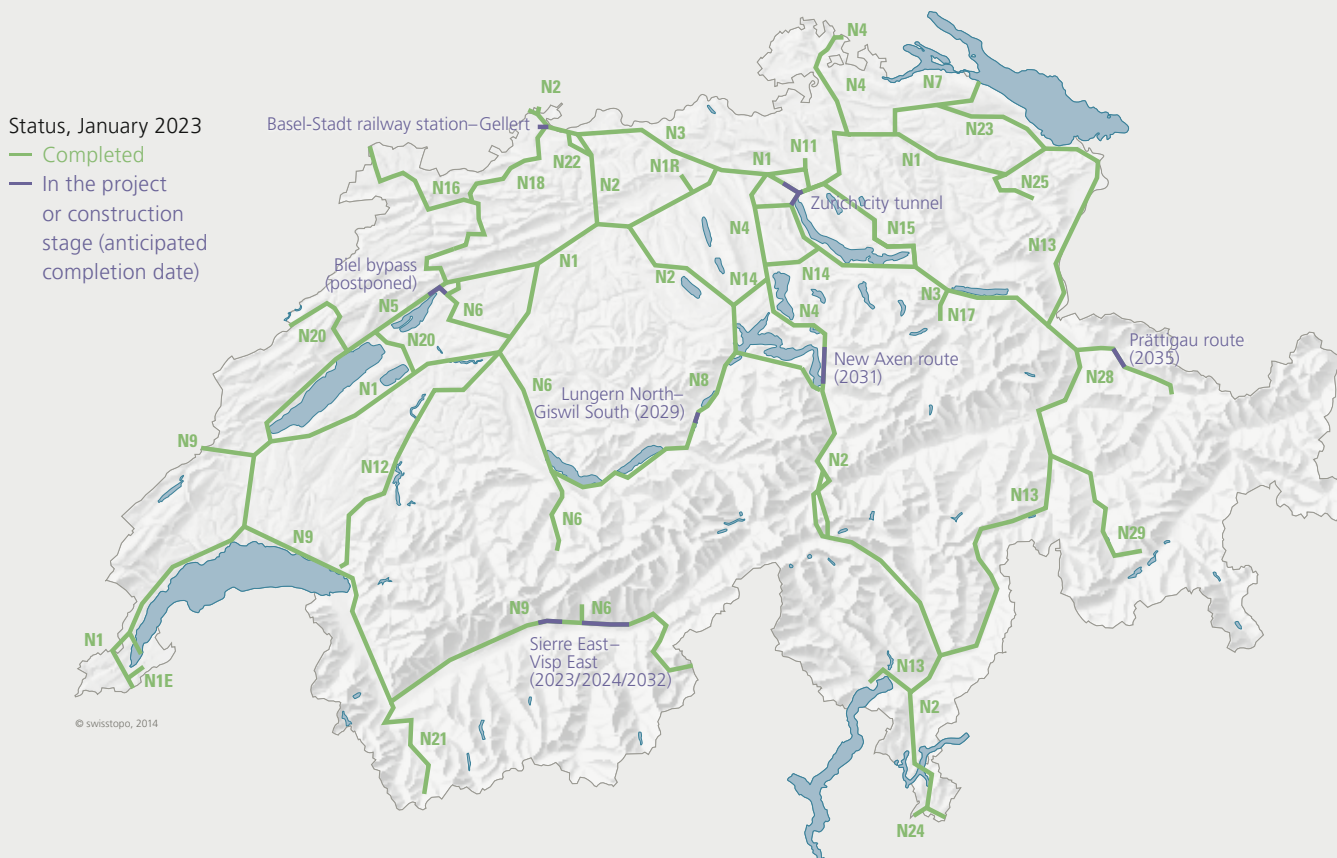
The 4.4-kilometre Visp tunnel on the A9 in Valais comprises a northern and a southern tube. The tube in the northerly direction was opened in 2022, bringing the total length of the network to exactly 2,258.9 kilometres as of the end of last year.

The northern tube of the Visp tunnel is an unusually complex structure in that it is an overpass tunnel, i.e. it runs above the main axis of the motorway in curved form. The construction of the northern tube cost CHF 350 million.

During the official opening of the tunnel on 20 August 2022, thousands of visitors passed through the Visp northern tube on foot, by bicycle or scooter, and in some cases even with prams and pushchairs. The southern tube of the Visp tunnel is scheduled for completion in 2025.

The A9 is mostly a multi-lane motorway, and partly a two-lane road (Simplon pass). The stretch runs in the canton of Vaud from Vallorbe to Chavornay, where it is interrupted by the A1 from Chavornay to Lausanne. From Lausanne, the A9 proceeds into Upper Valais and over the Simplon pass to Gondo (canton of Valais). In Upper Valais, the section of the A9 from Sierre East to Brig-Glis is a motorway stretch with a length of 35.2 kilometres. To date, 18 kilometres of this stretch have been completed, while the remaining section is scheduled for completion in 2034.

On 18 April 2023, the third tube of the 3.25-kilometre Gubrist tunnel near Zurich was opened to traffic. This did not increase the length of the network, however, because the new tube forms part of the existing tunnel.



Switzerland's national highways network

The Swiss national highways network – total length by road category (km)

	8-lane	7-lane	6-lane	5-lane	4-lane	3-lane	2-lane	Mixed traffic	Total
	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>	<i>in use</i>
Aargau		1.2	14	1.7	86.9		2.1		105.9
Appenzell AR								11.2	11.2
Appenzell IR								4.2	4.2
Basel-Landschaft			9.5	3,3	30.8		25.1		68.7
Basel-Stadt			3.5		6				9.5
Bern			13.2	3,1	160.4	1.1	72.1	34.7	284.6
Fribourg					84			5.5	89.5
Geneva					27.2				27.2
Glarus					16.6		2.2	7.6	26.4
Graubünden					43.6		100.7	81	225.3
Jura					35.4		11.8	7.3	54.5
Lucerne			2.6	2.7	53.2				58.5
Neuenburg					46.1	2.2	17.8	1.9	68.0
Nidwalden					22.9		2.9		25.8
Obwalden					1.8		22.3	13.3	37.4
Schaffhausen							12.3		12.3
Schwyz				2.7	40.5		2.2	4.3	49.7
Solothurn			6.5	5.4	31.9				43.8
St. Gallen				4.3	144.9		13.4		162.6
Thurgau			7.3	18	81		40.6	16.1	163.0
Ticino					45.1		33.5		78.6
Uri					37.1		16.3	16.1	69.5
Valais					76.0	6.7	17.7	66.6	167.0
Vaud	0.6		2.8	5.7	183.4		12.8		205.3
Zug			6		15.9		1.5		23.4
Zurich	1.2		31.3		131.4	1.9	21.2		187.0
Total	1.8	1.2	96.7	46.9	1,402.1	11.9	428.5	269.8	2,258.9

National highways network by road category

Category	Description	Km
Category I	Motorways	1,317.9
Category II	Expressways and motorways with reduced speed limits	551
Category III	Mixed-traffic roads	390
Total		2,258.9

Slight reduction in transalpine heavy goods traffic in 2022

In 2022, 879,752 heavy goods vehicles crossed the Alps via the four major Swiss passes – a slight reduction (–1.7 per cent) versus 2021.

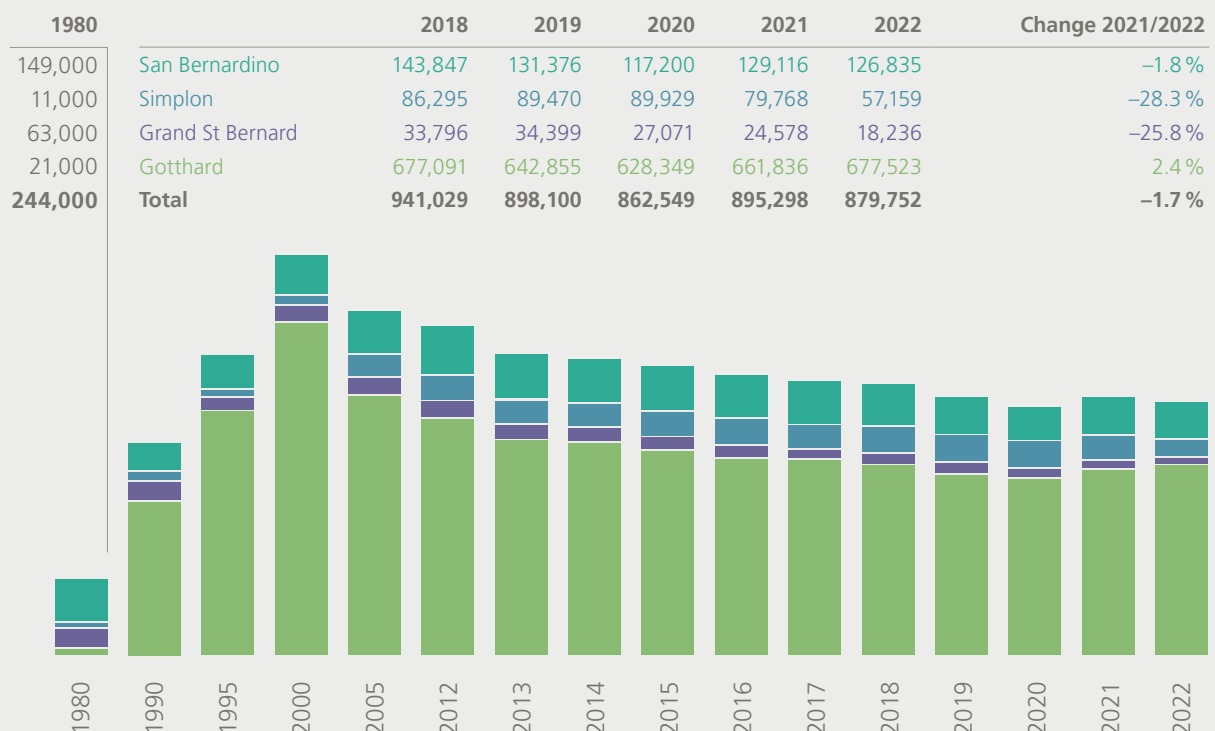
This represents a continuation of the long-term trend. The volume of transalpine heavy goods traffic reached its highest level of 1.404 million in 2000. Since then it has been steadily decreasing. However, the legally specified limit for 2018 of 650,000 transalpine journeys by HGVs still has not been reached by a considerable margin.

