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FEDRO ANNUAL REPORT

# ROADS AND TRAFFIC 2022

*Developments, facts and figures*

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The Grand St Bernard route in Valais – stretch between Bovernier and Sembrancher.

# Dear Reader,

For the Swiss Federal Roads Office (FEDRO), construction is always carried out in response to the demands of technological and ecological development, achievements and changes in framework conditions. For example, the road leading to the Grand St Bernard Pass in the canton of Valais is due for renovation because many of the bridges, galleries and other structures are getting old. In this edition of "Roads and Traffic" we show you how we are implementing the entire renovation project from the perspective of sustainability.

Sustainability includes not only ecological but also economic aspects and social issues. The overlapping of these three dimensions demonstrates that they cannot be viewed independently of one another. This is why we orient ourselves on the "Sustainable Construction Switzerland" standard. We are also applying this standard to our renovation project on the Grand St Bernard.

"Roads and Traffic" gives you further insights into our work in the fields of the human dimension, vehicles, financing and data, i.e. in all areas of activity which we can influence and which taken together define private transport. We also follow the principle of sustainability in the way we manage energy on the motorway/national roads network. We are already generating energy with photovoltaics in many locations today and we can expect to see this continue into the future. Parallel to this, the construction of 100 fast-charging stations for electric vehicles on motorway rest areas is progressing smoothly.



The steady growth in the volume of traffic on motorways – the "arteries" linking cities and agglomerations – is presenting us with major challenges. For this, our approach can be formulated as "doing one thing and not leaving the other one out", so to speak. Together with comprehensive measures to make the use of existing infrastructure more efficient, we are planning one-off expansion projects in the Strategic Motorway Development Programme (STEP) that are needed in the long term. We are also helping to finance agglomeration projects.

The automation of vehicles is advancing rapidly and creating new challenges for us. For this reason we want to integrate the potential of highly automated vehicles in the areas of safety, availability and compatibility as soon as possible. Currently, Parliament is debating the corresponding amendments to the Federal Road Traffic Act so that we can have a highly innovative and modern legal basis at our disposal. With this move the positive impact of vehicles at automation levels 3 to 5 will become clearly visible.

The reason why so many different and heterogeneous systems in the operational and safety equipment are still in use today can be found in the history of the Swiss motorway/national roads network since 1960. With the "Systems Architecture Switzerland" (SA-CH) project we are pushing ahead with the systematic harmonisation and standardisation of these systems while ensuring the smooth functioning of the network at all times.

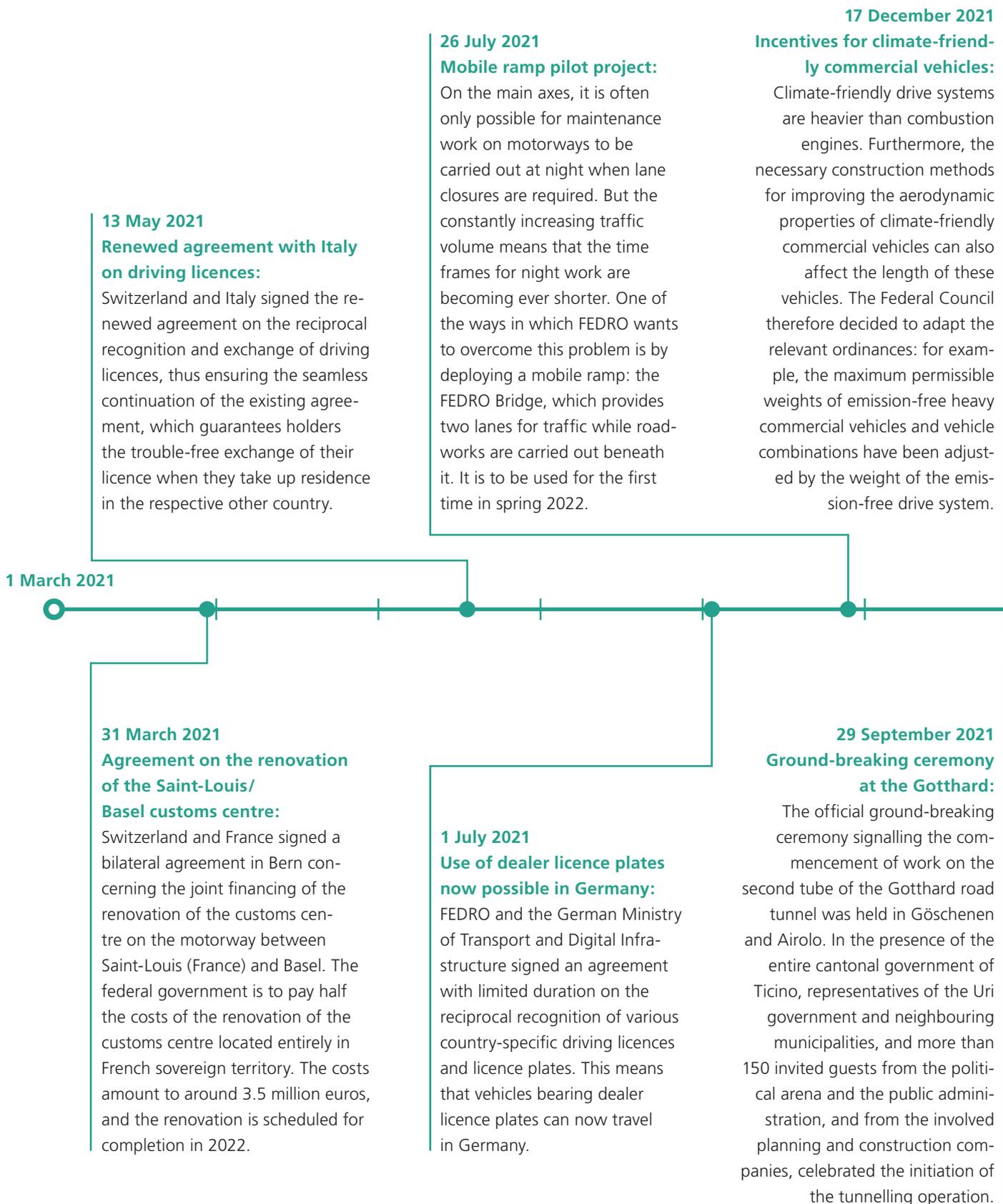
To be able to guarantee the high quality required with all these complex tasks, we have applied ISO-9001 certification standards for the last 20 years. Here we are continually reviewing internal processes and tasks and improving them where necessary and digitalising them where possible.

I hope you find this edition of "Roads and Traffic" an enjoyable and informative read.

A handwritten signature in black ink, appearing to read "J. Röthlisberger".

Jürg Röthlisberger  
Director of the Swiss Federal Roads Office (FEDRO)

# Overview of the year



### 3 February 2022

#### Safe cycling guidelines:

FEDRO and various road user associations have formulated guidelines for the correct behaviour by, and towards, cyclists and e-bike users. The brochure is addressed to cyclists, as well as to motorists.

### 1 March 2022

#### Red licence plate for rear-mounted bike racks:

An additional licence plate for rear-mounted bike racks can now be requested from cantonal road traffic authorities. With this third, red plate it is no longer necessary to shift the rear licence plate from the vehicle to the bike rack. Use of the third plate is voluntary and shifting the rear licence plate is still permissible. The red licence plate is valid in many European countries.

### 1 April 2022

#### Mandatory daytime use of lights for e-bikes:

Users of e-bikes now have to switch on their lights during the day. This increases their visibility and enhances road safety.

1 April 2022



Construction of the second tube of the Gotthard road tunnel: ground-breaking ceremony on 29 September 2021 at the southern portal in Airolo. A ceremony was also held on the same day at the northern portal in Göschenen.

# How sustainable is FEDRO's construction process?

Society, economy, environment: these three pillars define sustainability in Switzerland. FEDRO integrates aspects of sustainability into its planning and construction processes.

A development is deemed sustainable if it satisfies present-day needs without risking the fact that future generations cannot satisfy their own requirements. In addition to the environmental perspective, sustainability incorporates economic aspects as well as social issues. The comprehensive overlapping of these three dimensions demonstrates that they cannot be viewed independently of one another. In fact they influence one another. The objective is to take account of these three dimensions in as balanced a manner as possible.

## Sustainability standards

In 2003, FEDRO began to develop its sustainability indicators for road infrastructure projects. For development projects, 38 indicators are evaluated in the form of a cost/benefit analysis, a cost-effectiveness analysis and a qualitative analysis. SIA standard 112/2 (Sustainable construction – infrastructure) and the new standard, "Sustainable construction in Switzerland", have been developed on this basis.

FEDRO is currently focusing on integrating these into other phases of its construction activity. The "Sustainable construction in Switzerland" standard is being applied for the first time in the framework of the Grand St Bernard renovation project. The numerous criteria in this standard encompass not only the cited dimensions, but also others such as the circular economy, CO<sub>2</sub>-optimised construction and environmental measures in construction projects.

## Grand St Bernard pilot project

The 37-kilometre stretch to the Grand St Bernard is to be renovated on a step-by-step basis from 2025. Project planning is to be initiated in 2022, taking account of the "Sustainable construction in Switzerland" standard. The aim is to determine the extent to which this standard can supplement FEDRO's existing standard and how much added value it can generate for motorway and national road projects. The obtained findings are to be summarised in a final report, together with recommendations as to whether and under which circumstances the standard can be applied for other projects. The table below shows under which perspectives and criteria the sustainability of construction projects can be supported (cf. page 7).



Grand St Bernard project: the Orsière bridge crosses the river Dranse d'Entremont.



Bovernier (view towards Martigny) on the Grand St Bernard route.

### Criteria in the “Sustainable construction in Switzerland” standard

Dimensions	Topics	Criteria
Transversal topics	Transversal topics	Project-supporting sustainability assessment
		Objectives and system delimitation
		Conflicts of objectives, synergies
Society	Spatial planning and housing development	Spatial planning, landscapes, townscapes, cultural environment
		Living comfort, coexistence
		Access to infrastructure, quality of stay
	Community	Communication and participation
		Socially acceptable behaviour
		Legal certainty
		Solidarity, equality, distributional effects
	Health and safety	Workplace safety, accident prevention, rescue, healthcare
		Protection against violence and crime
Private sector	Business management	Business cost/benefit ratio
		Flexibility of use, adaptability, dismantling
	Economy	National economy cost/benefit ratio
		Aspects of regional economy
		Economical use of existing infrastructure
	Financing	Suitable financing
Environment	Raw materials, energy, land	Energy consumption
		Land use, recycling, soil
		Contaminated sites
		Recycling of uncontaminated and contaminated excavated and waste materials
		Environment- and resource-friendly use of materials
	Nature and environment	Impacts on climate
		Pollution of the environment
		Surface bodies of water, groundwater
		Nature and landscape
	Risk prevention	Natural hazards
		Malfunctions





The Rive-Haute bridge above Orsières.

# Gathering practical experience from the Grand St Bernard project

For the renovation of the stretch leading up to the Grand St Bernard in the canton of Valais to be carried out in the next few years, the principles of sustainability will be applied.



In 2020 the federal government adopted the stretch to the Grand St Bernard between Martigny-Bourg and the tunnel. It is 37 kilometres in length, has 63 bridges, 100 retaining walls and 43 galleries. The route is ageing and some of the engineering structures now need to be renovated. Sustainability will be an important aspect in this project.

With respect to road infrastructure, sustainability refers to energy management, materials, work processes and transport routes. These aspects will be taken into account during both the planning and the implementation stage. The findings will then flow into the standards for motorway and national road projects.

At the Grand St Bernard, sustainability is to be approached from two perspectives: on the one hand, the most urgent renovation projects. This mainly concerns bridges and retaining walls that were constructed in the 1960s and '70s. In the mountainous terrain, these are exposed to extreme weather conditions and heavy wear and tear. The renovation work is scheduled for 2025/26.

And on the other hand, other overlying aspects that concern the entire stretch are to be incorporated from the point of view of sustainability. At the Grand St Bernard, the focus will initially be on the open stretches (the tunnels and galleries will be the focus of separate projects). In accordance with the "Sustainable construction in Switzerland" standard, the overlying issues are: spatial planning, access to infrastructure, cost/benefit ratio, regional economy aspects, land use, contaminated sites, recycling of excavated and waste materials, surface bodies of water and natural hazards.

FEDRO will already accompany the project during the call for tenders stage and will support the development of a comprehensive concept for the overall project as follows:

- Identification of the applicable criteria for the project;
- Selection of the measures to be implemented;
- Planning of the necessary measures;
- Support with the necessary measures.

### **Circular economy**

With respect to the management of resources and materials, cycles are often not optimally closed, nor is attention paid to the question of minimisation and disposal of waste material. For the Grand St Bernard renovation project, resource and material management are to be incorporated at an early stage. In this way, cycles can be closed and negative impacts can be minimised. Re-use and recycling, as well as durability and reparability, are opportunities that need to be fully exploited. A waste and material management concept encompasses the various material categories and secures the re-use and recycling of construction and waste materials (for example, the recycling of milled material from the resurfacing process or the re-use of fragments of concrete as aggregate for cement).

In addition, the following environmental aspects will be taken into consideration: because a portion of the stretch in Martigny lies on a former industrial complex, a search for potentially contaminated sites is to be carried out. Since the existing situation does not comply with the FEDRO standard, a drain water treatment plant is to be constructed in order to more effectively protect surface bodies of water. And in order to protect against natural hazards such as avalanches, mudslides, rockfalls, floods, etc., the galleries are to be inspected and renovated where necessary.

# Sustainability in the tendering process

For the Grand St Bernard project, sustainability is an integral part of the procurement and tendering processes and an essential criterion for the award of contracts. As owner, FEDRO also issues a “sustainability” checklist that construction companies must address in their bids.



Retaining wall, Rive-Haute near Orsières on the Grand St Bernard route.

In its sustainable development strategy, the Federal Council expresses its agreement with regard to procurement as follows: that the Swiss federal administration is to procure products (goods, services, buildings) that must satisfy its high economic, ecological and social requirements for the duration of their life cycle. With the complete revision of the Swiss Federal Act on Public Procurement a “cultural revolution” has taken place in Swiss legislation governing the award of contracts. Offices that award contracts are required to attach higher priority to quality and sustainability criteria for awarding contracts in their calls for tenders.

Contracts are no longer awarded “only” to bidders to who make the economically most favourable offer, but rather to those that submit the most advantageous bid. Sustainability, together with other criteria, must be integrated in the tenders for infrastructure projects.

## Sustainability adopted in the FEDRO procurement manual

FEDRO has integrated these legal provisions in its manual on procurements for the motorway/national roads network. The economic dimension of sustainability ensures that funds entrusted to the state by the taxpayer are handled with due care and that qualitatively comparable services are to be acquired where they are most favourably offered.

In addition to the analysis of the task in question, project managers can demand a sustainability analysis where a planner or company is able to present project-related optimisations and innovations in areas such as materials management, minimising emissions and work safety. With operational and safety facilities the award criterion can take into account costs incurred over the entire life cycle in addition to nominal price in order to be able to assess the real cost of maintenance and repairs in the bid.



# Research on CO<sub>2</sub>-optimised construction

The enormous importance of environmental issues is also being reflected in road transport research: FEDRO has defined numerous research priorities that concern the environment and sustainability.

For its construction activities, FEDRO is examining all possible options for minimising CO<sub>2</sub> emissions in its projects, for example by optimising transport routes, using CO<sub>2</sub>-optimised concrete (and cement), or searching for new technologies for storing CO<sub>2</sub> in materials.

FEDRO is participating in three international research projects relating to this topic:

- “Resource Efficiency and Circular Economy” project, Conference of European Directors of Roads (CEDR).
- Decarbonising road construction” project in the framework of the “D-A-CH” research cooperation between the road construction authorities of Germany, Austria and Switzerland.
- “Special project: carbon neutrality of the road sector”, PIARC (World Road Association).