The figure fell by 0.6 per cent in the first half of 2022, and by 2.9 per cent in the second half. The slight decrease in the first half can be attributed to the catch-up effect resulting from the COVID-19 pandemic and the conflict in Ukraine, while the economic downturn observed in the second half of the year accounted for the more pronounced decrease in HGV traffic.

There was a particularly noticeable decrease in heavy goods traffic on the north-south axes in the canton of Valais: on the Simplon route the numbers were down by 28.3 per cent, and on the Grand St Bernard route by 25.8 per cent. But since these two passes are on the least frequented of the transalpine routes, these decreases did not have a significant influence on the overall statistics. A slight decrease (–1.8 per cent) was also recorded at the San Bernardino (canton of Graubünden).

By contrast, an increase of 2.4 per cent was recorded at the Gotthard, which is by far the most heavily frequented transalpine route. With 677,523 HGVs, the volume of traffic on this route is many times higher than on the other routes.

Total number of heavy goods vehicles crossing the Alps



Source: Federal Office of Transport (FOT)

Volume of traffic volume on the national highways continued to increase

In 2022, the accumulated distance travelled on Switzerland's national highways network surpassed 29 billion vehicle kilometres for the first time.

The COVID-19 pandemic resulted in a sharp drop in the volume of traffic, especially in 2020. Already in 2021, traffic volumes increased significantly once again. This trend continued in 2022: traffic volumes on the national highways increased by 6.7 per cent last year. A total of 29.3 billion vehicle kilometres were travelled. This means that traffic volumes almost returned to 2019 levels.

In 2022, 39,863 traffic jam hours were recorded on the national highways (+22.7 per cent versus 2020). This increase was in no way in proportion to that of the number of recorded vehicle kilometres. FEDRO attributes the extreme increase to a shift in traffic behaviour: it appears that private and commercial transport are increasingly occurring at the same times of day. This is causing additional congestion on heavily frequented stretches for longer periods of time.

More than 85 per cent of all traffic jam hours were attributable to congestion. This high figure indicates that so many stretches of the network are so congested that even minor interruptions to traffic flow can result in lengthy traffic jams and prompt large numbers of drivers to use local roads instead of the motorways.

* DTV = Average daily traffic volume.

Due to roadworks the measuring stations at the following hotspots have been temporarily deactivated: Lausanne (A9, Vaud), Baden-Baregg tunnel (A1, Aargau), Neuenhof (A1, Aargau), Weiningen-Gubrist (A1, Zurich), Zurich-Affoltern bypass (A1, Zurich) and Brüttsellen North (A1, Zurich).

Accumulated vehicle-kilometres on national highways network

Year	Billion km	+/- in %	Heavy goods transport (billion km)	+/- in %
2016	27,131	+2.4	1,566	+1.4
2017	27,680	+2.0	1,591	+1.6
2018	27,696	+0.1	1,598	+0.4
2019	27,799	+0.4	1,649	+3.9
2020	22,910	-17.6	1,431	-13.2
2020*	25,381	-8.7	1,524	-7.6
2021*	27,423	+8.0	1,611	+5.7
2022*	29,268	+6.7	1,638	+1.6

* Including the integrated stretches of cantonal roads

Number of traffic jam hours on national highways network*

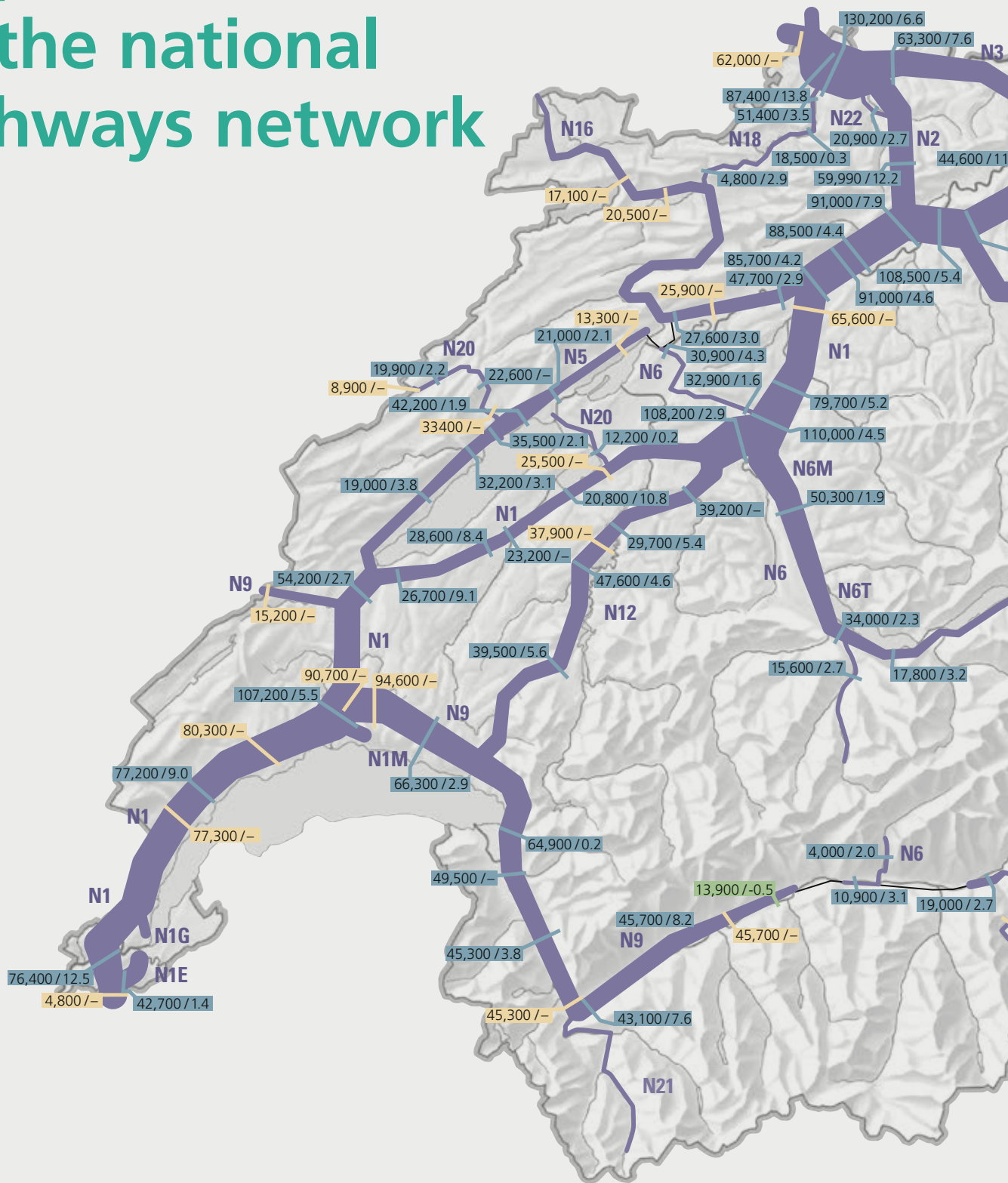
Causes	2020	2021*	2022*	+/- (in %)
Congestion	20,144	29,050	33,936	+16.8
Accidents	2,204	2,890	3,598	+24.5
Roadworks	138	338	2,203	+551.1
Other	90	203	125	-38.3
Total	22,576	32,481	39,863	+22.7

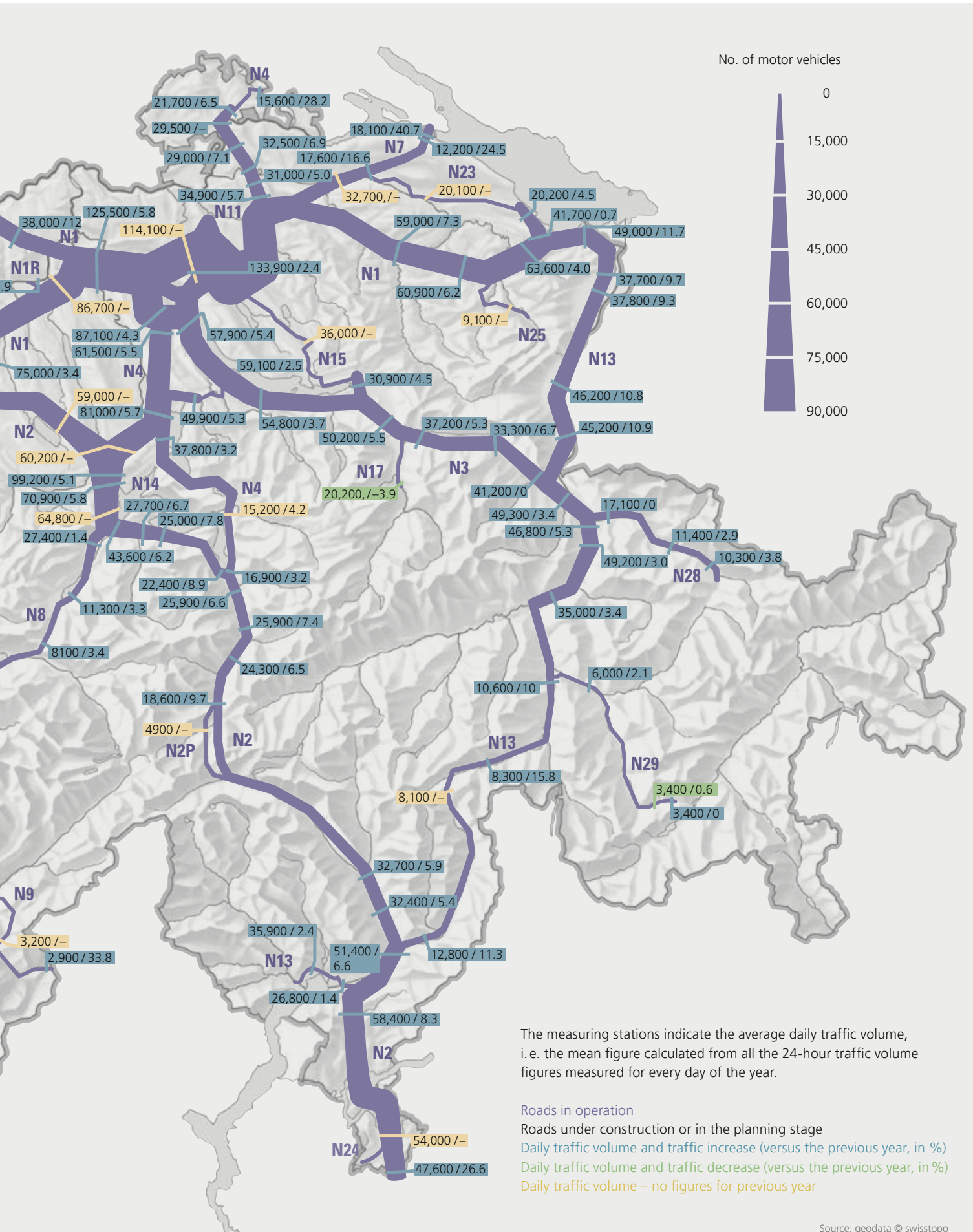
* 2021/2022: including integrated cantonal road stretches

Highest daily traffic volume (DTV*) on national highways (no. of vehicles per day)

	DTV* 2022	Share of HGVs (%), 2022	DTV* 2021	Share of HGVs (%), 2021	Change in DTV* (%) 2021/2022	Change in DTV* (%) 2020/2021
Wallisellen (ZH)	133,888	4.5	130,700	5.5	2.4	3.9
Muttenz (BL)	130,171	6.4	122,161	6.6	6.6	7.1
Würenlos (AG)	125,501	6.8	118,611	7.2	5.8	3.0
Schönbühl Grauholz (BE)	110,020	6.5	105,325	6.6	4.5	6.0
Bern Forsthaus (BE)	108,193	*	105,142	5.1	2.9	6.5
Bern Felsenau viaduct (BE)	107,278	6.3	103,377	6.4	3.8	6.4
Oftringen/Rothrist (AG)	108,533	9.6	102,986	10.0	5.4	7.4
Renens (VD)	107,225	3.5	101,385	3.4	5.8	11.8
Lucerne, Reussport tunnel (LU)	99,194	4.1	94,400	4.2	5.1	5.9
Chiasso-Brodega (TI)	47,564	5.3	37,582	6.4	26.6	8.8
Camignolo (TI)	58,358	5.8	53,888	6.2	8.3	17.0
Geneva, Plan-les-Ouates (GE)	42,694	3.7	42,091	3.9	1.4	14.2
Chur Nord (GR)	49,167	4.0	47,727	4.2	3.0	8.7
St. Gallen Rosenberg tunnel (SG)	71,960	3.7	72,197	4.1	-0.3	3.0

Map of traffic volume on the national highways network



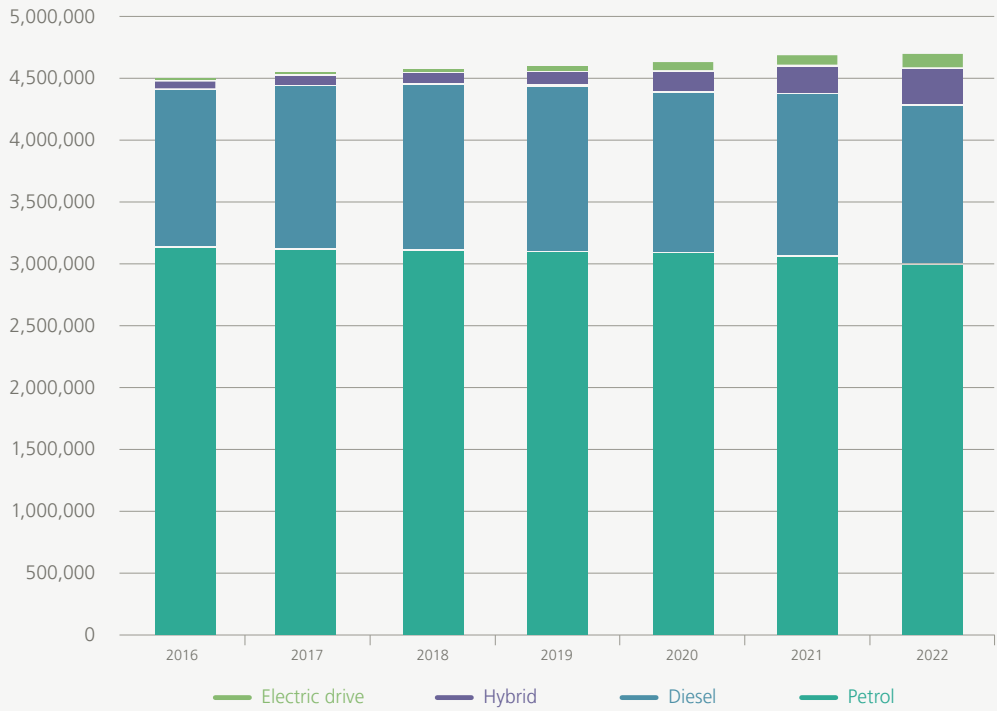


The measuring stations indicate the average daily traffic volume, i.e. the mean figure calculated from all the 24-hour traffic volume figures measured for every day of the year.