The aim of FEDRO’s participation in these research projects is to ensure that it always has the latest fundamental knowledge about sustainability at its disposal when planning and implementing maintenance and construction work.

Some measures have already been implemented, for example use of renewable electricity at major roadwork sites for drilling the second tube of the Gotthard road tunnel, and use of timber for the construction of wildlife crossings. In addition, in a pilot project in 2021 FEDRO tested a new type of concrete that requires a lower cement content and thus has a reduced CO<sub>2</sub> footprint.



Orsières on the Grand St Bernard route.

# Electricity production along motorways/national roads

The infrastructure on the motorways and national roads offers a certain degree of potential for electricity production from photovoltaic systems. This form of energy production is therefore to be increased in the next few years.

FEDRO already covers its entire electricity requirement for operating the motorway/national roads network from domestic hydropower (99 percent) and photovoltaics (1 percent). In 2021, it produced 1.1 GWh of electricity from its 14 own photovoltaic facilities installed at its depots, on tunnels and along open stretches of road.

Because there is no legal basis for FEDRO to produce electricity for third parties, it has to use all of the produced quantity for its own requirements. Ideally, electricity should be produced directly at the locations where it is needed. Because electricity is required for lighting in tunnels, the aim is to produce as much as possible on and in the vicinity of these structures. If more electricity is produced than is directly required, FEDRO stores the surplus quantity so that it can be used for another tunnel in the network.

## Installation on existing infrastructure

The aim of the implementation of the federal administration's "Climate Package" is to increase the level of own production of renewable energy by the entire administration, and to produce around 35 GWh a year by 2030. In addition, the utilisation of the potential for external systems is to be promoted. Thus FEDRO is installing its own photovoltaic facilities where it needs electricity directly on site. Studies have revealed that the potential is high when photovoltaic systems can be installed on the roofs of depots, at suitable tunnel operating centres, on portals and on existing galleries along the motorway/national roads network.

Other innovative projects are in the early stage of implementation. The aim of one of these is to determine where photovoltaic facilities could be installed on noise prevention barriers. In response to a postulate submitted to the National Council, in 2021 the utilisable potential was calculated for photovoltaic facilities installed on noise prevent barriers along the motorways and national roads. The identified potential is equivalent to around 55 GWh, and this is to be developed in the next few years.

## Photovoltaic projects

In 2021, FEDRO acquired the photovoltaic system that was installed in 1998 on the existing Sonnenhof covered stretch (Bern East, N6). The ageing panels are to be replaced by state-of-the-art products, as a result of which the level of production can be increased by a factor of four to 452 kW.

In addition, in 2021 two photovoltaic systems with a total capacity of 140 kW were installed at the operating centres of both portals of the Allmend tunnel near Thun (N6).

FEDRO is to place the surfaces that it will not be using for its own photovoltaic facilities at the disposal of third parties. In this way it wants to promote the installation of new systems on noise prevention barriers and at rest areas. Facilities planned by third parties have to meet the applicable legal and safety requirements, and their operators have to market the produced electricity themselves.

A solar power facility installed by an external provider on the existing partially covered stretch of the motorway near Zofingen (N2) was put into operation at the end of December 2021. The system, which will consist of more than 200 solar modules when fully completed, will produce around 700 kW. It has been partially equipped with vertical photovoltaic panels that are photosensitive on both sides. Thanks to this innovative panel structure, the nearby high rise buildings are exposed to less noise and the remaining surface area can be used for the promotion of biodiversity.



Photovoltaic facility on the roof of the operating centre of the Allmend tunnel in Thun.

### FEDRO's electricity statistics

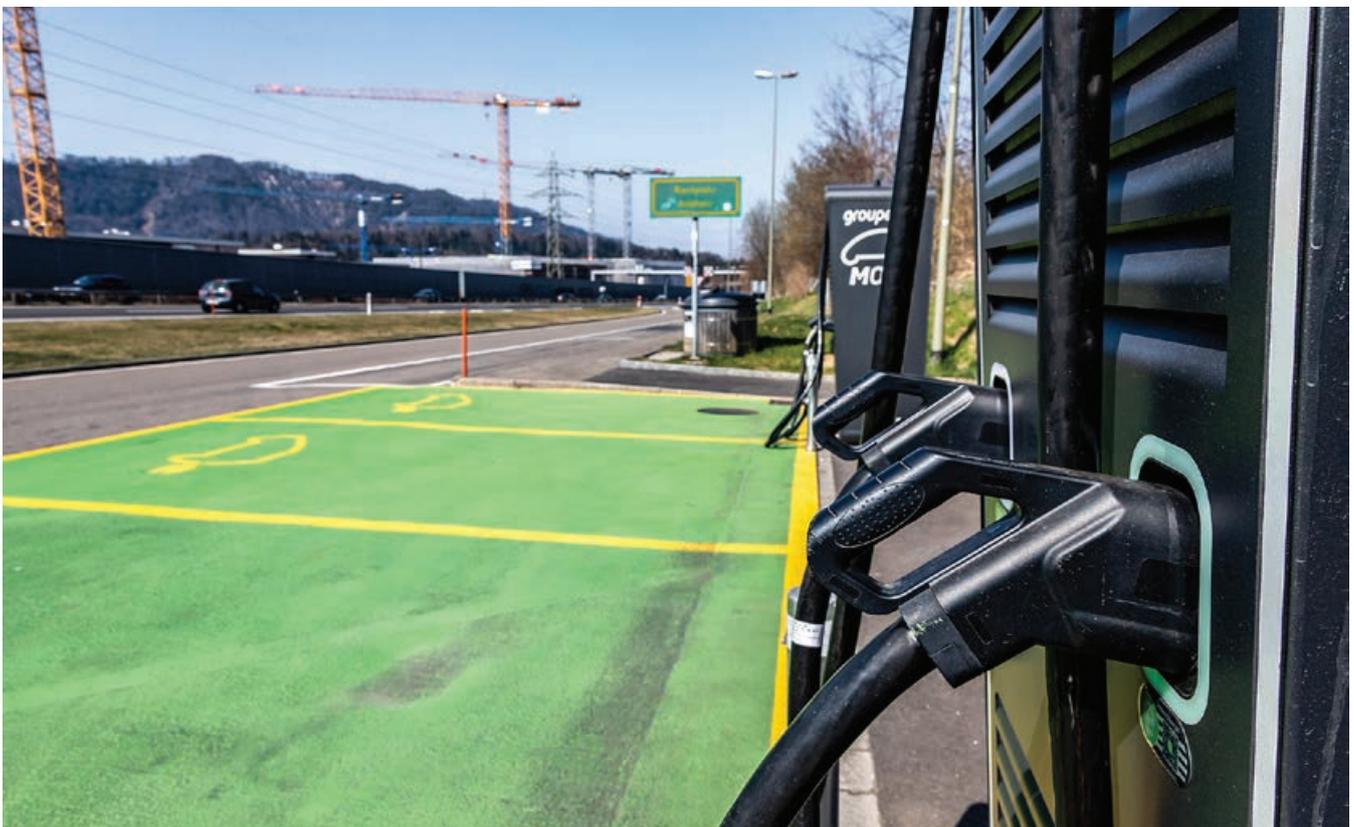
FEDRO	Electricity volume / year	Facilities
Electricity requirement in 2021	165 GWh	–
Photovoltaic production by FEDRO in 2021	1.1 GWh	14
Third-party photovoltaic production in 2021	3.6 GWh	13
Targeted production from FEDRO's own photovoltaic facilities by 2030	35 GW	90

# 47 fast-charging stations installed in rest areas by the end of 2022

The installation of fast-charging stations in 100 motorway rest areas is progressing smoothly. As of the end of April 2022, 19 fast-charging stations were in operation in rest areas and their use is increasing. A further 28 stations are to be opened in 2022.

The installation of fast-charging stations in motorway rest areas represents FEDRO's most important measure within the framework of its "Electric Mobility Roadmap" for 2022. A further 28 rest areas are to be equipped with fast-charging stations by the end of the year.

Five operating companies have each been allocated twenty locations. The original plan was for around fifty stations to be installed within six years, and this target looks set to already be achieved by the end of 2022. The project is scheduled for completion by 2030, which is the final deadline for the installation of fast-charging stations at all 100 rest areas.



Fast-charging station at the Aspholz rest area on the A3 near Adliswil.

# Four charging options per motorway rest area

Stephan Aerni is project manager at the Zofingen Regional Office.

## Stephan Aerni, what is FEDRO's task regarding the installation of fast-charging stations in motorway rest areas?

In accordance with the contracts with the five providers of fast-charging stations, FEDRO is responsible for providing the necessary space, power supply lines and transformer stations so that the providers can construct their charging facilities. We also have to coordinate and supervise the overall process.

## What is the main difficulty associated with these projects?

Different providers are involved at each rest area, including the relevant electricity works and the applicable municipality – and in some cases, several municipalities are involved due to the boundaries of plots of land through which the power supply line has to be drawn. This means that everything has to be meticulously planned so that the technical processes can be implemented in a uniform manner, otherwise things could become extremely complicated when a total of 100 rest areas are involved. The project therefore has to be implemented as a matrix organisation.

## How much space is allocated to the providers in the rest areas?

There are two different arrangements for the fast-charging stations: the first is based on a parking system. Here, there are four parking spaces (marked in green) with a charging point. With this arrangement, the space requirement is around 110 square metres. Approximately 80 of the 100 fast-charging stations will be installed according to this arrangement. The remainder will each be constructed along the lines of a conventional filling station and will require around 600 square metres of space.

## Is access to the power supply easy?

Actually, yes: a transformer station will have to be constructed at each rest area, and from there a power line will be drawn through to the existing electricity net-

work. The connection point can be as far away as several hundred metres.

## Is the capacity of the power line a problem?

No. In a first step, FEDRO will provide a transformer station with a capacity of 600 kW, which is sufficient to simultaneously recharge four electric vehicles. A later expansion to eight recharging points is already planned in the majority of cases.

Interview: Guido Biemann



Stephan Aerni.

## Electric fast-charging stations at motorway rest areas:

Year	Rest area	Canton	Motorway
2020	Inseli	Lucerne	A2
	Chilchbühl	Lucerne	A2
	Knutwil Nord	Lucerne	A2
	Knutwil Süd	Lucerne	A2
	Lenzburg	Aargau	A1
	Oftringen	Aargau	A1
2021	Suhr	Aargau	A1
	Mumpf Nord	Aargau	A3
	Mumpf Süd	Aargau	A3
	Eggberg	Solothurn	A2
	Teufengraben	Solothurn	A2
	Aspholz	Zurich	A3
	Mühlematt Ost	Basel-Landschaft	A2
	Mühlematt West	Basel-Landschaft	A2
	Erstfeld	Uri	A2
Grund	Uri	A2	
2022 1 <sup>st</sup> quarter	Othmarsingen	Aargau	A1
	Ardon Nord	Valais	A9
	Ardon Süd	Valais	A9
2022 April to December	Planned installation of 28 fast-charging stations		
2023	Planned installation of 21 fast-charging stations		
2024–2030	Planned installation of 32 fast-charging stations		

# Ongoing development of the motorway/national roads network

The importance of the motorway/national roads network is very high. Since 1990, the traffic volume has more than doubled – and it is continuing to grow. In view of this, in addition to increasing the efficient use of the existing infrastructure, it will be necessary to widen the most heavily frequented stretches.

## Problem categories

**Category I (117 kilometres):** The traffic volume exceeds the available capacity by up to 10 percent. Following even the slightest disruptions, congestion occurs on the sections concerned during one to seven hours a week.

**Category II (139 kilometres):** The traffic volume exceeds the available capacity by 10 to 20 percent. Congestion occurs daily during one to two hours of slow-moving traffic.

**Category III (111 kilometres):** The traffic volume exceeds the available capacity by at least 20 percent. Daily occurrence of congestion and slow-moving traffic during two to four hours.

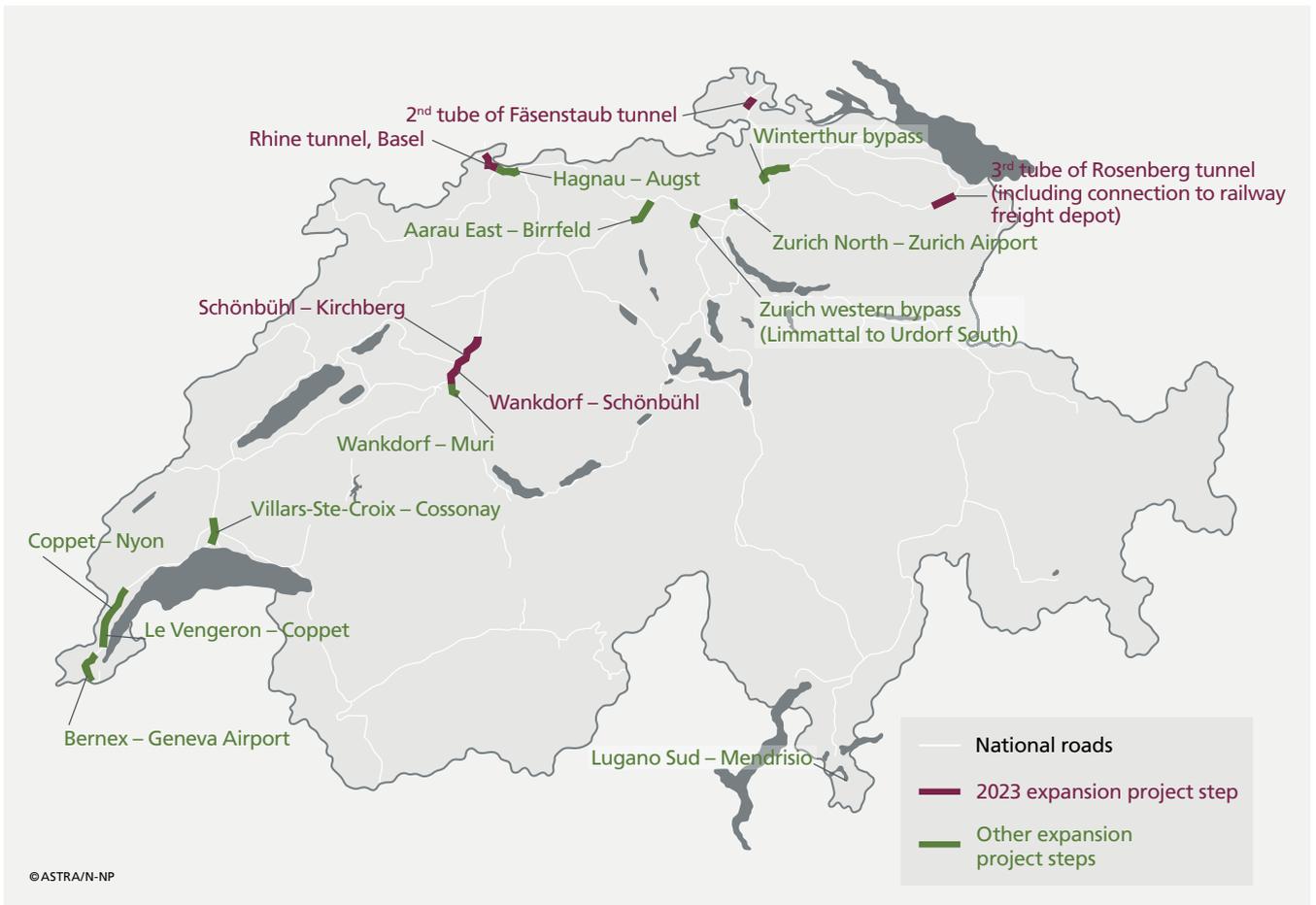
The motorways/national roads account for around 40 percent of all private road transport and 74 percent of goods transport by road, yet they barely account for 3 percent of the country's overall road network. While the traffic volume on the latter rose by 38 percent between 1990 and 2019, during the same period it increased by 137 percent on the motorway/national roads network. This clearly underscores the importance of the latter.

However, on this network the traffic volume is increasing at a slower pace than on the country's other roads. This may be attributable to the fact that many of the motorways/national roads have reached the limit of their capacity and can no longer handle any more increases in traffic volume. According to the traffic perspectives of the Federal Department of the Environment, Transport, Energy and Communications (DETEC), the volume of road traffic is expected to increase by 18 percent (private mobility) and 33 percent (goods transport) respectively by 2040. In order to improve the flow of traffic on the motorway/national roads network and thus ease the burden on the other roads which pass through towns and villages, it will be necessary to widen certain stretches and increase the efficient use of the existing infrastructure.

## Parliament to define priorities

As a rule, at the request of the Federal Council, every four years Parliament defines the further development of the motorway/national roads network within the scope of the Strategic Motorway Development Programme (STEP). This occurred for the first time in 2019. The preparation of the 2023 development programme is currently in progress.

The priorities and most purposeful projects are to be allocated to the 2030 implementation horizon. As soon as the various projects have reached a certain planning status, they will be incorporated into an expansion step. This concerns projects that are expected to be ready for



Projects allocated to the 2030 implementation horizon in the STEP motorway/national roads programme.

development within the next four years. Projects that are also necessary for maintaining the functional capacity of the network, but which are less urgent or are still in an earlier planning stage, will be allocated to the 2040 implementation horizon.

In January 2022, the Federal Council submitted the draft 2023 programme for consultation. Its goal is to improve traffic flow and the compatibility of motorways in the agglomerations in particular by 2030. For this purpose it intends to petition Parliament for approval of the following five projects in the framework of the 2023 development programme: N1, Wankdorf to Schönbühl; N1, Schönbühl to Kirchberg; N1, Rosenberg tunnel in St Gallen; N2, Rhine tunnel in Basel; and N4, Fäsenstaub tunnel in Schaffhausen (including the necessary credit facility).

#### Inclusion of adopted stretches for the first time

As of 1 January 2020, with the new federal network resolution the federal government adopted around 400 kilometres of cantonal roads into the motorway/national roads network. With this move, responsibility for three bypass projects (Le Locle, La Chaux-de-Fonds

and Näfels) was transferred to the federal government. In the framework of STEP 2019, Parliament had already definitively approved the implementation of these projects, together with the credit facility amounting to 1.5 billion Swiss francs. The Federal Council is now petitioning for the incorporation of three additional projects (Netstal bypass, Zurich Oberland motorway and connection between Bellinzona and Locarno) into the 2040 implementation horizon.

With the transfer of the former cantonal stretches, the federal government adopted a total of 16 expansion projects. The Federal Council has adopted three of these projects into the STEP programme. Together with the cantons and municipalities it also wants to closely examine seven other projects and potential solutions. The findings will flow into the next STEP proposal (2026). In the view of the Federal Council there is no need for action regarding the other six projects, primarily because there are no associated problems or the planning documentation is not up to date.

# Traffic on top, roadworks underneath

FEDRO is deploying its mobile ramp for the first time in 2022. This construction on wheels is 236 metres long and feeds traffic over the top of a roadwork site while the work is carried out beneath it.



The FEDRO Bridge is to be used for the first time between April and July 2022 on the A1 near Solothurn after the Luterbach junction in the direction of Bern.



## FEDRO Bridge

**Dimensions:** Length, 236 metres; width, 7.30 metres; height, 4.32 metres; lane width, 3 metres. Roadwork section: length, 100 metres; width, 5.10 metres; height, 3.10 metres.

**Cost:** 20.5 million Swiss francs for development, planning and realisation.

Nowadays, construction work that requires lane narrowing or closures is carried out at night whenever possible. This lessens the impact on traffic flow. But work overnight means higher labour costs and socially less acceptable working hours. On the other hand, noisy construction work in the vicinity of populated areas can only be carried out at night by way of exception. Furthermore, due to the constantly increasing volume of traffic the already limited time frames for night work are becoming ever shorter.

To find a solution to this problem, FEDRO conceived a 236-metre long mobile ramp (the FEDRO Bridge) that enables traffic to travel in two lanes over the roadwork site while the construction work is carried out beneath it. The FEDRO Bridge is mobile, i.e. it is on wheels so that it can be shifted to the next roadwork section.

The ramp comprises several modules and can be moved both lengthwise and laterally. This means it can be shifted from one project section to the next without having to be dismantled. Its steering is controlled via GPS.

### In use for the first time in 2022

The FEDRO Bridge is being used for the first time in spring 2022 on the A1 between Zurich and Bern for the maintenance work on the stretch from Recherswil to Luterbach. This will yield valuable findings regarding its use. This maintenance project is suitable for the trial deployment of the FEDRO Bridge because there are relatively few obstacles on the stretch concerned (overpasses, etc.) that would prevent the use of the ramp.

## Fly-over ramp for small-scale projects

The idea of diverting traffic over a ramp while roadwork is carried out below is not new. In 2010, FEDRO purchased a fly-over ramp, which has since been used around thirty times so that roadwork could be carried out while traffic is fed over the site. The fly-over ramp is static and around 100 metres in length. Roadwork is carried out beneath the lanes that feed traffic over the site at a height of 1.8 metres. By contrast, with the FEDRO Bridge the work space beneath the ramp is higher and the ramp can be moved on its own wheels.

# New legal provisions for professional drivers

A number of new legal provisions concerning professional drivers came into force in 2022. They are based on changes to the Ordinance on working hours and rest periods for professional drivers (Professional Drivers Ordinance) and the Ordinance on the Licensing of Professional Drivers.



Professional drivers' rest periods are regulated in the Professional Drivers Ordinance.

The Professional Drivers Ordinance regulates the working hours, driving times and rest periods of drivers of motor vehicles transporting loads of more than 3.5 tonnes and passenger vehicles with more than nine seats. As of the beginning of 2022, Switzerland adopted a range of EU

regulations into its own legislation. This step provides legal security and uniform conditions in cross-border traffic, and avoids problems in implementation and distortions to competition.

### Improvements in social regulations

The main aim of these changes is to improve the working conditions of professional drivers. From now on, companies are required to organise journeys so that drivers can return for the weekly rest period to the company base or their place of residence at least once every four weeks. In addition, they are no longer permitted to sleep in their vehicle for their weekly rest period after having driven for more than 45 hours. They must spend more time at home or in appropriate accommodation paid for by the employer.

Other changes concern in particular new possibilities for taking rest periods for international drivers and alternative driving times in extraordinary situations. These changes create the possibility of enabling drivers on journeys abroad to take two consecutive, reduced weekly rest periods that can then be compensated later (ideally at home). In the case of unforeseeable events, driving times can be extended for up to two hours to allow the driver to reach the company base or his/her place of residence. This provision is based on the condition, however, that after arrival at the destination a weekly rest period is taken.

In addition, drivers may be exempted from the provisions of the Professional Drivers Ordinance if they deliver hand-crafted goods within a limited area and the driving period lasts no longer than half the average weekly working period. Furthermore, new regulations have been introduced for registering border crossings in tachographs.

### New provisions for Federal Certificates of Competence and further training

The Ordinance on the Licensing of Professional Drivers governs the licensing of drivers for the transport of passengers and goods by road, as well as further training and requirements concerning instruction centres. Within the framework of the Agreement on Land Transport between Switzerland and the EU, the federal government adopted a range of EU regulations on training and further education into Swiss legislation.

Persons who transport machines that they use in their professional activity are no longer required to hold a Federal Certificate of Competence on the condition that vehicle operation on a weekly average takes up no more than half their working time. Journeys for the transport of passengers or goods for non-commercial purposes are also exempt from the certificate obligation. The term "non-commercial" replaces the term "private". The transport of goods for agricultural, forestry, horti-

## More flexibility for operators of snow and ice clearance services

Drivers subject to regulations concerning working hours, driving times and rest periods and who perform snow and ice clearance services will be able to extend their rest period on domestic journeys from 24 to 30 hours. This exemption may, however, only be applied for unplanned journeys and once a week at the most. A regular weekly rest period is to be taken during the week in question, and a prolonged uninterrupted day of rest is to be taken as compensation. This increases flexibility in the case of unplanned trips, for instance in the case of unexpected changes in weather conditions.

cultural and bee-keeping purposes may now be carried out without a certificate. This exemption applies on the condition that such journeys are carried out for purposes concerning the operation of own businesses, that they are restricted to an area of not more than 20 kilometres from the location of the business, and that vehicle driving must not take up more than half the average weekly working time of the driver concerned.

Further amendments to the Ordinance on the Licensing of Professional Drivers take effect as of July 2022. These concern updating the content of obligatory further training programmes. New provisions address aspects of safety and health protection at the work place and reducing the environmental impact of driving. In future, it will be possible to complete part of the further training requirements online.

The knowledge and skills required for acquiring the certificate will also be updated. In addition, the use of driving assistance and automated systems, optimisation of fuel consumption and the capacity to predict traffic risks will be introduced.

# Standardised systems for the operation of the motorways and national roads

“SA-CH” stands for Swiss Systems Architecture. It refers to the full range of management and control systems of the operating and safety equipment of the motorway/national roads network. FEDRO is currently working on standardising these systems throughout the country.

The operating and safety equipment comprises the following systems: energy supply, lighting, tunnel ventilation, fire alarms, signalisation, traffic management, video monitoring, communications (data networks, emergency telephones, wireless systems), control technology, equipment in the tunnel and control centres.

The 280 tunnels are equipped with differing management and control systems because they were constructed and operated by the individual cantons before their ownership was transferred to the federal government (i.e. FEDRO). These systems were developed and operated separately from one another and are thus not compatible with one another. With its Swiss Systems Architecture (“SA-CH”) project, FEDRO aims to fully standardise them.

## Creation of a uniform systems architecture

The aim of this project is to create a uniform architecture for all the required systems. For this purpose the following criteria will have to be met: homogeneity, modularity, expandability, local autonomy, standardised interfaces between the various systems, technological independence. The architecture also has to be based on substantiated needs.

Standardising the systems will improve their networking capacity and simplify their monitoring and management. In this way, all players will be able to work on a uniform basis. The project will involve the FEDRO head office in Ittigen, its local offices, the Traffic Management Centre in Emmenbrücke, the regional offices (mandated cantonal civil engineering departments), the police and the system suppliers.

With respect to operation, the intention is to focus on a handful of standardised processes, for example traffic management. This will enhance the level of road safety on the motorways and national roads, and especially in the tunnels.

Thanks to this project it will be easier to adapt the systems to new applications and requirements in the future, as well as to expand them as necessary. Parallel developments can be avoided and the operating and maintenance costs can be reduced, which will in turn cut the overall costs for the operation of the motorway/national roads network.

# FEDRO attends three world congresses

FEDRO will play an active part in three world congresses this year: the World Road Congress, the World Tunnel Congress and the World Conservation Congress. The main reason for attending these world meetings is to exchange knowledge.

PIARC stands for Permanent International Association of Road Congresses. It has been in existence since 1909 and comprises 120 member countries. Each PIARC congress is dedicated to a specific thematic area.

This year the PIARC World Road Congress was held from 7 to 11 February. FEDRO was represented by Jörg Dreier, head of the Traffic Management Centre Switzerland, and Dimitrios Papastergiou, head of the Engineering Structures section. In his speech on the subject of heavy-duty traffic management in winter conditions, Jörg Dreier discussed the use of waiting areas for heavy-duty vehicles in such conditions. He also discussed the use of these waiting areas for other purposes, including vehicle inspections. His key message was that waiting areas increase road safety and the efficiency of snow and ice clearance.

Dimitrios Papastergiou (Bridges section), spoke about seismic security and protection of the motorway/national roads network and related structures against earthquakes. In his speech he focused on the two-level review of bridges on Swiss motorways/national roads. Most of the bridges subjected to in-depth inspections were built before 1989, i.e. before modern regulations on protection against earthquakes came into force.

## Two projects at the World Tunnel Congress

The annual World Tunnel Congress is an international highlight for the Tunnel Construction and Geotechnology section. This year it will take place from 2 to 8 September in Copenhagen. It will be organised by the International Tunnelling and Underground Space Association (ITA-AITES), which comprises 78 member states, including Switzerland. Richard Kocherhans, head of the FEDRO Regional Office in Zofingen, is a member of the ITA-AITES governing board.

At this congress, FEDRO will make a presentation on synergies with the electricity supplier, Swissgrid, in the construction of the second tube of the Gotthard road tunnel. Specifically, this project concerns laying the heavy-duty power supply line that until now has gone over the mountains but in the future will run through a special channel of the Gotthard road tunnel. In addition, at the congress FEDRO will present the method it has developed for renewing a non-reinforced inner lining during night work while ensuring the continued operation of all lanes at peak times. In this process the lining is partially removed, a drainage and sealing system is installed, and a new inner lining made of self-sealing concrete is applied. Thanks to this method, existing tunnels can be renovated to meet long-term traffic requirements without substantially disturbing the tunnel's original structure.

The World Conservation Congress took place in September 2021 in Marseilles. Marguerite Trocmé, head of the Environment section, gave a speech entitled "Promoting the links between infrastructure, biodiversity and transitions in ecological zones".

## Links

### PIARC – World Road Association:

[www.piarc.org](http://www.piarc.org)

### World Tunnel Congress:

[www.tunnel-online.info](http://www.tunnel-online.info)

### World Conservation Congress:

[www.iucn.org](http://www.iucn.org)

# Two access shafts to geological fault zones

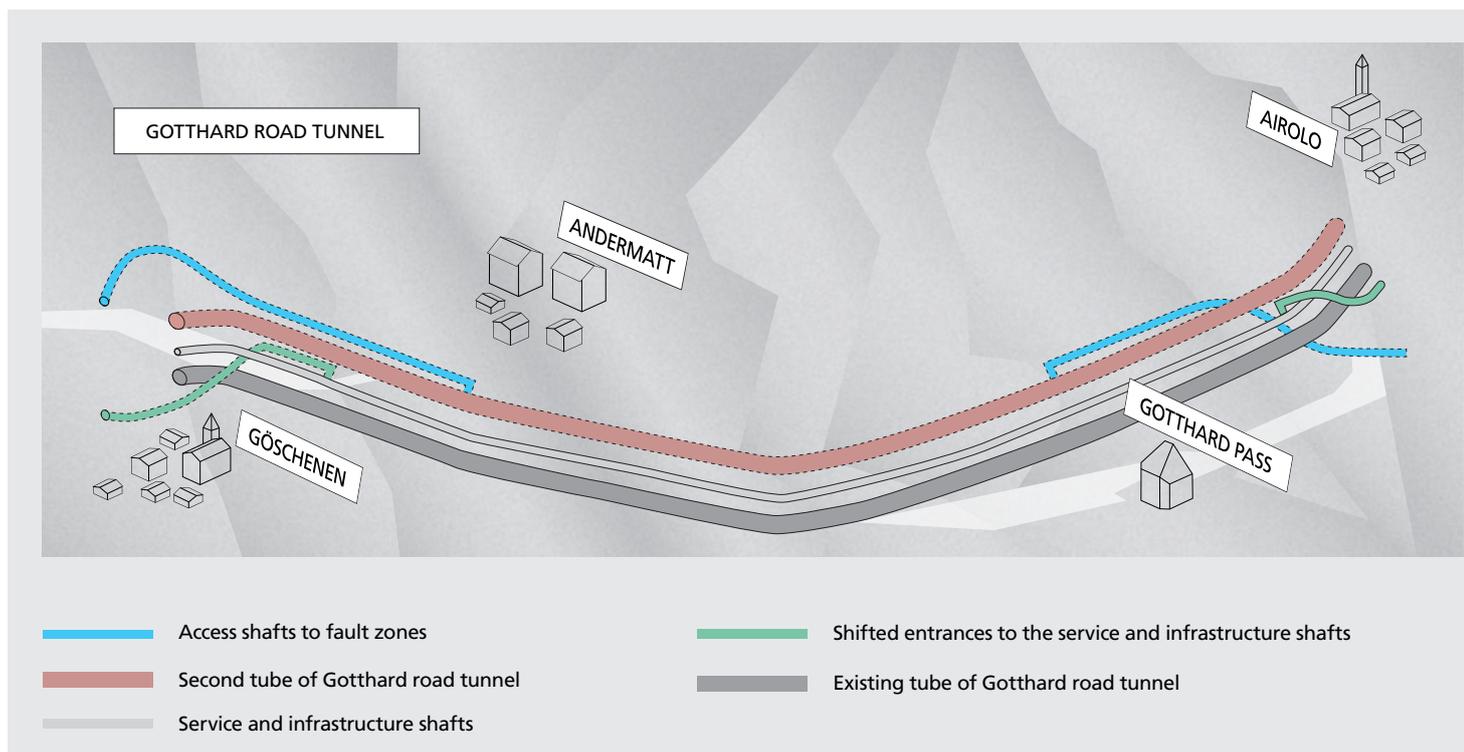
After the official ground-breaking ceremony for the second tube of the Gotthard road tunnel was held in autumn 2021, various preliminary operations were initiated. The focus was on the four-kilometre long access shaft on the north side and the five-kilometre-long access shaft on the south side leading to geological fault zones.