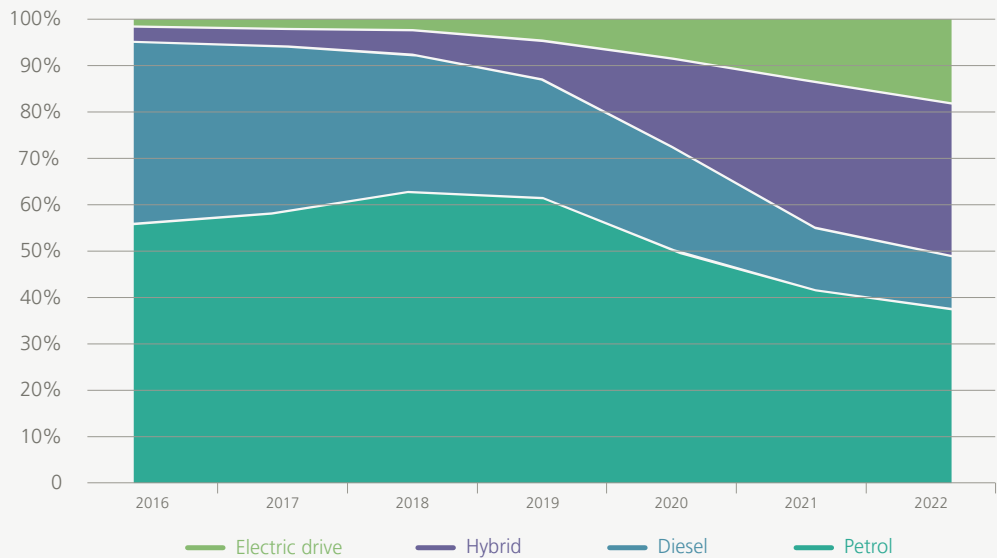
- Roads in operation
- Roads under construction or in the planning stage
- Daily traffic volume and traffic increase (versus the previous year, in %)
- Daily traffic volume and traffic decrease (versus the previous year, in %)
- Daily traffic volume – no figures for previous year

Vehicle statistics

Inventory of passenger cars 2016–2022



New registration of passenger cars 2016–2022



Total vehicle registrations down by around 8 per cent

With a total of 322,387 registrations, the number of newly registered motor vehicles fell by 7.8 per cent in 2022 versus the previous year. Also, in comparison with the last pre-pandemic year (2019), the number of new registrations fell by 21.2 per cent. Here the conflict in Ukraine was a contributing factor in that it intensified the pandemic-related supply shortages. In the passen-

Inventory of motor vehicles in Switzerland as of 31.12.2022

	Motor vehicles total	Motor vehicles total	Change versus 2021	Cars	Petrol 2022	Diesel 2022	Hybrid 2022
	2022	2021		2022			
Total	6,368,579	6,339,553	+0.46 %	4,721,280	2,991,092	1,319,337	284,417
Lake Geneva region	1,163,443	1,161,829	+0.14 %	868,669	573,374	213,538	59,617
Geneva	304,208	305,883	-0.55 %	215,814	148,922	45,540	16,961
Valais	308,420	305,150	+1.07 %	229,719	148,591	65,484	10,271
Vaud	550,815	550,796	0.00 %	423,136	275,861	102,514	32,385
Central plateau	1,435,180	1,428,814	+0.45 %	1,047,745	684,642	284,224	55,165
Bern	776,864	775,023	+0.24 %	547,500	349,879	158,089	27,160
Fribourg	257,809	255,203	+1.02 %	195,639	129,223	48,706	12,917
Jura	60,008	59,603	+0.68 %	44,564	31,434	9,820	2,344
Neuchâtel	124,979	125,028	-0.04 %	97,015	67,019	22,784	5,417
Solothurn	215,520	213,957	+0.73 %	163,027	107,087	44,825	7,327
Northwest Switzerland	831,212	825,603	+0.68 %	628,974	400,772	176,413	35,386
Aargau	544,030	538,977	+0.94 %	412,986	262,469	117,391	22,558
Basel-Landschaft	202,155	200,889	+0.63 %	152,254	99,163	40,119	8,803
Basel-Stadt	85,027	85,737	-0.83 %	63,734	39,140	18,903	4,025
Zurich	987,608	984,958	+0.27 %	754,340	461,693	213,446	52,486
Eastern Switzerland	969,177	963,765	+0.56 %	702,539	428,068	223,445	33,406
Appenzell Ausserrhoden	44,937	45,016	-0.18 %	32,391	20,135	9,997	1,543
Appenzell Innerrhoden	15,242	15,169	+0.48 %	10,300	6,313	3,228	498
Glarus	33,219	33,327	-0.32 %	24,297	14,592	8,051	1,137
Graubünden	165,489	165,290	+0.12 %	116,859	64,647	44,340	5,470
Schaffhausen	66,473	65,674	+1.22 %	47,726	30,350	13,823	2,295
St Gallen	394,890	392,193	+0.69 %	290,796	176,273	93,181	13,908
Thurgau	248,927	247,096	+0.74 %	180,170	115,758	50,825	8,555
Central Switzerland	675,623	668,448	+1.07 %	496,430	299,409	151,400	30,902
Lucerne	311,355	309,311	+0.66 %	222,910	138,620	67,008	11,823
Nidwalden	37,761	37,504	+0.69 %	27,897	17,253	8,322	1,606
Obwalden	33,590	33,385	+0.61 %	23,417	13,855	7,840	1,210
Schwyz	143,856	142,620	+0.87 %	106,895	67,365	30,722	5,922
Uri	28,462	28,454	+0.03 %	20,499	12,195	7,174	795
Zug	120,599	117,174	+2.92 %	94,812	50,121	30,334	9,546
Ticino	306,336	306,136	+0.07 %	222,583	143,134	56,871	17,455

ger cars segment the proportion of newly registered electric cars rose again year-on-year, to 17.7 per cent. The total number of registered motor vehicles was almost 6.4 million in 2022. This figure is based on the road vehicle statistics published by the Federal Statistical Office.

In the period from 2000 to 2022, the inventory of motorised road vehicles (excluding mopeds) rose by around 39 per cent to 6.4 million. Approximately two-thirds of these are passenger cars, and for several years now there has been a trend towards vehicles with a hybrid or electric drive. In 2022, around 110,800 electric cars were registered, which is equivalent to a proportion of 2.3 per cent of the total number of registered passenger cars. The canton with the highest proportion of electric vehicles was Zug (4.6 per cent).

The number of registered motorcycles (+60 per cent since 2000) and light goods vehicles (+84 per cent) has also increased sharply:

In 2015, 65 per cent of all households possessed at least one bicycle, and around 7 per cent possessed an electric bike.

<i>Gas 2022</i>	<i>Electric drive 2022</i>	<i>Others 2022</i>	<i>Passenger transport vehicles 2022</i>	<i>HGVs, articulated vehicles, semi-trailers 2022</i>	<i>Utility vehicles up to 3.5 tonnes 2022</i>	<i>Agricultural vehicles 2022</i>	<i>Industrial vehicles 2022</i>	<i>Motor- cycles 2022</i>
10,642	110,751	5,041	105,158	54,700	421,014	196,942	79,691	789,794
1,814	19,840	486	15,658	8,019	75,376	22,706	11,741	161,274
317	3,907	167	3,164	1,784	19,326	1,536	1,828	60,756
226	5,054	93	4,957	2,656	22,119	7,570	5,369	36,030
1,271	10,879	226	7,537	3,579	33,931	13,600	4,544	64,488
2,322	20,709	683	28,997	11,645	96,716	62,093	19,749	168,235
1,393	10,605	374	18,122	6,024	55,594	39,619	12,191	97,814
272	4,427	94	4,361	2,075	15,876	10,000	2,854	27,004
110	824	32	902	398	3,911	3,817	794	5,622
150	1,596	49	2,161	869	7,312	2,945	1,447	13,230
397	3,257	134	3,451	2,279	14,023	5,712	2,463	24,565
1,711	14,204	488	13,230	8,951	55,321	18,686	7,576	98,474
935	9,314	319	8,827	5,898	33,533	14,466	5,097	63,223
478	3,600	91	3,089	1,750	14,601	4,066	1,786	24,609
298	1,290	78	1,314	1,303	7,187	154	693	10,642
1,944	22,302	2,469	14,986	6,870	60,499	16,338	11,713	122,862
1,335	15,777	508	16,893	10,377	65,784	44,522	16,974	112,088
41	651	24	871	270	2,624	2,491	613	5,677
6	252	3	200	125	1,022	1,351	344	1,900
60	446	11	528	345	2,383	1,419	737	3,510
104	2,263	35	3,250	2,389	12,633	8,881	4,803	16,674
135	1,039	84	1,345	662	4,364	2,993	909	8,474
606	6,616	212	6,309	4,177	26,174	15,983	6,039	45,412
383	4,510	139	4,390	2,409	16,584	11,404	3,529	30,441
1,016	13,358	345	12,202	6,139	45,139	28,524	8,456	78,733
409	4,885	165	5,786	3,336	20,776	15,776	3,600	39,171
31	660	25	726	218	2,142	1,395	430	4,953
23	463	26	685	323	2,192	2,175	572	4,226
158	2,660	68	2,453	1,142	8,09	5,706	2,202	16,549
10	320	5	608	222	1,696	1,391	610	3,436
385	4,370	56	1,944	898	9,424	2,081	1,042	10,398
500	4,561	62	3,192	2,699	22,179	4,073	3,482	48,128