In 2021, comprehensive preparations were made for the installation zones for the construction sites at the two portals. At the northern portal in Göschenen, workers can reach the construction site to the east of the Reuss via a footbridge. In the village there is a modern canteen for the site personnel. At the southern portal in Airolo, the existing railway installations are being adapted so that they can be used for site logistics. Near the mo-

torway junction a large zone is being prepared for the concrete plant.

## Shifted entrances to the service and infrastructure shafts

Originally the service and infrastructure shafts on the north and south sides were to end immediately alongside the entrance to the existing tube. But because they



Progress of the construction of the second tube of the Gotthard road tunnel.

are now to be used for the new tube, the entrances to these shafts have had to be shifted. For this purpose their course has been changed over a length of several hundred metres. The breakthrough between the new entrance to the service and infrastructure shafts and the existing shafts was made in December 2021 on the southern side and in spring 2022 on the northern side. The new course of these shafts can be put into operation in spring 2023.

### Geological fault zones

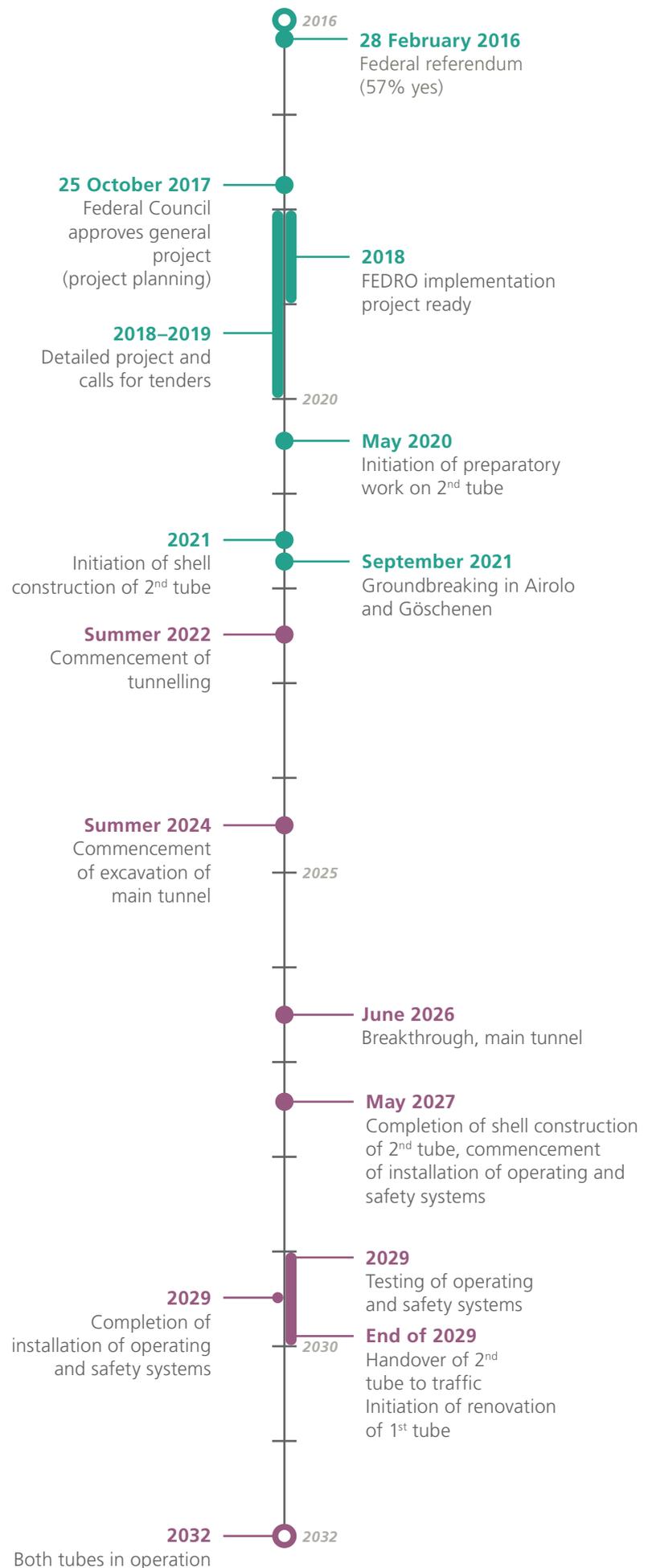
The assembly of two small tunnelling machines commenced at the beginning of 2022 in Airolo and in mid-May in Göschenen. With a diameter of eight metres, these machines are to be used for the construction of the two shafts for accessing the two geological fault zones, which are located four kilometres on the northern side, and five kilometres on the southern side, from the tunnel portals and are several hundred metres in length. The tunnelling machines are expected to break through to the fault zones in summer 2023, at which time the complex excavation work will commence in these sections. The excavation of the main tunnel is scheduled to commence in summer 2024. The tunnelling machines for this operation will have a diameter of twelve metres.

### Sustainable accommodation

At the same time as the tunnelling work, the accommodation and canteens for the workers are being built: three new timber buildings are being constructed in the middle of Göschenen village. Two of these will be converted for use as residential dwellings after work on the second tunnel tube has been completed, while the third is a modular structure that can be dismantled and re-used elsewhere. In Airolo, the former Hotel Alpina is to be renovated, and can be used by the municipality after the tunnel project has been completed.

## Guided tours from May 2022

The two information centres at Göschenen and Airolo railway stations offer interactive and fascinating background information about the construction of the second Gotthard road tunnel tube. Visits to the information centres and guided tours of the construction sites can be booked as of May 2022.



# FEDRO also co-financing agglomeration projects

FEDRO is co-financing agglomeration projects in addition to its funding of the motorway/national roads network. These projects are defined every four years within the framework of agglomeration programmes.



The Poya bridge (851 metres in length) in Fribourg crosses the river Saane and reduces through-traffic in the historic section of town near the cathedral.

Since 2008, the federal government has been co-financing measures aimed at improving the traffic systems in agglomerations. Following the creation of the Motorway and Agglomeration Traffic Fund in 2018, the federal government is not only able to provide sufficient funding for the operation, maintenance and expansion of the motorway/national roads network, but can also co-finance agglomeration projects. Thanks to this instrument, the cantons and agglomerations are able to more effectively plan their various projects because their long-term financing is secured.

From 2008, it was initially the most urgent projects that were implemented. The first generation of agglomeration projects was financed from 2011. In the meantime, the cantons submit a new generation of agglomeration projects to the federal government every four years. The fourth such generation was submitted in 2021. The Federal Office for Spatial Development (ARE) is responsible for approving the agglomeration programmes together with FEDRO, the Federal Office of Transport (FOT) and the Federal Office for the Environment (FOEN). FEDRO is responsible for the financing agreements concerning road traffic and human-powered mobility measures for all project generations, as well as for tram transport measures from the third generation of agglomeration programmes.

#### Fourth generation as of 2023

The measures defined in the first two generations of agglomeration programmes have to be implemented by the end of 2027, while those specified in the third and fourth generations have to be implemented within five to six years after their approval by Parliament. The measures defined in the fourth generation are expected to receive parliamentary approval in 2023.

The numerous projects that have received financial support within the scope of agglomeration programmes include the Thun bypass (first generation) with 40 million Swiss francs; the Limmattal tram line (third generation) with 210 million; the Poya bridge in Fribourg (urgent project) with 83 million; and the pick-up and drop-off zone at Bellinzona railway station in Ticino, with 8 million.

Numerous other smaller projects have also been supported with amounts ranging from 30,000 to 300,000 Swiss francs, including bike parking zones, footpaths and cycle lanes, bus routes, bus stops, etc. With effect from the third generation, lump-sum contributions can be granted for small projects in order to cut administrative costs. Within FEDRO, the management of agglomeration projects is the responsibility of the Network Planning section.



The Limmattal tram line is 13.4 kilometres long and leads from Zurich-Altstetten to Killwangen.

#### Projects financed between 2011 and 2021

	Year	No. of projects	Million Swiss francs
First generation	2011	475	454
Second generation	2015	425	272
Third generation	2019	150	659
<b>Total</b>		<b>1,050</b>	<b>1,385</b>

# Motorway in canton of Uri as flood discharge channel

The motorway stretch in the canton of Uri is not just part of an international transit axis: the section between Erstfeld and the Lake of Lucerne can also be transformed into a discharge channel during extreme flooding events.



Near Altdorf (canton of Uri), in the event of flooding the river Reuss can be diverted via the A2 motorway.

When floods occur, the river Reuss can breach the flood barrier between Erstfeld and Flüelen on the Lake of Lucerne. This occurs if the river's flow rate exceeds 620 cubic metres per second. In the event of an impending flood, a warning is sent to the traffic police of the canton of Uri, who upon consultation with the cantonal

authority responsible for flood response have to decide whether or not to close the motorway stretch between Erstfeld and the Lake of Lucerne so that the flood water can be diverted onto it. Thus a section of the Reuss can be discharged in a controlled manner in the direction of the Lake of Lucerne.

The last time the Reuss burst its banks was at the beginning of October 2020 near Altdorf. On that occasion the motorway was closed for twenty hours so that the water could be diverted into the lake. On 13 July 2021 the same stretch of motorway had to be closed as a precaution, though in the end the Reuss did not burst its banks this time.

#### Local and transit traffic

The flood that occurred in 2020 underscored the fact that there is a need for coordination and preparation when it comes to traffic management. In spring 2022 a new traffic concept developed by the canton of Uri will ensure that both local and transit traffic can now be diverted in a coordinated manner in the event that the motorway has to be closed. The cantonal civil engineering office and police force developed a traffic concept in collaboration with an external planning bureau. Any necessary diversions of transit traffic can now be implemented without delay: traffic in both directions is diverted between Erstfeld and Flüelen.

The 2021 event demonstrated that a traffic service is required at practically every junction. In addition, heavy transit vehicles can now be held back in waiting areas outside the canton.

The 1.5-metre flood barrier along the Reuss also performs other important functions: it acts as a crash barrier for vehicles, protects wildlife and reduces traffic noise for nearby residential areas.



# Vehicle registration – a challenge for the future

The ongoing automation and increased use of electronics in vehicles represent new challenges for the licensing authorities. The corresponding regulations are being constantly adapted in international expert groups.

The use of new technologies, electronics and software in vehicles is developing at a rapid pace. Thus the life-cycle compliance of existing vehicles is a major challenge for the licensing authorities. The technical requirements on vehicles have to be specified so that their roadworthiness can be guaranteed throughout their entire service life (= life-cycle compliance).

In addition, international technical committees are endeavouring to define uniform assessment methods, in particular with respect to the use of automated driving systems in vehicles. One of these bodies is the Geneva-based GRVA (Groupe rapporteur de véhicules autonomes/Workgroup for Automated Vehicles”), which is drawing up technical regulations for vehicles and submitting its proposals to the UN for validation. This process forms the basis for the development of the applicable UNECE regulations. The GRVA is focusing on the definition of criteria for vehicle manufacture and Switzerland is represented in this workgroup through FEDRO.

## Type approval

Any manufacturer wishing to bring a new vehicle onto the market has to obtain the necessary type approval, which has to be granted by the relevant approval or national licensing authority. For certain vehicle types and components, FEDRO is the relevant authority.

Every vehicle comprises a broad variety of components, and manufacturers initially have to have all sub-systems approved individually. Exhaust emissions are measured on a test bench; all lamps in the lighting installations have to be tested individually (this includes verification that they have been correctly installed); and various components of the braking systems have to be tested (including the anti-blocking system).

As a result of automation, the requirements placed on vehicles are becoming more complex, and the criteria for the test procedures for electronic components are becoming increasingly stringent. The regulations now also stipulate how the manufacturer has to carry out system updates so that the functions of the engine do not change (for example with respect to exhaust emissions).

However, this does not mean that in the new test procedures, strictly mechanical testing is no longer required. This will remain unchanged for the time being. For practical trials, driver assistance systems (for example, adaptive cruise control) have to be tested and braking systems have to be subjected to special inspections.

## Responsibility of FEDRO

In Switzerland, there are three ways in which new vehicles can be registered:

- Type approval procedure (10 percent of registrations);
- Data sheet or technical data produced from the European overall approval of the vehicle (83 percent);
- Certificate of Conformity, i.e. an inspection by the relevant road traffic authority that confirms that the vehicle is in conformity with the corresponding requirements (7 percent).

FEDRO is responsible for issuing type approvals and data sheets. It creates and manages the documents in its TARGA database, which enables the federal and cantonal authorities to access important vehicle data. Here, CO<sub>2</sub> penalties for passenger cars are calculated and invoiced.



## Cyber security

One of the major challenges for vehicle registration with regard to electronics and software concerns manipulation by third parties. This involves the cyber security of vehicles. Systems have to be designed in order to ensure that unauthorised third parties are unable to access or collect data. There are currently two UNECE Regulations (No. 155 and No. 157) which specify how updates of vehicle systems (and thus cyber security) have to be developed.

### **Decarbonisation of vehicles**

Together with the technical development of vehicles, efforts are also being made to decarbonise road transport, i.e. to promote the changeover from combustion engines to electric motors. In Switzerland, the Federal Council has introduced incentives and corresponding legal provisions. On 1 April 2022 it adapted the provisions governing the weight and length of climate-friendly heavy goods vehicles. Because electric drive systems are heavier than combustion engines, these vehicles are allowed to be up to two tonnes heavier. And in order to improve their aerodynamics, their maximum permissible length can be increased so that a sloping front and a retractable rear spoiler can be added.

The registration of a vehicle includes a detailed inspection of both the chassis and the engine.

With effect from 2026, EU member states will have to be able to exchange Certificates of Conformity in electronic form (as "e-COCs") with the authorities of other member states. For domestic manufacturers and importers, a uniform system is of the utmost importance. A motion submitted to Parliament calls for the registration of all new vehicles to be based solely on a Certificate of Conformity (i.e. without the need to present the vehicle to the cantonal road traffic authority for inspection). In view of this, FEDRO initiated a system change in favour of individual vehicle data and launched a project called Initial Vehicle Information. In the future, instead of the type approval, the abbreviation "IVI" or "IVIX" will be indicated in position 24 on the vehicle licences of passenger cars and light commercial vehicles.

# Enabling automated driving

To enable automated driving, a variety of technical innovations will be required and various changes will have to be made to the existing legislation. The new provisions are currently being defined within the framework of the revisions of the Vienna Convention on Road Traffic and the Federal Road Traffic Act.



Mirror-cam in a heavy goods vehicle – a camera with screen is used instead of a rear-view mirror.

Automated vehicles have the potential to enhance road safety, improve traffic flow and reduce environmental emissions, as well as to open up new opportunities for the economy and providers of transport services. As one of the first countries in Europe, Switzerland wants to en-

able automated driving, but this will require the creation of the necessary legal basis.

The 1968 Vienna Convention on Road Traffic regulates various aspects of road transport. It also standardises

## Automation categories

**0 (non-automated vehicles):** Vehicles are equipped with warning systems only. Drivers maintain complete control of their vehicle.

**1 (assisted driving):** The system assumes either the longitudinal (cruise control) or latitudinal (lane-keeping) control of the vehicle, while the driver assumes control of the respective other direction. Here the driver has to permanently monitor the system and be able to resume full control of the vehicle at any time.

**2 (partially automated driving):** The system can assume both the longitudinal and latitudinal control of the vehicle for a certain period of time or in special situations (e.g. overtaking on a motorway). Here the driver has to permanently monitor the system and be able to immediately resume control of the vehicle at any time.

**3 (conditionally automated driving):** The system assumes the longitudinal and latitudinal control of the vehicle for a certain period of time or in certain situations. Here the driver is no longer required to permanently monitor the system, but must always be able to resume control of the vehicle in sufficient time if instructed to do so by the system.

**4 (highly automated driving):** The system can automatically assume full control of the vehicle in a defined situation, for example on a motorway. It has to instruct the driver to resume control of the vehicle prior to the termination of the defined situation. If the driver fails to take back control, the vehicle must automatically switch into a low-risk status (e.g. stop in the emergency lane of the motorway).

**5 (fully-automated driving):** Here, no driver is necessary throughout the entire journey. The system assumes all operating tasks.

traffic regulations among its contracting states. For example, one of its regulations stipulates that the person at the steering wheel must be in control of the vehicle at all times. But with the increasing automation of vehicles, driver assistance systems are assuming control to an ever greater extent. The Vienna Convention has therefore been revised.

In order to enable automated driving on public roads in Switzerland, the Federal Council adopted the revised Vienna Convention at the end of 2021. However, the amendments are intended as an interim solution until a new Convention has been prepared that regulates automated driving in detail.

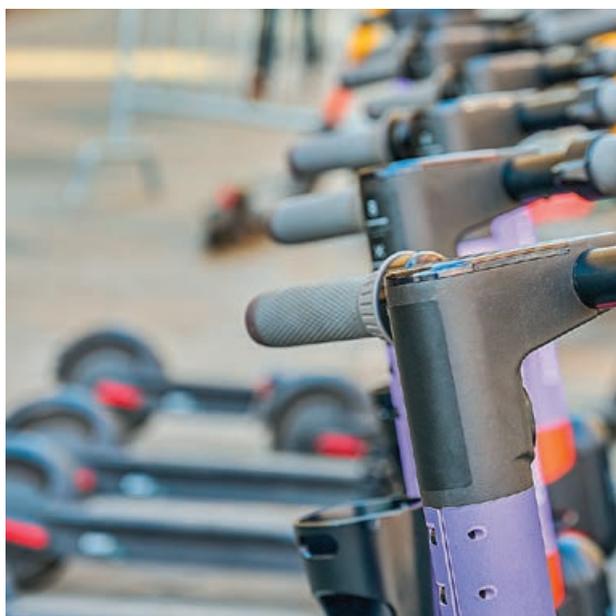
### Revision of the Federal Road Traffic Act

At the international level, the applicable technical requirements and specifications for the use of automated vehicles are to be defined in the next few years, together with their impacts on drivers. In order for Switzerland to benefit from the resulting opportunities, the Federal Road Traffic Act is to be revised. The proposed revision is currently being debated in Parliament.

To ensure a timely response to the developments with respect to automated driving, the Federal Council is to be empowered to issue the necessary regulations in an ordinance. In particular, this means authorising it to define the extent to which operators of automated vehicles can be exempted from their obligations, and to specify the framework within which vehicles with an automated drive system can be put into circulation. In addition, an allowance has to be made for vehicles with an automated driving system to be used on public roads on a trial basis within a limited framework. In this way it will be possible to obtain findings regarding their further development and the necessary legislation. FEDRO is to be authorised to licence such trials and to also have the possibility of financially supporting new technologies.

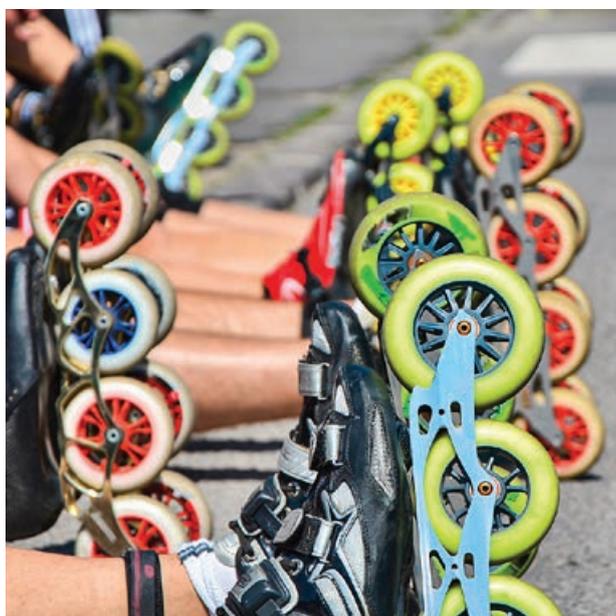
# Slow vehicles in road traffic

The objective of Switzerland's road transport policy is to meet all mobility needs efficiently and in an environmentally compatible manner. Human-powered mobility can make a valuable contribution towards this goal.



The Federal Council has adopted a report providing an overview of human-powered mobility. The findings are to be used in order to optimise the future framework conditions for this category of mobility. The term "human-powered mobility" also includes certain vehicles that are not especially slow, such as e-bikes. But these are by no means the only ones.

The various **non-motorised devices similar to vehicles are also classified in this category**. These include personal vehicles equipped with wheels or rollers and which are exclusively human-powered (e.g. roller skates, in-line skates, scooters). They are largely subject to the same traffic rules as pedestrians, which means they may be used on footpaths and pavements, as well as in cycle lanes and on less-frequented roads.



**Electric scooters** may not exceed 20 km/h when powered by the motor. Otherwise the same regulations apply as those for **slow e-bikes** with electric pedal support up to 25 km/h. Both these vehicle types must be equipped with front and rear brakes, as well as white front and red rear lights. They are not subject to type approval and can be put into circulation without registration or a licence plate. Nonetheless, they have to comply with the applicable regulations. Their users must obey the same regulations that apply to other cyclists. Slow e-bikes may only be used on footpaths, pavements, etc., that are expressly permitted for use by cyclists. For safety reasons, wearing a cycle helmet is recommended, but is not compulsory.



There are also **fast e-bikes**, which provide pedal support up to 45 km/h. These are classified as mopeds, have to be registered and require a yellow licence plate. Helmets are mandatory.

In the past few years, other vehicles such as trendy electric self-balancing scooters have appeared on the market. To date, only the two-wheeler **Segway** has been permitted for use in Switzerland. Hoverboards are prohibited for safety reasons, as are **single-wheeled self-balancing e-scooters** such as the Monowheel and Smartwheel, which may not be used on public roads, pavements, etc. The same applies to electric skateboards.

## Requirement of lights and tachometers for e-bikes

With effect from 1 April 2022, on all public roads, all e-bikes in Switzerland must have their lights switched on during the day. Lights must be firmly affixed to the bike. As a rule, the mandatory use of lights during the day also applies on public tracks and bike trails. The aim here is to increase the visibility of these vehicles, and thus make the use of e-bikes safer. In accordance with the corresponding legal provision, the requirement applies to front lights only, but FEDRO recommends always switching on both the front and the rear light.

Furthermore, as of 1 April 2022 all e-bikes must obey the general and signalled speed limits. From 1 April 2024, fast e-bikes (pedal support up to 45 km/h) must be equipped with a speedometer in order to be put into circulation. Fast e-bikes that are already in use must be equipped with an e-bike tachometer as of 1 April 2027.

# FEDRO management board

In 2021 and 2022, FEDRO implemented a variety of personnel and organisational changes. At the beginning of October 2021 the Federal Department of the Environment, Transport, Energy and Communications (DETEC) appointed Erwin Wieland as Deputy Director. He will remain head of the Road Networks division.

Valentina Kumpusch is to assume the position of Vice-Director of FEDRO as of the beginning of August 2022. She will be responsible for the motorway/national roads infrastructure in western Switzerland and the canton of Bern, plus the maintenance planning and operation of the Swiss motorway/national roads network. She was previously general project manager for the construction of the second tube of the Gotthard road tunnel.

In order to respond to the increased requirements relating to information technology and its growing importance, FEDRO has reorganised its IT activities and incorporated these into a new section called Digital Services, which is headed by Manfred Jungo.

Vivian Welten has been appointed as the new head of the Political and Official Affairs Division. She was previously head of the Investment Planning (East) section of the Infrastructure East Division. Vivian Welten is an attorney-at-law. She joined FEDRO in 2014.

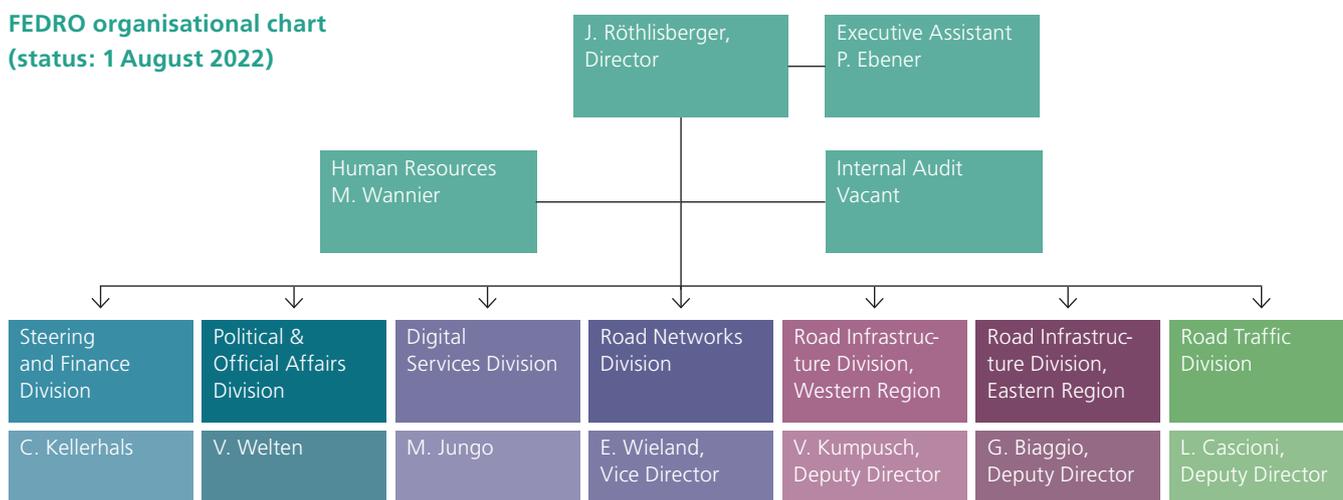


Jürg Röthlisberger,  
Director



Erwin Wieland, Vice Director,  
Road Networks Division

## FEDRO organisational chart (status: 1 August 2022)





Guido Biaggio, Deputy Director, Head of Road Infrastructure Division, Eastern Region



Lorenzo Cascioni, Deputy Director Road Traffic Division



Valentina Kumpusch, Deputy Director, Head of Road Infrastructure Division, Western Region



Petra Ebener,  
Executive Assistant



Vivian Welten, Head of Political and Official Affairs Division



Manfred Jungo,  
Head of Digital Services Division



Christian Kellerhals,  
Head of Steering and Finance Division



Marianne Wannier,  
Head of Human Resources



# Facts, figures and statistics

636 employees

## People



Tunnels: 280

Construction projects: 827

Connections: 480

Heavy vehicle inspection centres: 7

9 FEDRO locations

45 IT systems

Rest areas (picnic): 122



## Data

Replacement value of motorway/national roads network: 95.3 billion Swiss francs

95.3 billion Swiss francs

Expenditure: 3.49 billion Swiss francs

Traffic counting stations: 429

Concluded contracts in 2021: 3,630

Investment in infrastructure:

2.3 billion Swiss francs

## Finance



Bridges: 4,400 (main axes and overpasses)

HGVs via main transalpine routes: 860,000

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



## Infrastructure

Junctions: 52

Vehicle kilometres on the network: 27 billion

Drainage water treatment plants: 162

Large-scale wildlife corridors: 43

## Vehicles



2,254.5 kilometres Length of motorway/national roads network

Highest average daily traffic volume: 130,000 vehicles (Wallisellen)

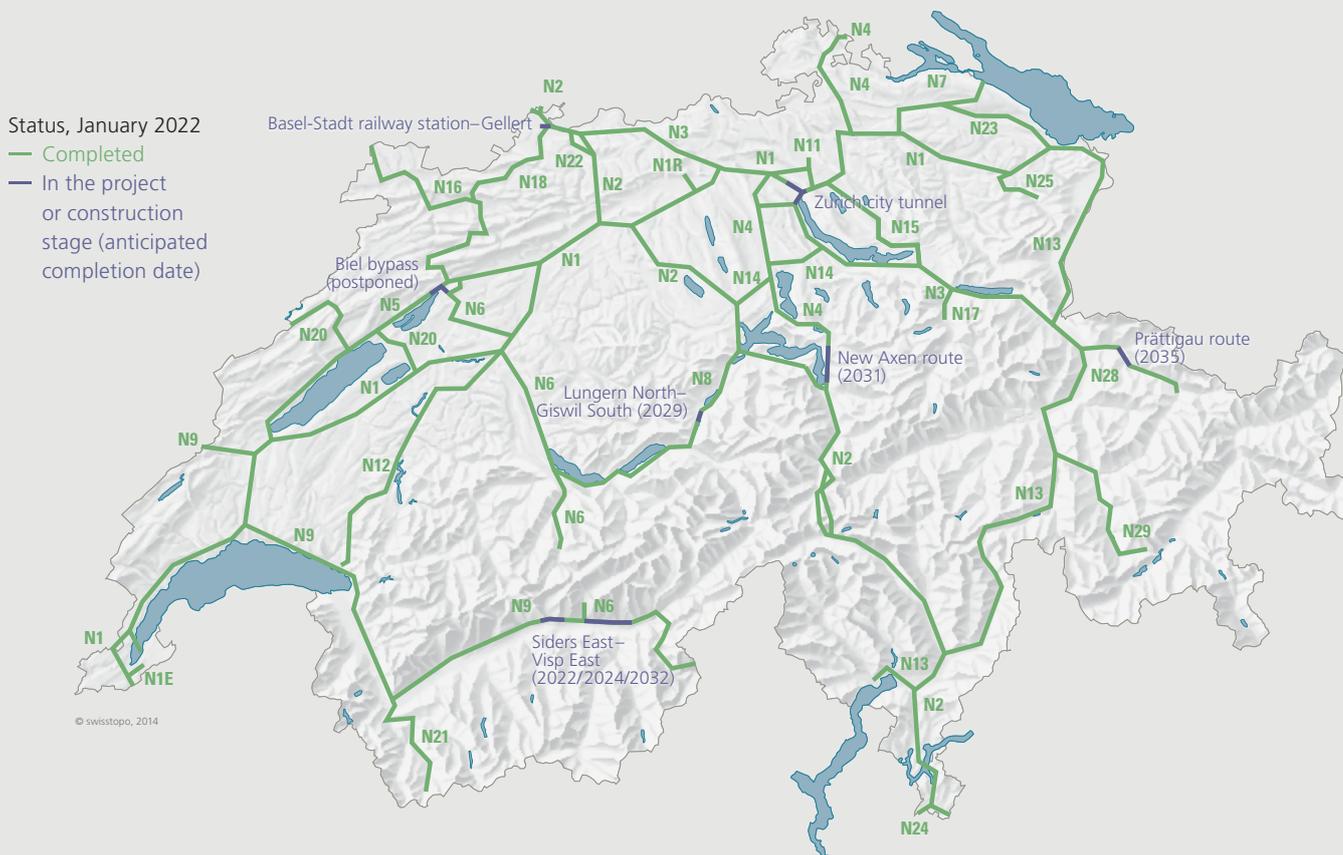
# Partial opening of Visp bypass

In summer 2022, the motorway/national roads network will be 4.4 kilometres longer following the opening of a section of the Visp bypass. This section cost a total of 450 million Swiss francs, with the construction of the northern tube of the Visp tunnel (2.6 kilometres) accounting for 350 million. The southern tube is currently under construction. The Visp bypass is part of the Gampel-Brig/Glis project. The total length of the Upper Valais motorway will be 31.8 kilometres, of which around 15 kilometres have been opened to traffic. The 3.4 kilometre stretch from Steg/Gampel-East to Raron is scheduled for completion in 2023.