Passenger car registrations down by 5.2 per cent

New registration of motor cars

	2012	2018	2019	2020	2021	2022
Total	334,045	300,887	312,377	238,475	242,022	229,403
Type						
Limousine	196,221	141,329	128,493	98,243	102,330	94,351
Station wagon	128,957	153,168	177,403	135,555	134,548	131,152
Convertible	8,867	6,390	6,481	4,677	5,144	3,900
Engine size (cc)						
Below 999	13,548	36,200	37,450	27,436	27,444	24,944
1,000–1,399	89,272	55,858	44,907	31,120	33,763	26,073
1,400–1,799	78,913	56,291	60,228	43,688	44,835	41,912
1,800–1,999	94,510	100,208	116,544	86,742	74,067	67,237
2,000–2,499	23,217	14,899	10,096	6,320	7,646	9,276
2,500–2,999	21,434	23,387	22,583	17,178	16,345	13,914
3,000 and over	12,227	8,633	7,392	6,239	5,905	5,540
Not specified	924	5,411	13,177	19,752	32,017	40,507
Gear mechanism						
Manual	188,816	77,200	65,180	40,117	29,812	22,840
Automatic	144,989	223,672	247,197	198,357	212,210	206,563
Unknown	240	15	0	1	0	0
Fuel						
Petrol	200,576	188,847	192,119	118,987	100,768	86,231
Diesel	124,911	90,360	79,461	51,951	32,639	26,608
Petrol/elec. hybrid	5,530	10,434	18,285	27,510	44,738	47,100
Petrol/elec. plug-in hyb.	191	4,129	4,199	14,132	21,231	17,540
Diesel/elec. hybrid	956	794	3,847	5,363	9,692	10,941
Diesel/elec. plug-in hyb.	31	75	10	161	572	272
Electric drive	924	5,411	13,177	19,752	32,017	40,507
Hydrogen	1	27	27	48	66	72
Gas	519	805	1,250	571	296	132
Others	406	5	2	0	3	0
Drive						
Front-wheel drive	202,075	142,069	141,583	112,144	113,420	100,161
Rear-wheel drive	19,416	11,593	10,881	7,843	13,125	13,697
4×4	112,554	147,225	159,913	118,488	115,477	115,545
Output (kilowatts)						
below 60	29,346	12,377	10,994	8,142	6,947	6,463
60.01–80	67,143	36,342	33,553	26,209	29,646	24,335
80.01–100	54,216	58,301	54,553	40,988	40,193	37,862
100.01–120	81,881	57,802	61,544	46,003	45,871	39,239
120.01–140	40,593	58,530	62,923	41,939	33,008	30,346
140.01–160	21,476	18,175	18,434	16,284	23,865	25,267
160.01–180	11,051	11,078	15,340	10,706	7,643	7,782
180.01–200	9,013	11,657	10,496	7,366	8,161	7,906
200 and over	19,289	36,621	44,535	40,838	46,687	50,199
Not specified	37	4	5	0	1	4
CO₂ emissions (g/km)						
0–50	983	7,570	15,537	32,020	48,067	56,729
51–100	12,046	20,431	13,011	20,653	8,181	5,206
101–150	150,523	170,331	161,334	110,606	71,712	73,514
151–200	113,061	85,431	99,361	56,313	74,419	60,873
201–250	14,260	9,946	15,839	13,101	25,824	21,270
251–300	2,427	3,344	3,346	3,363	7,847	6,071
300 and over	1,383	1,039	1,261	979	2,613	2,232
Unknown	39,362	2,795	2,688	1,440	3,359	3,508

Note on CO₂ emissions: until 2020, measurements were indicated in accordance with the New European Driving Cycle, and as of 2021 they are based on the new, more realistic Worldwide Harmonised Light-Duty Vehicles Test Procedure. This means that data as of 2021 cannot be compared with the earlier figures.

In 2022, passenger cars accounted for almost three-quarters of new vehicle registrations. A total of 229,403 cars were licensed for use on Switzerland's roads. This figure is 5.2 per cent lower than in 2021 and a notable 26.6 per cent lower than in 2019. However, the figures fluctuated sharply versus the previous year depending on the month: while new registrations remained slightly above the 2021 level in January and February 2022 despite ongoing supply problems due to the global shortage of microchips, in March the figures fell sharply. After Russia's invasion of Ukraine, manufacturers' supply problems intensified again. This especially affected the supply of cable harnesses, many of which are manufactured in Ukraine.

The market share of electric cars rose again in 2022: over the full year, the number of registered purely electrically operated cars increased by 17.7 per cent, which was 4.5 per cent higher than in 2021 (13.2 per cent). In 2022, the overall share of plug-in vehicles rose fairly moderately, from 22.2 to 25.4 per cent. According to the stated target for the second stage of the federal road map for the promotion of electric mobility at the end of 2025, these vehicles are to account for half the number of all new registrations.

No. of new vehicles put into circulation (all types)

	2021	2022
Cars	242,022	229,403
Passenger transport vehicles	9,706	7,972
Goods vehicles	33,380	28,942
Utility vehicles	29,476	25,145
HGVs	2,928	2,682
Articulated vehicles	4	5
Semi-trailers	972	1,110
Agricultural vehicles	3,378	2,753
Industrial vehicles	4,711	4,518
Motorcycles	56,468	48,799
Trailers	21,782	19,968
Total vehicles	371,447	342,355
Total motor vehicles	349,665	322,387

Source: Federal Statistical Office

Marked increase in serious accidents

In 2022, 241 people lost their lives in road accidents, and 4,002 were seriously injured. Thus the number of serious accidents was significantly higher in comparison with the past few years.

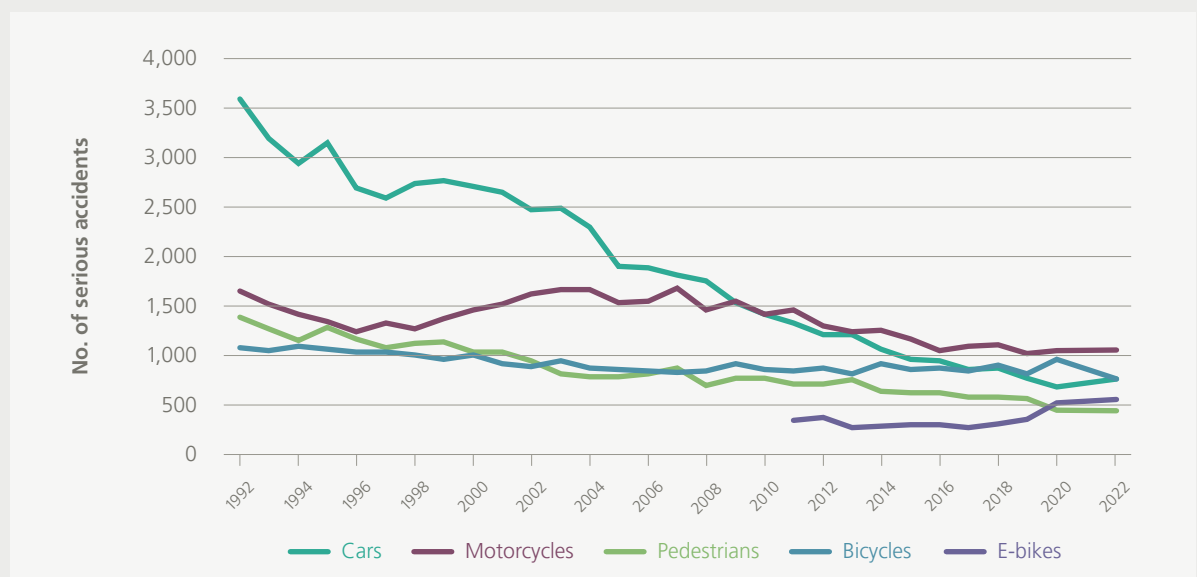
Versus the previous year, the number of fatalities increased by 41 and the number of serious injuries rose by 69. The sharp increase in fatalities and serious injuries in the passenger car segment ran contrary to the long-term trend of falling accident figures. For this reason, FEDRO is to carry out a comprehensive analysis of accidents involving passenger cars in order to identify causes for this trend reversal.

87 occupants of **passenger cars** lost their lives (+22 versus 2021), and 768 were seriously injured (+30 versus 2021). The largest increases in fatalities and serious injuries were in the following age groups: 65–74 years: 95 serious injuries (+21); 75 and older: 145 serious injuries (+30). Of the 630 drivers of passenger cars who were involved in serious accidents (225 serious injuries were incurred by passengers), 74 per cent caused the accident

themselves. Last year, 46 **motorcyclists** lost their lives (2021: 47 fatalities) and 1,063 suffered serious injuries on Switzerland's roads (2021: 1,067). Of the 1,051 motorcyclists involved in accidents (58 were passengers), 66 per cent were themselves the cause of the accident.

In 2022, 19 **cyclists** died in road accidents (-3 versus 2021) and 769 were seriously injured (50 fewer than in 2021). The highest number of serious accidents (170) involved cyclists between the ages of 55 and 64 (+12 versus 2021). 23 **e-bike** users lost their lives in 2022 (6 more than in 2021). 460 accidents involved slower e-bikes, while 123 involved fast models.