The construction of the interior of the third tube of the **Gubrist motorway tunnel in Zurich** was completed in November 2021. The installation of the operating and safety systems was initiated in spring 2022, and is scheduled for completion by the end of the year, including the

functions and safety tests. The tunnel is expected to be handed over to traffic at the beginning of 2023. There will then be three lanes in two tubes in the direction of Bern; in the direction of St Gallen, due to the renovation of the existing tubes, two lanes will be open as before.

The **3.2-kilometre Belchen tunnel** between Basel and Egerkingen traverses the Jura range. The two existing separated two-lane tubes that were constructed in the 1970s now need to be renovated. In order to minimise traffic disruptions (daily traffic volume, 55,000 vehicles) a new tube (Belchen renovation tunnel) is being constructed, which is scheduled for completion in summer 2022, after which the renovation of the two existing tubes will be initiated.



# The Swiss motorway/ national roads network

## Total length by road category (km) – Status: 31 December 2021

	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>				
Aargau		1.2	14	1.7	86.9		2.1		<b>105.9</b>
Appenzell AR								11.2	<b>11.2</b>
Appenzell IR								4.2	<b>4.2</b>
Basel-Landschaft			9.5	3.3	30.8		25.1		<b>68.7</b>
Basel-Stadt			3.5		6				<b>9.5</b>
Bern			13.2	3.1	160.4	1.1	72.1	34.7	<b>284.6</b>
Fribourg					84			5.5	<b>89.5</b>
Geneva					27.2				<b>27.2</b>
Glarus					16.6		2.2	7,6	<b>26.4</b>
Grisons					43.6		100.7	81	<b>225.3</b>
Jura					35.4		11.8	7.3	<b>54.5</b>
Lucerne			2.6	2.7	53.2				<b>58.5</b>
Neuenburg					46.1	2.2	17.8	1.9	<b>68.0</b>
Nidwalden					22.9		2.9		<b>25.8</b>
Obwalden					1.8		22.3	13.3	<b>37.4</b>
St. Gallen				4.3	144.9		13.4		<b>162.6</b>
Schaffhausen							12.3		<b>12.3</b>
Schwyz				2.7	40.5		2.2	4.3	<b>49.7</b>
Solothurn			6.5	5.4	31.9				<b>43.8</b>
Thurgau					45.1		33.5		<b>78.6</b>
Ticino			7.3	18	81		40.6	16.1	<b>163.0</b>
Uri					37.1		16.3	16.1	<b>69.5</b>
Valais					71.6	6.7	17.7	66.6	<b>162.6</b>
Vaud	0.6		2.8	5.7	183.4		12.8		<b>205.3</b>
Zug			6		15.9		1.5		<b>23.4</b>
Zurich	1.2		31.3		131.4	1.9	21.2		<b>187.0</b>
<b>Total</b>	<b>1.8</b>	<b>1.2</b>	<b>96.7</b>	<b>46.9</b>	<b>1,397.7</b>	<b>11.9</b>	<b>428.5</b>	<b>269.8</b>	<b>2,254.5</b>

## Motorway/national roads network by road category

Category	Description	Km
Category I	Motorways	1,313.5
Category II	Expressways and motorways with reduced speed limits	551
Category III	Mixed-traffic roads	390
<b>Total</b>		<b>2,254.5</b>

# Volume of heavy vehicles crossing the Alps remains practically constant

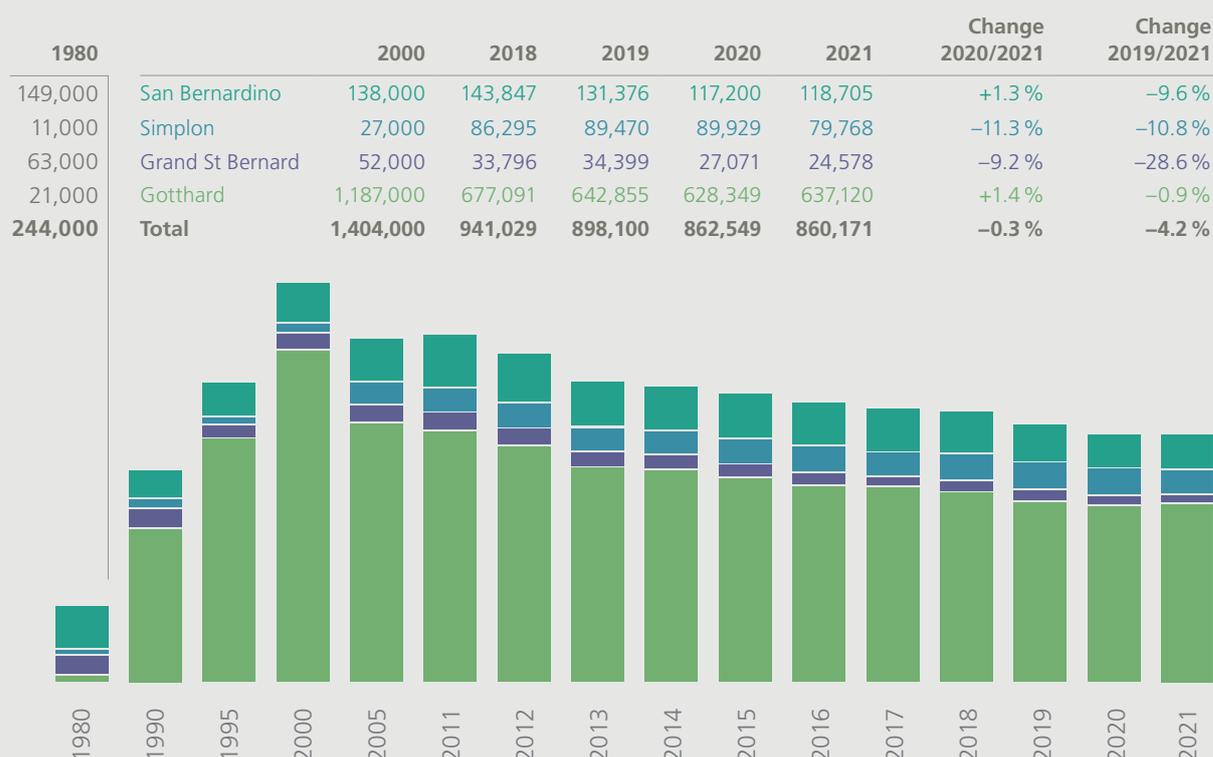
The total number of heavy goods vehicles crossing the Alps in 2021 remained more or less unchanged versus 2020: approximately 860,000 vehicles crossed the Alps, i.e. about 2,400 fewer (-0.3 percent) than in 2020.

Heavy vehicle traffic on transalpine roads presented a mixed picture in 2021, however: in the first half of the year, the volume of heavy vehicles crossing the Alps increased by 10.5 percent compared with the same period in 2020. In the first half of 2020, the volume of traffic was low owing to the Covid-19 pandemic and the countermeasures taken by different countries. In the second half of 2021, there was a clear drop of 10.1 percent in traffic volume versus the same period of the previous year.

In 2021, the drop in the tonnage of goods traffic on Swiss roads versus 2020 of 3.1 percent was significantly greater than that in the number of vehicles crossing the Alps (-0.3 percent). This is attributable to the proportionally larger decrease of 4.2 percent in the number of goods vehicles with trailers and articulated vehicles in the same period. The average load of heavy goods vehicles fell from 11.4 tonnes per vehicle in 2020 to 11.0 tonnes per vehicle in 2021.

Compared with 2019 (the year prior to the outbreak of the Covid-19 pandemic), in 2021, the number of goods vehicles crossing the Alps fell by 4.2 percent, or approximately 38,000 vehicles.

## Total number of heavy goods vehicles crossing the Alps



Source: Federal Office of Transport (FOT)

# Distance travelled on motorways almost back to pre-pandemic level

In 2020, the total distance travelled on Swiss motorways fell significantly as a result of the Covid-19 pandemic. In 2021, the accumulated distance increased to 27.4 billion kilometres, returning almost to the 2019 level.

The overall length of the Swiss road network is 83,000 kilometres, of which 2,254.5 kilometres are motorways/national roads. The latter account for more than 40 per cent of the accumulated distance travelled on the entire Swiss road network. The figure for 2021 was 27.4 billion kilometres, which almost corresponds to the level prior to the Covid-19 pandemic. The intensive use of the motorways/national roads is also apparent from the traffic jam statistics. The 400 kilometres of cantonal roads that were integrated into the motorway/national roads network in 2020 have to be taken into account in the 2021 statistics. A comparison between the 2019 traffic jam statistics and the same road network in 2021 shows that last year the number of traffic jam hours was around 6.3 percent lower than in 2019.

Traffic congestion remains the main reason for traffic jams, followed by accidents and road works.

The list of the most congested stretches of the motorway/national roads network has been headed for years by Wallisellen (canton of Zurich), followed by Muttenz (Basellandschaft), Würenlos (Aargau) and Schönbühl (Bern).

## Accumulated vehicle-kilometres on the Swiss motorway/national roads network

Year	Billion km	+/- (in %)	Heavy goods transport (billion km)	+/- (in %)
2015	26,485	+4.2	1,544	+0.2
2016	27,131	+2.4	1,567	+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

\* Including the integrated stretches of cantonal roads

## Number of traffic jam hours on the Swiss motorway/national roads network\*

Causes	2019	2020*	2021*	+/- (in %)
Congestion	26,832	20,144	29,050	+44.2
Accidents	2,835	2,204	2,890	+31.1
Roadworks	245	138	338	+144.9
Other	319	90	203	+125.6
<b>Total</b>	<b>30,230</b>	<b>22,575</b>	<b>32,481</b>	<b>+43.9</b>

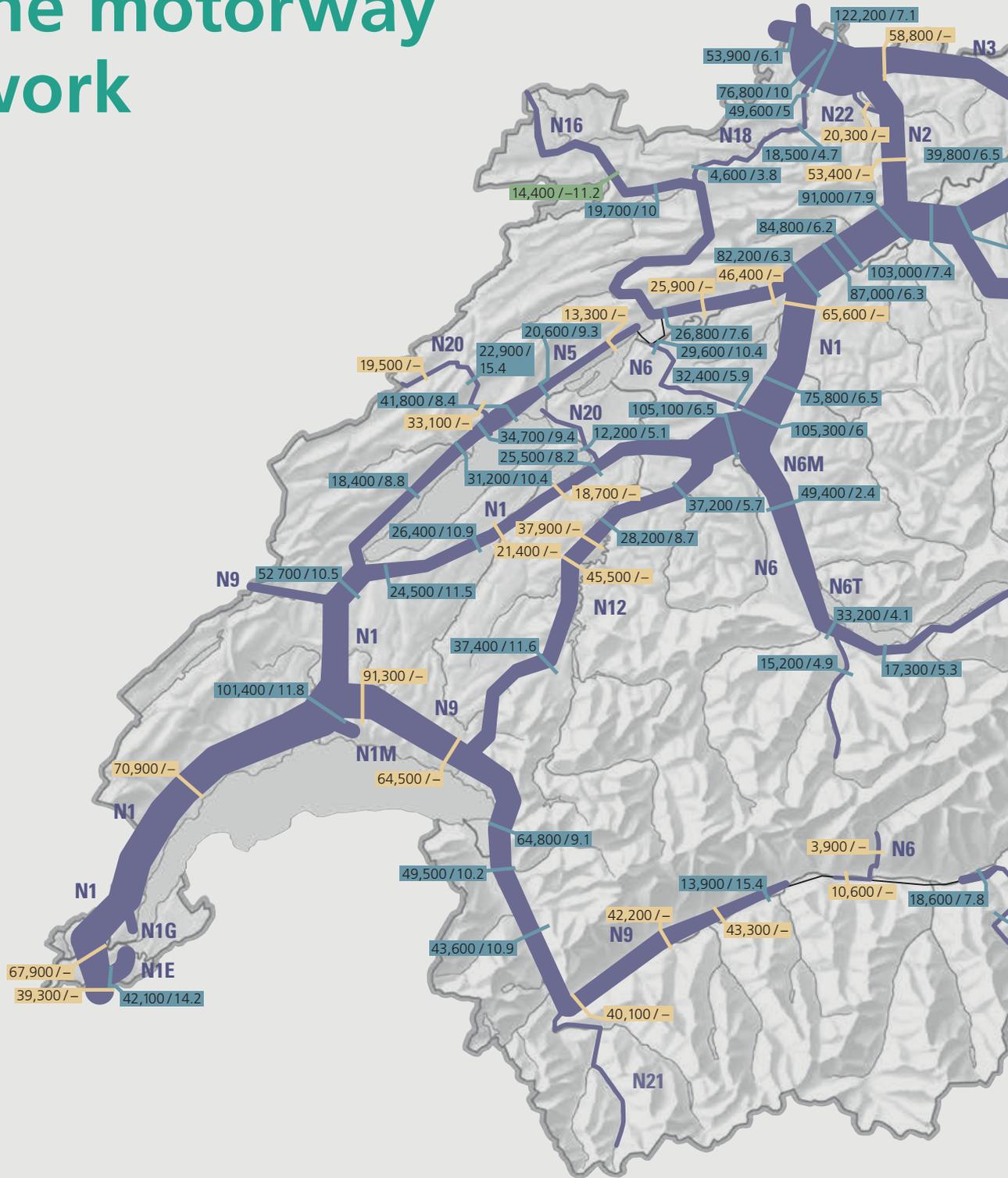
\* 2020/2021: including integrated cantonal road stretches

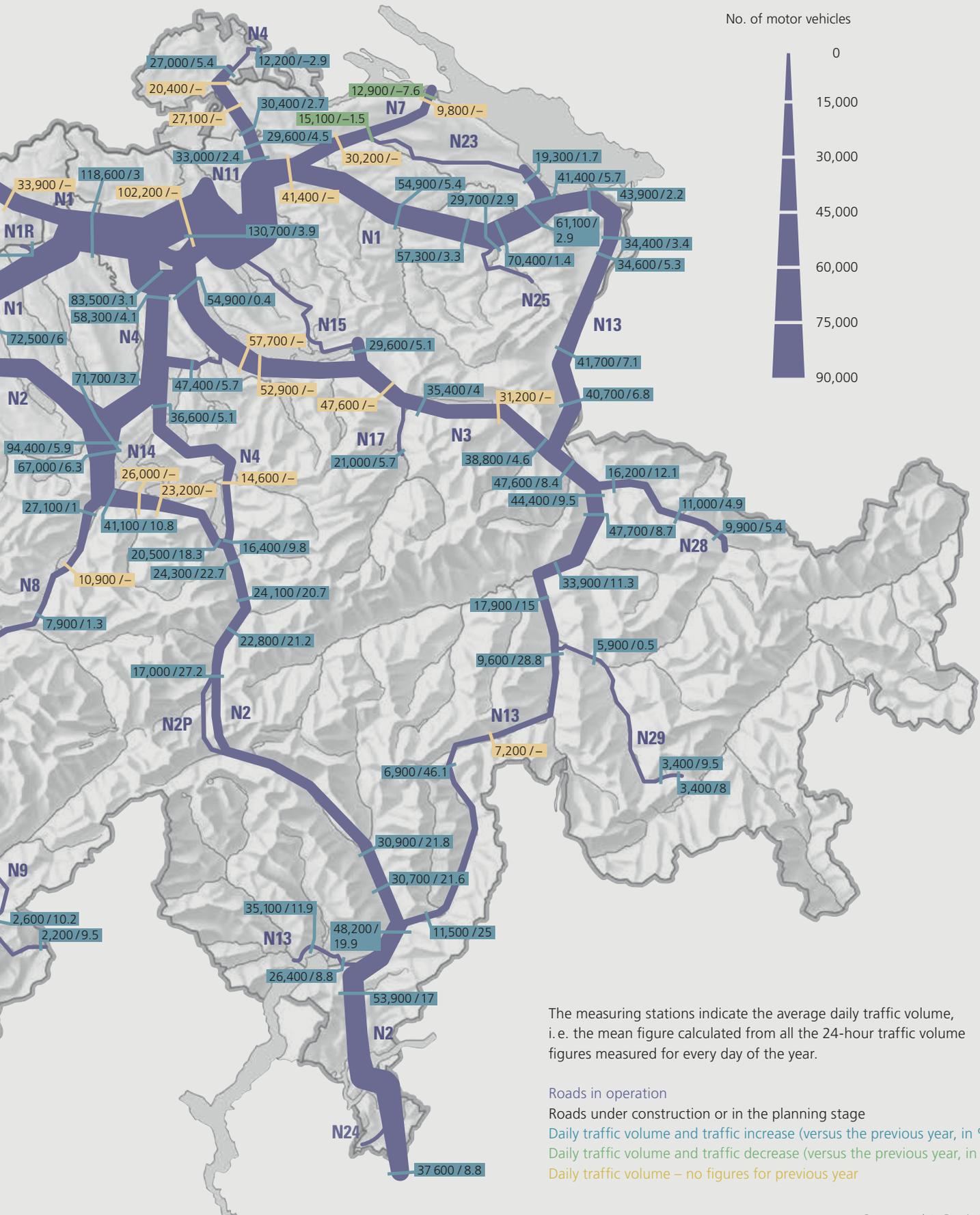
## Highest daily traffic volume (DTV\*)

	DTV* 2021	Share of heavy vehicles (%), 2021	DTV* 2020	Share of heavy vehicles (%), 2020	Change in DTV* (%) 2020/2021	Change in DTV* (%) 2019/2021
Wallisellen (ZH)	130,700	5.5	125,747	5.3	3.9	***
Muttenz (BL)	122,161	6.6	114,047	6.7	7.1	-5.5
Würenlos (AG)	118,611	7.2	115,203	7.1	3.0	-7.5
Schönbühl Grauholz (BE)	105,325	6.6	99,408	6.6	6.0	-4.6
Bern Forsthaus (BE)	105,142	5.1	98,682	5.2	6.5	-3.0
Bern Felsenau viaduct (BE)	103,377	6.4	97,169	6.4	6.4	-3.9
Oftringen/Rothrist (AG)	102,986	10.0	95,880	10.1	7.4	-4.3
Renens (VD)	101,385	3.4	90,647	3.6	11.8	***
Lucerne, Reussport tunnel (LU)	94,400	4.2	89,176	4.2	5.9	-7.3
Chiasso-Brodega (TI)	37,582	6.4	34,549	6.4	8.8	-27.5
Bellinzona (TI)	48,211	7.1	40,214	7.6	19.9	-4.4
Geneva, Plan-les-Ouates (GE)	42,091	3.9	36,841	4.3	14.2	***
Chur Nord (GR)	47,727	4.2	43,915	4.2	8.7	***
St. Gallen Rosenberg tunnel (SG)	72,197	4.1	70,069	4.3	3.0	-8.2

\* 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). \*\* Heavy goods vehicles. \*\*\* Measuring station not available in 2019.

# Map of traffic volume on the motorway 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

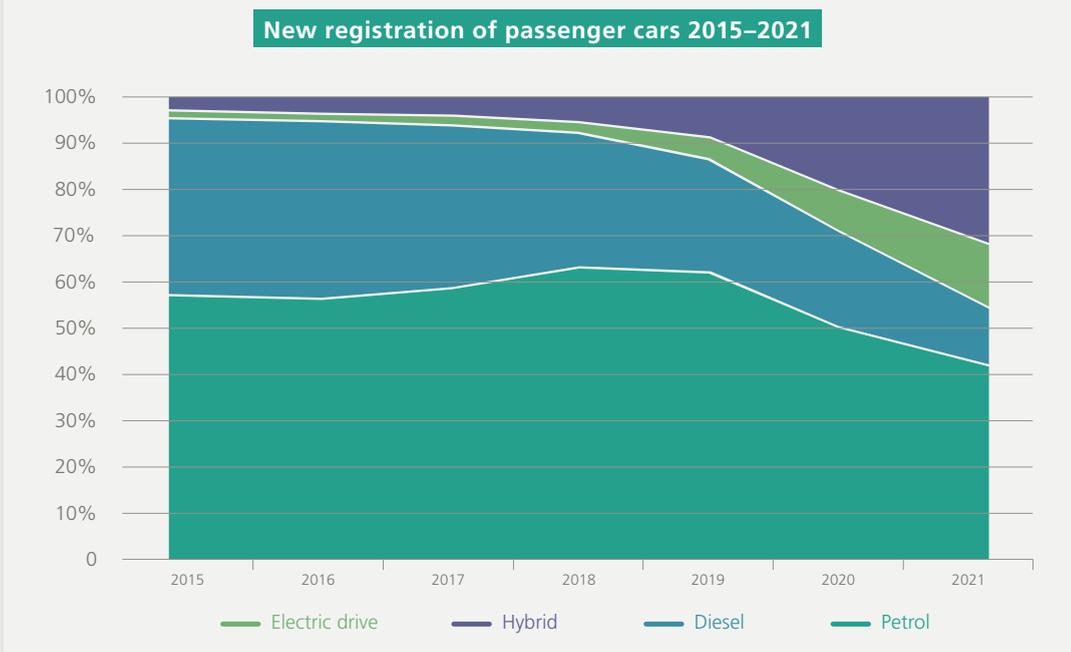
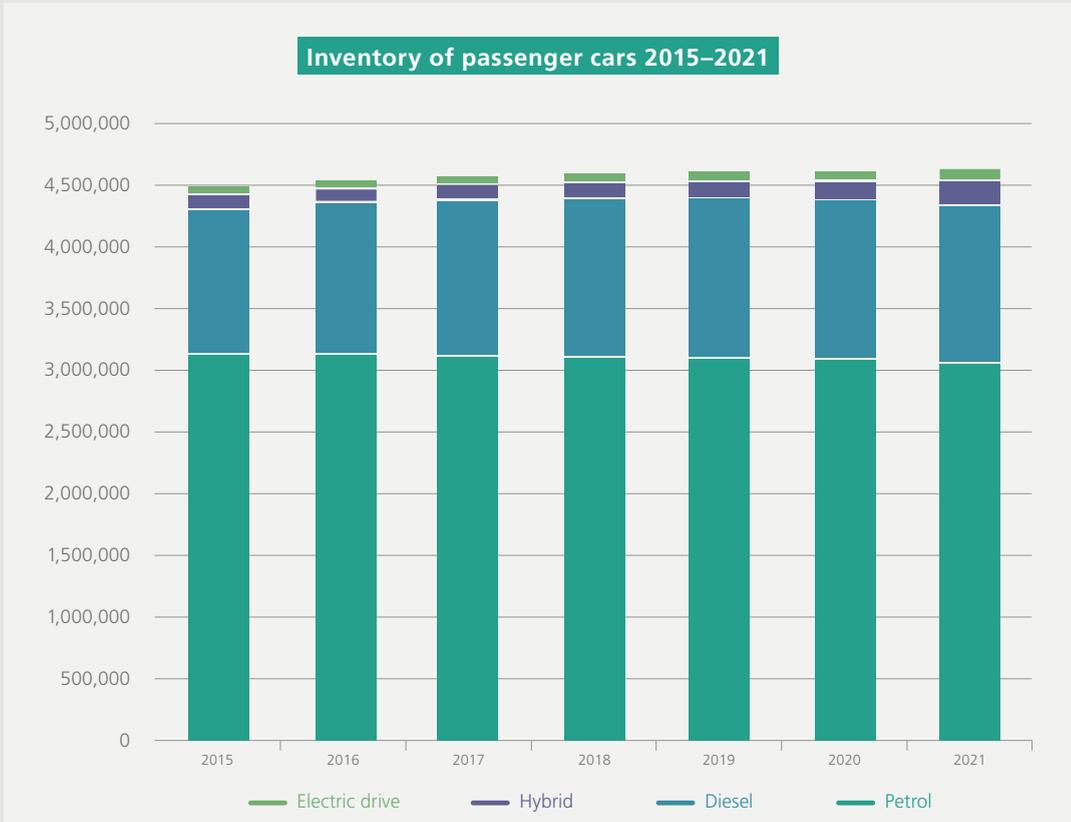
Roads under construction or in the planning stage

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



# 70,914 more vehicles in Switzerland

In spite of the low number of new registrations on a long-term comparison, the number of road vehicles increased in 2021 to 6,312,055. This corresponds to 70,914 more vehicles or a 1.1 percent in-

crease versus 2020. Approximately three-quarters of all motor vehicles are passenger vehicles. With a total of 4,688,235 registered vehicles in 2021, the total number of passenger vehicles increased by

## 2021 inventory of motor vehicles in Switzerland

	Motor vehicles (total)	Motor vehicles (total)	Change versus 2020	Cars	Petrol 2021	Diesel 2021	Hybrid 2021	Gas 2021
	2021	2020		2021				
<b>Total*</b>	<b>6,312,055</b>	<b>6,241,141</b>	<b>1.14 %</b>	<b>4,688,235</b>	<b>3,046,645</b>	<b>1,355,901</b>	<b>201,344</b>	<b>10,937</b>
<b>Lake Geneva region</b>	<b>1,156,075</b>	<b>1,146,403</b>	<b>0.84 %</b>	<b>864,814</b>	<b>585,477</b>	<b>223,165</b>	<b>41,747</b>	<b>1,822</b>
Vaud	547,672	543,109	0.84 %	421,226	282,418	108,186	22,477	1,278
Valais	304,078	298,242	1.96 %	226,844	149,514	67,183	7,020	218
Geneva	304,325	305,052	-0.24 %	216,744	153,545	47,796	12,250	326
<b>Central plateau</b>	<b>1,422,928</b>	<b>1,406,280</b>	<b>1.18 %</b>	<b>1,040,785</b>	<b>695,560</b>	<b>291,409</b>	<b>38,100</b>	<b>2,398</b>
Bern	772,085	763,059	1.18 %	545,249	356,092	161,846	18,831	1,480
Fribourg	253,911	249,555	1.75 %	192,828	130,820	50,266	8,866	270
Solothurn	213,179	211,262	0.91 %	161,773	108,707	45,417	5,079	391
Neuchâtel	124,379	123,666	0.58 %	96,664	68,054	23,786	3,676	144
Jura	59,374	58,738	1.08 %	44,271	31,887	10,094	1,648	113
<b>Northwest Switzerland</b>	<b>822,311</b>	<b>811,473</b>	<b>1.34 %</b>	<b>624,507</b>	<b>407,489</b>	<b>180,032</b>	<b>25,517</b>	<b>1,730</b>
Basel-Stadt	85,306	85,030	0.32 %	64,442	40,490	19,536	3,122	315
Basel-Landschaft	200,030	197,987	1.03 %	151,156	100,879	41,106	6,259	470
Aargau	536,975	528,456	1.61 %	408,909	266,120	119,390	16,136	945
<b>Zurich</b>	<b>980,091</b>	<b>970,446</b>	<b>0.99 %</b>	<b>749,999</b>	<b>473,387</b>	<b>220,369</b>	<b>38,869</b>	<b>2,003</b>
<b>Eastern Switzerland</b>	<b>960,682</b>	<b>947,714</b>	<b>1.37 %</b>	<b>697,112</b>	<b>435,717</b>	<b>226,377</b>	<b>23,143</b>	<b>1,339</b>
Glarus	33,221	32,690	1.62 %	24,272	15,013	8,101	794	66
Schaffhausen	65,460	64,572	1.38 %	47,067	30,708	13,924	1,567	137
Appenzell Ausserrhoden	44,830	44,351	1.08 %	32,331	20,632	10,121	1,076	43
Appenzell Innerrhoden	14,953	14,671	1.92 %	10,098	6,375	3,203	365	7
St Gallen	391,067	386,499	1.18 %	288,228	179,186	94,480	9,600	608
Grisons	164,666	162,452	1.36 %	116,157	65,743	45,098	3,742	100
Thurgau	246,485	242,479	1.65 %	178,959	118,060	51,450	5,999	378
<b>Central Switzerland</b>	<b>665,585</b>	<b>654,716</b>	<b>1.66 %</b>	<b>489,567</b>	<b>303,583</b>	<b>154,270</b>	<b>21,677</b>	<b>1,124</b>
Lucerne	308,188	304,656	1.16 %	220,948	140,624	68,178	8,434	445
Uri	28,345	28,182	0.58 %	20,429	12,396	7,278	546	13
Schwyz	142,091	139,503	1.86 %	105,837	68,453	31,229	4,186	175
Obwalden	33,293	32,843	1.37 %	23,348	14,172	7,923	891	27
Nidwalden	37,368	36,700	1.82 %	27,678	17,608	8,431	1,152	31
Zug	116,300	112,832	3.07 %	91,327	50,330	31,231	6,468	433
<b>Ticino</b>	<b>304,383</b>	<b>304,109</b>	<b>0.09 %</b>	<b>221,451</b>	<b>145,432</b>	<b>60,279</b>	<b>12,291</b>	<b>521</b>

0.6 percent in 2020 (+29,900). The share of electric cars increased from 0.9 percent in 2020 to 1.5 percent in 2021, and the proportion of plug-in-hybrids rose from 0.5 to 0.9 percent. By contrast, the share of petrol vehicles fell from 66.3 per cent in 2020 to 65.0 per cent in 2021, while the proportion of diesel vehicles fell from 29.6 to 28.9 per cent.

In 2021, the number of vehicles on Swiss roads increased by 350,056. This number corresponds to an increase of 3.9 percent versus 2020, but a 14.6 percent decrease

versus 2019, i.e. before the outbreak of the Covid-19 pandemic. The main reasons for the continued low number by long-term comparison were supply bottlenecks in connection with the shortage of microchips. It should be noted that in view of the supply bottlenecks, a large number of car manufacturers prioritised the production of models with alternative drives. One of their aims was to reduce the CO<sub>2</sub> emissions of the vehicles they sold.