Types of accident (share in per cent)



Accident statistics 2022 (overall Swiss road network)

All accidents

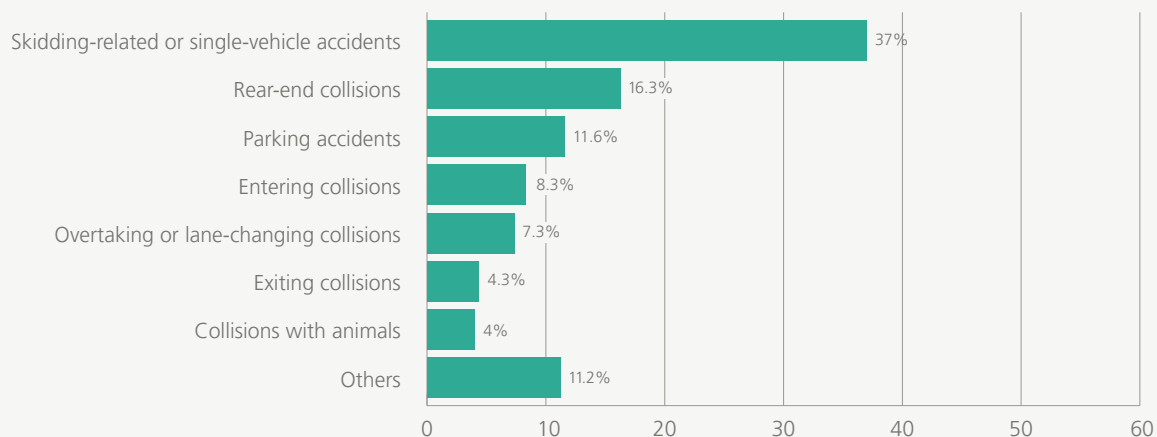
Year	Total no. of accidents
2014	51,756
2015	53,235
2016	55,053
2017	56,112
2018	54,378
2019	53,528
2020	48,662
2021	52,217
2022	54,146

Accidents resulting in fatalities/injuries

	2022	2021
Fatalities	228	194
Serious injuries	3,763	3,714
<i>life-threatening injuries</i>	166	182
<i>severe injuries</i>	3,597	3,532
Minor injuries	14,405	13,528
Total	18,396	17,436

Serious injuries and fatalities	Serious injuries 2022	Fatalities 2022	Serious injuries 2021	Fatalities 2021
by form of transport				
Cars	768	87	738	65
Passenger transport vehicles	36	0	26	1
Goods transport vehicles	57	7	39	4
Motorcycles	1,063	46	1,067	47
Motor scooters	113	6	92	3
Electric bikes	560	23	531	17
Bicycles	769	19	819	22
Pedestrians	445	36	424	37
<i>on pedestrian crossings</i>	213	9	202	14
<i>elsewhere</i>	232	27	222	23
Devices similar to vehicles	52	4	62	0
Others	139	13	135	4
Total	4,002	241	3,933	200
by assumed main cause				
Influence of alcohol	432	28	363	16
Speeding	477	36	513	33
Inattention/distraction	565	37	597	26
by type of road				
Motorways and expressways	231	28	219	19

Proportion in per cent by type of accident



Number of driving licence confiscations at pre-pandemic level

The number of confiscated driving licences rose by around three per cent in 2022, but remained below 80,000 for the fourth consecutive year.

This brings the number of confiscations back up to the level recorded in 2019, i.e. prior to the outbreak of the COVID-19 pandemic. The main grounds for confiscation in 2022 were once again speeding and driving under the influence of alcohol. After reaching a high level in 2021, the number of new driving licences issued in 2022 returned to normal. This trend is based on the annual statistics of the Federal Roads Office (FEDRO) regarding driving licences and administrative measures.

According to the figures for administrative measures (ADMAS database), 79,282 driving licences were confiscated in 2022 (a 3.3 per cent increase versus 2021). This figure is only slightly below that recorded in 2019 (79,922), i.e. prior to the outbreak of the COVID-19 pandemic). The number of provisional driving licences that were cancelled rose by 9.4 per cent versus 2021 to

1,555. By contrast, the number of withdrawn learner's licences fell last year by 10.5 per cent to 4,122.

As in the previous years, speeding and driving under the influence of alcohol accounted for more than 50 per cent of these confiscations. Licences were confiscated for speeding (-1.8 per cent versus 2021) in 28,418 cases; and for driving under the influence of alcohol in 13,043 cases (+23.2 per cent versus 2021). As such the number of confiscations due to driving under the influence of alcohol reached the level recorded prior to the outbreak of the COVID-19 pandemic (13,128 in 2019).

Last year, in 8,192 cases licences were confiscated for endangering others through careless driving (+10.7 per cent versus 2021). Here the upward trend recorded in 2018, but which was interrupted in 2021, resumed in 2022.

Measures imposed against drivers

	2022	2021	+/-
Warnings to holders of a learner's licence	420	405	+3.7 %
Warnings to holders of a driving licence	46,329	46,425	-0.2 %
Withdrawal of learner's licence	4,122	4,604	-10.5 %
Withdrawal of driving licence	71,288	68,427	+4.2 %
<i>Of which withdrawal of provisional licence</i>	6,833	6,637	+3.0 %
Withdrawal of other licences	3,872	3,719	+4.1 %
Cancellation of provisional driving licence	1,555	1,422	+9.4 %
Refusal of learner's or driving licence	3,388	3,419	-0.9 %
Refusal to accept a foreign driving licence	17,936	16,610	+8.0 %
Instruction in road use	1,690	1,614	+4.7 %
New driving test	3,188	3,561	-10.5 %
Examination by specialised psychologists	4,296	4,087	+5.1 %
Examination by specialised physicians	8,485	7,244	+17.1 %
Special requirements	6,648	6,666	-0.3 %
Total	173,217	185,114	-6.4 %

Number of new licence holders back to normal

According to the driving licence statistics, as of 31 December 2022 around 6.2 million people in Switzerland held a driving licence for passenger cars. This number has only changed slightly versus 2021 (+1.1 per cent). 83,626 new driving licences for passenger cars were issued in 2022 (-21.9 per cent versus 2021).

Administrative measures

	2022	+/-*
Reasons for withdrawal		
Speeding offences	28,418	-1.8
Drink driving	13,043	+23.2
Inattention	8,192	+10.7
Failure to give way	4,307	+8.6
Failure to observe traffic signals	1,237	+3.3
Unlawful overtaking	910	-9.0
Other driving errors	4,566	+1.6
Alcohol addiction	1,733	+24.6
Influence of drugs	4,240	-8.5
Drug addiction	2,666	+13.4
Sickness or infirmity	5,246	+2.6
Other reasons	20,583	+2.7
Duration of withdrawal		
1 month	30,910	-0.4
2 months	1,497	+4.0
3 months	15,264	+6.2
4-6 months	6,723	+2.6
7-12 months	1,962	-3.3
More than 12 months	917	+1.7
Indefinite period	21,987	+7.8
Permanent withdrawal	22	-21.4
Age of persons affected		
Under 20	5,273	+11.1
20 to 24	10,143	-0.5
25 to 29	9,650	-0.3
30 to 34	8,705	+3.8
35 to 39	7,550	+0.0
40 to 49	12,913	+2.9
50 to 59	11,678	+2.7
60 to 69	6,230	+10.3
70 and over	7,140	+7.8
Reasons for withdrawal or refusal of learner's/driving licence		
Learner driving unaccompanied	404	-12.6
Driving error**	2,618	-13.6
Drink driving	690	-4.2
Driving without a licence	2,920	+0.1
Failure to pass driving test	372	-0.5
Driving despite withdrawal of licence	132	-20.5
Theft	392	-4.4
Sickness or infirmity	160	+16.8
Other reasons	2,228	-1.2
Reasons for warnings		
Speeding	41,333	+5.2
Drink driving (> = 0.050 to 0.079%)	3,522	+19.4
Inattention	2,725	-2.7
Failure to give way	1,380	-14.6
Driving an unroadworthy vehicle	2,583	-16.8
Failure to observe traffic signals	471	-6.0
Unlawful overtaking	180	-22.7
Other reasons	7,707	-9.3

Driving licence statistics

Driving licences (cars)	2022	2021	+/-
All licences	6,211,588	6,143,131	+1.0%
By age group			
18-24	390,056	395,326	+1.1%
25-44	2,115,949	2,099,015	-1.3%
45-64	2,379,988	2,373,422	+0.8%
65-74	849,863	822,908	+3.3%
75+	475,732	452,460	+5.1%
By gender			
Female	2,898,893	2,861,981	+1.3%
Male	3,312,449	3,280,888	+1.0%
Unknown	246	262	-6.1%
New drivers			
	83,626	107,130	-21.9%
By age group			
18-24	64,839	86,436	-25.0%
25-44	17,186	19,067	-9.9%
45-64	1,592	1,604	-0.7%
65-74	9	21	+57.1%
75+	0	2	-100.0%
By gender			
Female	41,451	53,583	-22.6%
Male	42,175	53,547	-21.2%
Unknown	0	0	0.0%
Motorcycles			
Motorcycles	2022	2021 ²	+/-
All licences	4,252,020	4,230,631	+0.5%
By age group			
15-17 ¹	7,012	5,572	+25.8%
18-24	98,728	99,113	-0.4%
25-44	1,006,564	1,036,435	-2.9%
45-64	1,906,793	1,898,211	+0.5%
65-74	768,250	749,117	+2.6%
75+	464,673	442,183	+5.1%
New drivers			
	26,218	32,722	-19.9%
By age group			
15-17 ¹	6,837	5,717	+19.6%
18-24	10,589	11,165	-5.2%
25-44	8,063	14,922	-46.0%
45-64	723	913	-20.8%
65-74	5	5	0.0%
75+	1	0	0.0%

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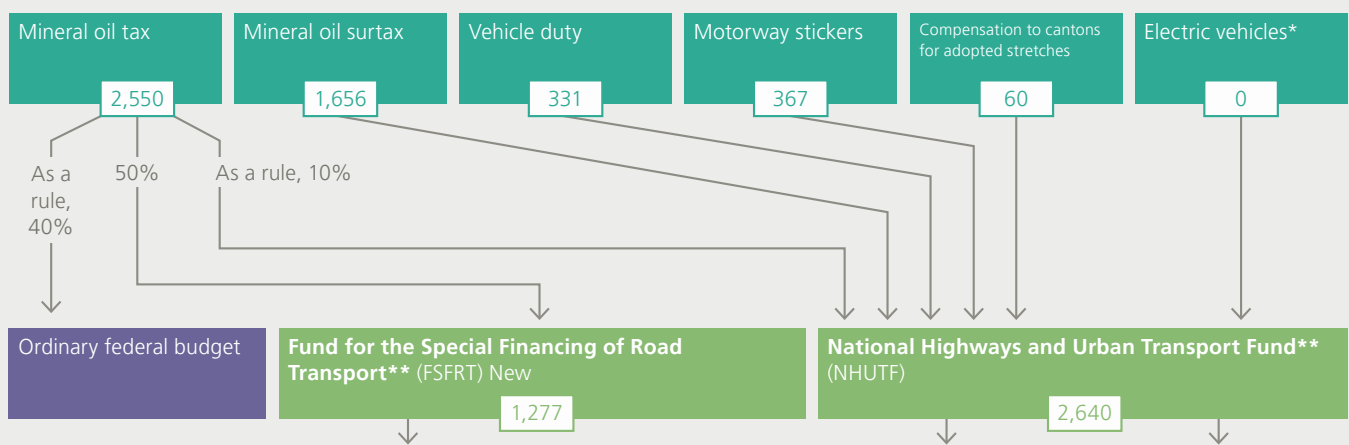
* Change in per cent versus 2021
 ** Inattention, failure to give way, speeding, failure to observe traffic signals, unlawful overtaking, other reasons
¹ The motorcycle driving licence can only be obtained from the age of 15 since 2021
² Correction with regard to 2021 driving licence statistics

Finance flows for the two road transport funds

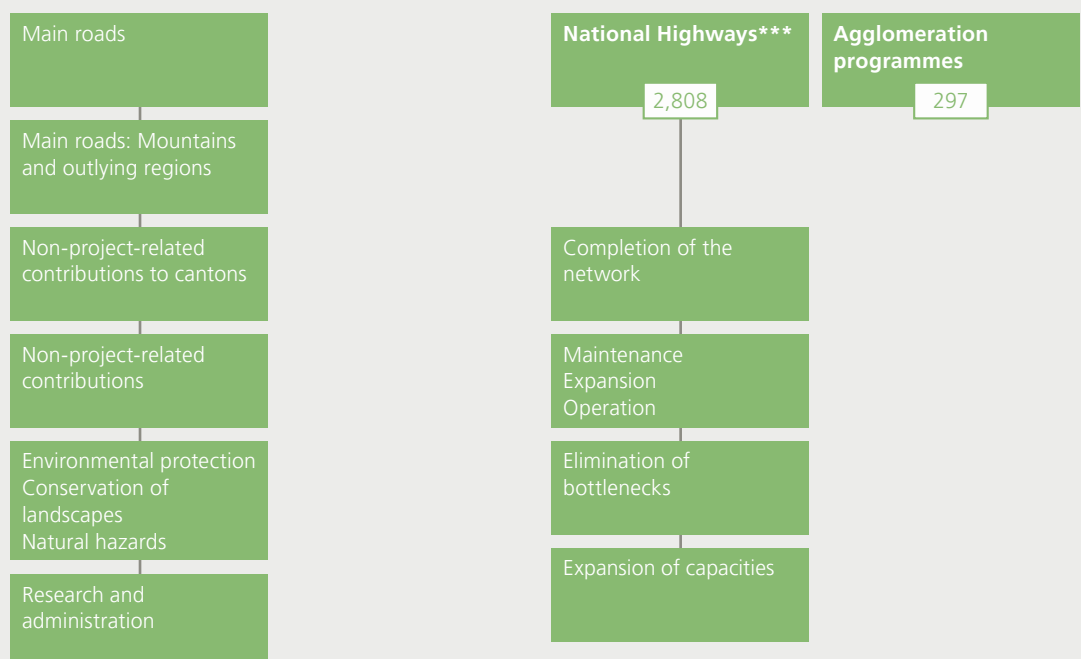
The National Highways and Urban Transport Fund finances the national highways and major projects in the agglomerations. The Fund for the Special Financing of Road Transport mainly supports cantonal road transport infrastructure.

Flows of funds in 2023 (in CHF million): in accordance with 2023 budget

Revenue



Expenditure



* Date of introduction still open
 ** Including various smaller amounts (both funds)
 *** Taking account of 2020–2023 payment framework for maintenance/expansion/operation

Amounts in the totals may differ due to rounding up or down of the individual figures.

Expenditure on the national highways encompasses operation, maintenance, expansion, elimination of bottlenecks, capacity increases, major projects and completion of the network. All this expenditure is financed from the Motorway and Agglomeration Traffic Fund, which entered into effect on 1 January 2018. This move increases the degree of transparency, and also simplifies the short- and medium-term management of credit facilities.

Parliament decides how much may be withdrawn from the fund each year, which is not governed by the federal debt brake mechanism. The balance of any approved funding that is not utilised remains in the fund. This increases its liquidity and the funds remain available for use at a later date.

Composition of deposits:

- Mineral oil surtax (100%)
- Motorway tax (100%)
- Vehicle duty (100%)
- As a rule, 10% of the mineral oil tax
- Compensation from the cantons for the transfer of cantonal roads to the federal government as per the new federal resolution on the network

Special Fund for the Financing of Road Transport: all transfer payments from a single source

This fund is the single source for all transfer payments in the road transport sector at the federal level, as well as for the administrative and research costs of FEDRO. It is financed from half the revenue from the mineral oil tax and, where necessary, from vehicle duty revenue. As before, it is managed via the ordinary federal budget.

Deposits into the National Highways and Agglomeration Traffic Fund (in CHF million)

	2020 R*	2021 R**	2022 R**	2023 VA**
Mineral oil surtax	1,635	1,761	1,702	1,656
Vehicle duty	331	310	331	331
National highways charge	310	321	376	367
CO ₂ reduction penalty (passenger cars)	80	145	35	5
Mineral oil tax (10%)	247	265	259	254
Provisional deposit into the Fund for the Special Financing of Road Transport (old)	148	0	0	0
Revenue from third-party funding (National Highways and Agglomeration Traffic Fund)	47	50	42	30
Management income (National Highways and Agglomeration Traffic Fund)	10	10	11	10
Deposit from Fund for the Special Financing of Road Transport (adopted cantonal stretches)	60	60	60	60
Cuts in traffic fund deposits from 2020	-72	-72	-72	-72
Total withdrawals/expenditure	2,795	2,850	2,744	2,640

Withdrawals from National Highways and Urban Transport Fund (in CHF million)

	2020 R*	2021 R*	2022 R*	2023 VA**
Operation of national highways	402	425	430	453
Expansion and maintenance of national highways	1,628	1,637	1,568	1,614
Completion of national highways network	146	163	152	259
Elimination of bottlenecks	134	113	84	107
Capacity increases and large-scale projects	75	193	205	375
Contributions towards transport infrastructure in urban centres	256	177	184	297
Total withdrawals/expenditure	2,640	2,708	2,623	3,105

* Charged

** Budgeted, including 2020–2023 expenditure for operation, expansion and maintenance of the national highways network

Due to rounded up or down figures, minor differences may arise in the totals.

FEDRO operated 17 photovoltaic facilities in 2022

In 2021, electricity consumption for the national highways amounted to 157 GWh. This was 8 GWh less than in 2021. The electricity was produced entirely from renewable energy (Swiss hydropower and photovoltaics), while 56 per cent of the heat originated from renewable energy.

Within the framework of the federal administration's 'Climate Package', FEDRO aims to optimise its energy consumption still further in order to cut CO₂ emissions. By 2030, it wants to produce 35 GWh per annum of its energy requirement from its own photovoltaic facilities. 17 facilities were in operation in 2022.

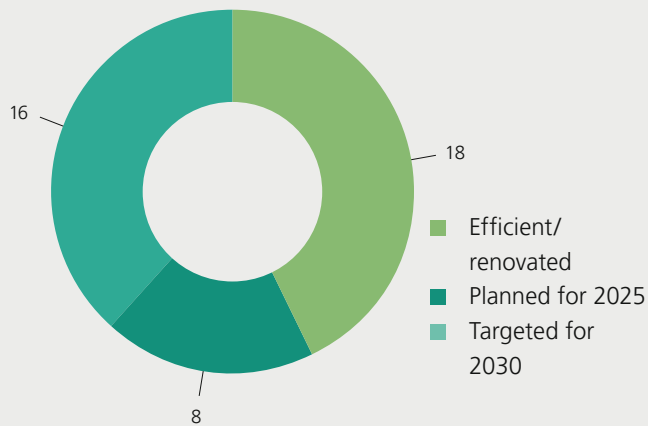
Electricity production – Electricity consumption

FEDRO	Electricity volume / year
FEDRO electricity demand 2022	157 GWh
Photovoltaic production by FEDRO in 2022	1.6 (17 facilities)
Targeted production from FEDRO's own photovoltaic facilities by 2030	35 (90 facilities)
Third-party photovoltaic production in 2022	3 (13 facilities)

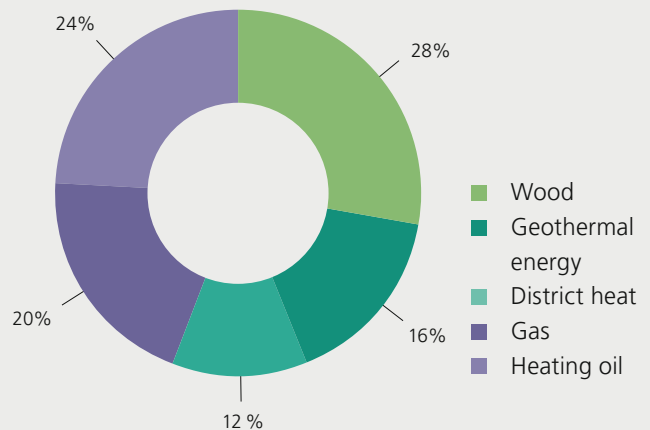
FEDRO has set itself the following objectives for 2030:

- To improve the energy consumption of all its buildings;
- To replace all oil-fired heating systems;
- To replace all gas-fired heating systems when they reach the end of their service life;
- To cover 35 GWh per annum of its electricity requirements from its own photovoltaic facilities.

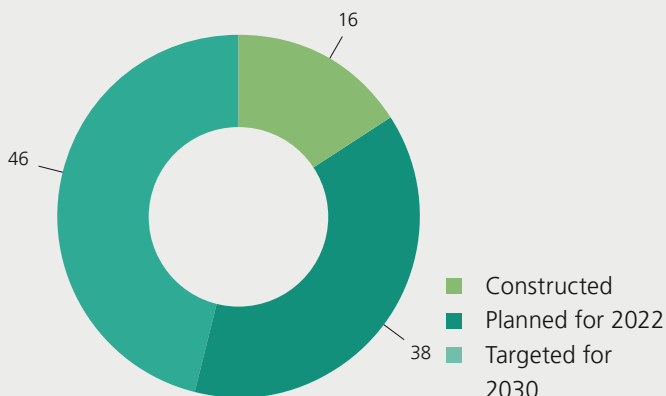
Renovation of buildings



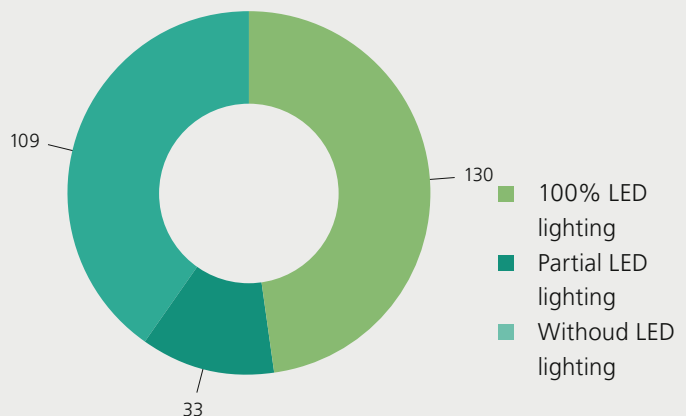
Heating in buildings (in per cent)



No. of fast-charging stations in rest areas



No. of tunnels with LED lighting



No. of personnel in 2022

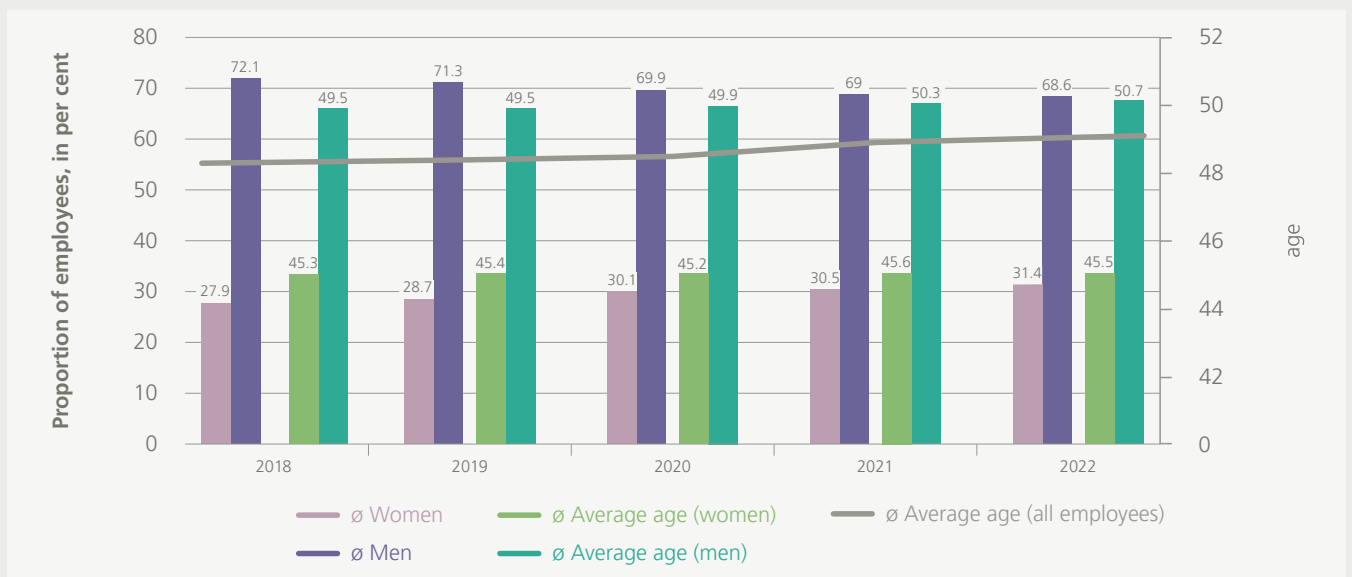
Trend

Year	No. of employees	Apprentices	University-level trainees
1.1.2008	363	–	–
1.1.2019	548	19 commercial/2 mediamatics	11
1.1.2020	586	19 commercial/2 mediamatics	11
1.1.2021	602	17 commercial/2 mediamatics	9
1.1.2022	633	15 commercial/2 mediamatics	13
31.12.2022	639 (excl. app./int.)	13 commercial/2 mediamatics	16

Employees by profession in 2022

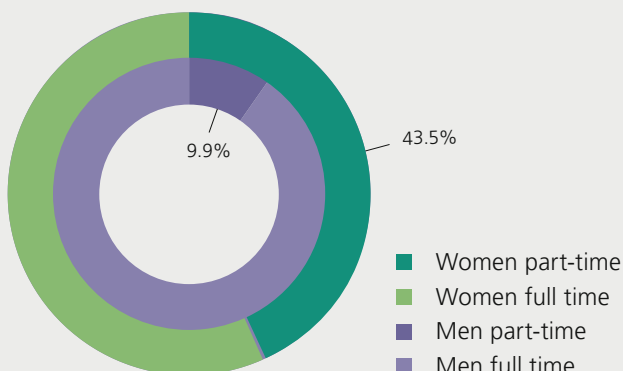
Employees by profession	No. of employees
Engineering	265
Law	92
Business and finance	102
IT/Data	97
Administration	70
Communication, language services	19
Apprentices/interns	31

Proportions of employees and their average ages



As of 31 December 2022, 205 women and 434 men were employed by FEDRO. Average age: 49.1 yrs.

20.5 per cent of the employees work part-time



18 nationalities were represented in ASTRA in 2022

FEDRO's workforce comprises employees of 18 different nationalities. 88 per cent are Swiss. Other nationalities: German, Italian, French, Austrian, Spanish, Serbian, Finnish, Polish, Portugal, Dutch, Canadian, Slovakian, Ukrainian, Hungarian, Romanian, Swedish and Greek.

Publication details

Publisher

Federal Roads Office (FEDRO)

Research and text

Federal Roads Office (FEDRO)

Layout

diff. Kommunikation AG, www.diff.ch

Photo credits

Federal Roads Office (FEDRO)

Orders

Federal Roads Office (FEDRO)

Federal Roads Office (FEDRO)

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