\* Total; excluding mopeds and fast e-bikes \*\* Including other vehicles with an electric motor \*\*\* No cantonal statistics available  
Source: Swiss Federal Statistical Office

Electric drive 2021	Others 2021	Passenger transport vehicles 2021	HGVs, articulated vehicles, semi-trailers 2021	Utility vehicles up to 3.5 tonnes 2021	Agricultural vehicles 2021	Industrial vehicles 2021	Motorcycles 2021	Mopeds incl. electric bikes 2021	
								Total	of which e-bikes**
<b>70,223</b>	<b>3,185</b>	<b>97,255</b>	<b>53,748</b>	<b>410,402</b>	<b>196,315</b>	<b>77,300</b>	<b>788,800</b>	<b>244,527</b>	<b>***</b>
<b>12,107</b>	<b>496</b>	<b>14,516</b>	<b>7,908</b>	<b>73,979</b>	<b>22,726</b>	<b>11,339</b>	<b>160,793</b>	<b>22,561</b>	<b>***</b>
6,646	221	7,067	3,548	33,155	13,544	4,362	64,770	11,744	5,659
2,801	108	4,482	2,620	21,627	7,645	5,169	35,691	2,513	***
2,660	167	2,967	1,740	19,197	1,537	1,808	60,332	8,304	***
<b>12,638</b>	<b>680</b>	<b>27,067</b>	<b>11,468</b>	<b>94,174</b>	<b>61,876</b>	<b>19,164</b>	<b>168,394</b>	<b>74,609</b>	<b>***</b>
6,621	379	17,135	5,982	54,359	39,497	11,843	98,020	48,239	***
2,501	105	3,948	2,025	15,231	9,975	2,756	27,148	9,324	4,211
2,066	113	3,167	2,183	13,643	5,681	2,380	24,352	13,382	6,696
951	53	2,010	882	7,106	2,940	1,405	13,372	2,259	729
499	30	807	396	3,835	3,783	780	5,502	1,405	225
<b>9,233</b>	<b>506</b>	<b>12,094</b>	<b>8,573</b>	<b>53,661</b>	<b>18,451</b>	<b>7,285</b>	<b>97,740</b>	<b>41,239</b>	<b>19,883</b>
902	77	1,144	1,259	7,112	157	612	10,580	4,021	2,342
2,349	93	2,825	1,752	14,128	4,002	1,738	24,429	11,634	7,447
5,982	336	8,125	5,562	32,421	14,292	4,935	62,731	25,584	10,094
<b>14,786</b>	<b>585</b>	<b>13,836</b>	<b>6,853</b>	<b>59,135</b>	<b>16,369</b>	<b>11,506</b>	<b>122,393</b>	<b>31,445</b>	<b>17,801</b>
<b>10,035</b>	<b>501</b>	<b>15,574</b>	<b>10,206</b>	<b>64,083</b>	<b>44,519</b>	<b>16,450</b>	<b>112,738</b>	<b>38,560</b>	<b>***</b>
282	16	489	338	2,383	1,429	709	3,601	1,095	380
664	67	1,251	644	4,214	2,987	871	8,426	2,383	947
436	23	796	267	2,621	2,487	600	5,728	2,185	232
146	2	165	119	995	1,336	327	1,913	798	***
4,142	212	5,827	4,144	25,468	15,949	5,867	45,584	17,808	***
1,435	39	3,029	2,364	12,258	9,009	4,685	17,164	3,402	***
2,930	142	4,017	2,330	16,144	11,322	3,391	30,322	10,889	3,951
<b>8,560</b>	<b>353</b>	<b>11,222</b>	<b>6,066</b>	<b>43,457</b>	<b>28,267</b>	<b>8,129</b>	<b>78,877</b>	<b>31,379</b>	<b>***</b>
3,095	172	5,376	3,288	20,185	15,602	3,483	39,306	17,373	8,510
189	7	561	216	1,653	1,392	586	3,508	1,157	243
1,730	64	2,247	1,131	8,649	5,659	2,108	16,460	5,235	1,500
309	26	630	319	2,124	2,167	544	4,161	2,380	***
431	25	667	218	2,039	1,384	410	4,972	2,145	***
2,806	59	1,741	894	8,807	2,063	998	10,470	3,089	1,416
<b>2,864</b>	<b>64</b>	<b>2,946</b>	<b>2,674</b>	<b>21,913</b>	<b>4,107</b>	<b>3,427</b>	<b>47,865</b>	<b>4,734</b>	<b>381</b>

# One in eight newly registered cars is electric

## New registration of motor cars

	2011	2017	2018	2019	2020	2021
<b>Total</b>	<b>327,955</b>	<b>315,032</b>	<b>300,887</b>	<b>312,902</b>	<b>238,664</b>	<b>242,263</b>
<b>Type</b>						
Limousine	206,969	153,638	141,329	128,686	98,330	102,434
Station wagon	111,628	153,883	153,168	177,713	135,645	134,672
Convertible	9,358	7,511	6,390	6,503	4,689	5,157
<b>Engine size (cc)</b>						
Below 999	9,653	30,582	36,200	37,491	27,452	27,474
1,000–1,399	97,643	69,161	55,858	44,972	31,136	33,790
1,400–1,799	85,228	55,473	56,291	60,295	43,710	44,883
1,800–1,999	81,249	104,003	100,208	116,761	86,803	74,138
2,000–2,499	21,875	19,062	14,899	10,109	6,325	7,648
2,500–2,999	21,121	23,847	23,387	22,635	17,201	16,368
3,000 and over	10,734	7,975	8,633	7,442	6,272	5,929
Not specified	452	4,929	5,411	13,197	19,765	32,033
<b>Gear mechanism</b>						
Manual	243,846	98,793	77,035	65,127	40,111	29,866
Automatic	83,279	215,241	223,346	247,387	198,338	212,293
Unknown	830	998	506	388	215	104
<b>Fuel</b>						
Petrol	211,540	183,637	188,847	192,430	119,097	100,881
Diesel	109,324	113,848	90,360	79,618	51,987	32,680
Petrol/elec. hybrid	5,325	8,186	10,434	18,133	27,423	44,815
Petrol/elec. plug-in hyb.	119	3,378	4,129	4,380	14,245	21,217
Diesel/elec. hybrid	17	181	794	3,810	5,334	9,700
Diesel/elec. plug-in hyb.	1	101	75	53	194	572
Electric drive	452	4,929	5,411	13,197	19,765	32,033
Hydrogen	0	2	27	27	48	66
Gas	651	769	805	1,252	571	296
Others	526	1	5	2	0	3
<b>Drive</b>						
Front-wheel drive	213,637	151,015	142,069	141,757	112,201	113,521
Rear-wheel drive	19,553	14,504	11,593	10,912	7,859	13,143
4 × 4	94,765	149,513	147,225	160,233	118,604	115,599
<b>Output (kilowatts)</b>						
below 60	29,535	15,290	12,377	11,009	8,145	6,951
60.01–80	72,617	39,543	36,342	33,597	26,224	29,686
80.01–100	54,327	62,412	58,301	54,603	41,013	40,228
100.01–120	79,780	61,483	57,802	61,656	46,026	45,900
120.01–140	34,012	60,050	58,530	63,036	41,966	33,034
140.01–160	21,755	19,628	18,175	18,457	16,295	23,893
160.01–180	11,294	11,327	11,078	15,372	10,717	7,649
180.01–200	7,375	11,342	11,657	10,519	7,372	8,163
200 and over	17,245	33,950	36,621	44,648	40,906	46,758
Not specified	15	7	4	5	0	1
<b>CO<sub>2</sub> emissions (g/km)</b>						
0–50	488	7,202	7,570	15,559	32,041	48,097
51–100	6,293	25,696	20,431	13,028	20,655	8,188
101–150	141,397	194,190	170,331	161,563	110,668	71,785
151–200	117,027	74,275	85,431	99,530	56,361	74,474
201–250	17,030	6,351	9,946	15,882	13,117	25,852
251–300	2,732	2,567	3,344	3,365	3,373	7,864
300 and over	1,286	805	1,039	1,273	989	2,623
Unknown	41,702	3,946	2,795	2,702	1,460	3,380

Note on CO<sub>2</sub> 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.

With 242,263 new registrations, passenger cars accounted for more than two-thirds in 2021. This number is 22.6 percent lower than in 2019, but 1.5 percent higher than in 2020. As in previous years, the share of electric cars again increased: in 2021, more than one in eight newly registered cars (13.2 percent) was a straight electric vehicle.

In addition to the development in passenger cars, it is to be noted that a particularly high number of newly registered vehicles were partially or wholly for leisure activities. The number of 56,556 newly registered motorcycles set a new record with an increase of 12.8 percent versus 2020. The number of mobile homes registered in 2021 was also the highest ever with 8,457 new registrations, i.e. a 26.4 per cent increase compared with 2020.

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

	2011	2021
Cars	327,955	242,263
Passenger transport vehicles	3,950	9,723
Goods vehicles	33,119	33,414
<i>Utility vehicles</i>	28,644	29,502
<i>HGVs</i>	3,273	2,935
<i>Articulated vehicles</i>	6	4
<i>Semi-trailers</i>	1,196	973
Agricultural vehicles	3,714	3,380
Industrial vehicles	4,006	4,720
Motorcycles	48,131	56,556
Trailers	22,205	21,812
<b>Total vehicles</b>	<b>443,080</b>	<b>371,868</b>
<b>Total motor vehicles</b>	<b>420,875</b>	<b>350,056</b>

Source: Swiss Federal Statistical Office

# Fewer fatalities, more severe injuries

In 2021, 200 people lost their lives in traffic accidents on Swiss roads and 3,933 were seriously injured.

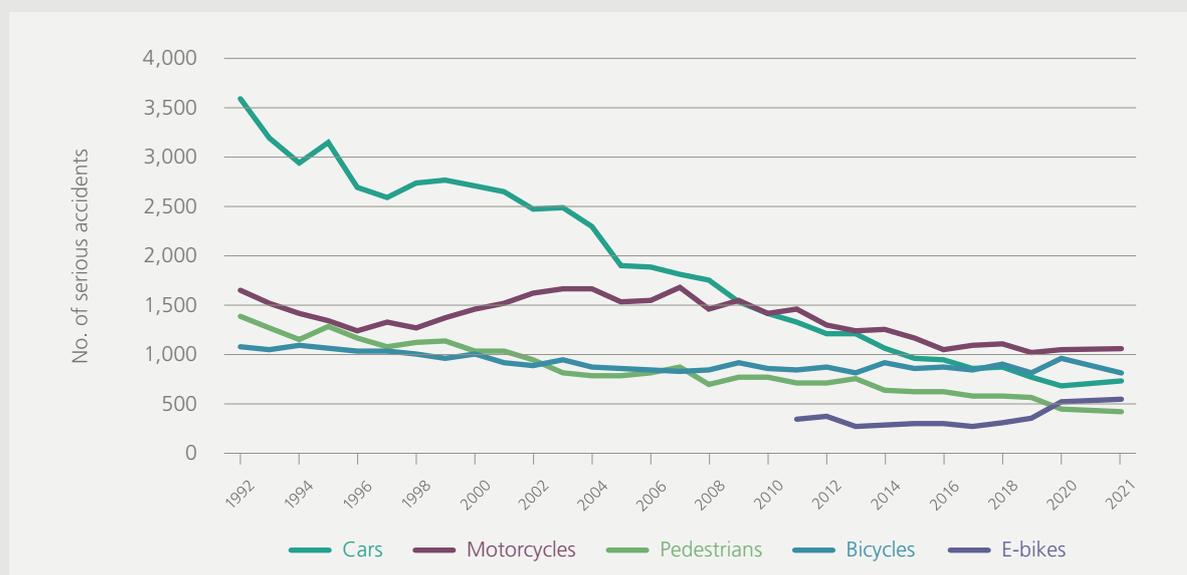
A total of 200 people were killed on roads in Switzerland last year. In 2020, the number of traffic-related deaths amounted to 227. In contrast, the number of people who were seriously injured increased from 3,793 to 3,933.

Last year, 65 people were killed in accidents involving **passenger cars** (2020: 71) and 738 were seriously injured (2020: 611). The biggest increase in deaths and serious injuries occurred in rear-end collisions (+50 versus 2020), cornering (+27) and head-on collisions (+25 versus 2020). The number of people killed in **motorcycle** accidents fell from 52 in 2020 to 47 in 2021. 1,067 were seriously injured (2020: 998). A clear drop in the number of people killed or seriously injured occurred in the 55 to 64 age group (33 fewer than in 2020), while in the under 17 age group the number increased by 73, and in the 45 to 54 and 65 to 74 age groups the number increased by 16 and 15 respectively.

In 2021, 37 **pedestrians** were killed in traffic accidents (2020: 36), of which 14 fatalities occurred on pedestrian crossings (2020: 16) and 23 elsewhere (2020: 20). In the previous year, 424 pedestrians had been seriously injured (2020: 408). In 2021, 202 people were seriously injured on pedestrian crossings (2020: 201) and 222 elsewhere (2020: 207). The number of people aged 75 or over who were involved in serious accidents increased (2020: 121; 2021: 132).

In 2021, 22 **cyclists** lost their lives in accidents (2020: 29) and 819 were seriously injured (2020: 934). In many of the latter cases no other road users were involved. The number of fatal accidents involving **e-bikes** increased from 15 in 2020 to 17 in 2021, while the number of those seriously injured increased to 531 (2020: 521). Accidents involving fast e-bikes resulted in 98 serious injuries (2020: 114), while with those involving slower e-bikes the number rose from 422 to 450 in 2021.

Types of accident (share in percent)



# Accident statistics 2021 (overall Swiss road network)

## All accidents

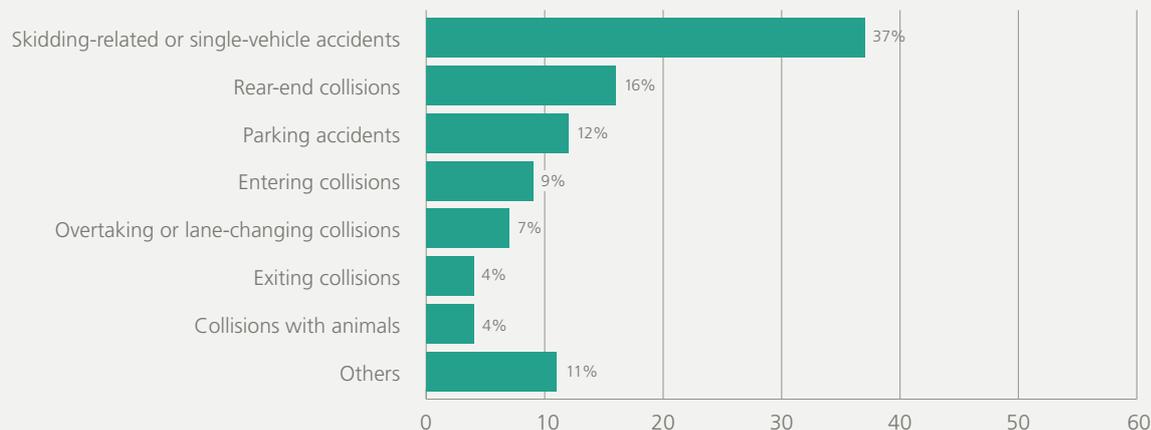
Year	Total no. of accidents
2013	53,052
2014	51,756
2015	53,235
2016	55,053
2017	56,112
2018	54,378
2019	53,528
2020	48,662
2021	52,217

## Accidents resulting in fatalities/injuries

	2021	2020
Fatalities	194	224
Serious injuries	3,714	3,619
<i>life-threatening injuries</i>	182	181
<i>severe injuries</i>	3,532	3,438
Minor injuries	13,528	13,054
<b>Total</b>	<b>17,436</b>	<b>16,897</b>

Serious injuries and fatalities	Serious injuries 2021	Fatalities 2021	Serious injuries 2020	Fatalities 2020
<b>by form of transport</b>				
Cars	738	65	611	71
Passenger transport vehicles	26	1	32	1
Goods transport vehicles	39	4	47	5
Motorcycles	1,067	47	998	52
Motor scooters	92	3	92	6
Electric bikes	531	17	521	15
Bicycles	819	22	934	29
Pedestrians	424	37	408	36
<i>on pedestrian crossings</i>	202	14	201	16
<i>elsewhere</i>	222	23	207	20
Devices similar to vehicles	62	0	57	2
Others	135	4	93	10
<b>Total</b>	<b>3,933</b>	<b>200</b>	<b>3,793</b>	<b>227</b>
<b>by assumed main cause</b>				
Influence of alcohol	363	16	401	24
Speeding	513	33	468	41
Inattention/distraction	597	26	531	26
<b>by type of road</b>				
Motorways and expressways	219	19	144	20

Proportion in percent by type of accident



# Number of confiscated licences down again

In 2021, 76,750 driving licences were confiscated in Switzerland – approximately 2 percent fewer than in 2020.

This is the third consecutive year that this number has remained below 80,000. Although the overall number of confiscations has fallen, the three main reasons remain unchanged: in 28,949 cases, licences were confiscated for speeding (604 fewer, or –2 percent versus 2020); in 10,591 cases, for driving under the influence of alcohol (–1,340, or –11 percent); and in 7,402 cases, licences were confiscated for endangering others through careless driving (–583, or –7.3 percent).

By contrast, the number of provisional driving licences that were cancelled rose by 6.5 percent to 1,422, as was also the case with learner's licences (4,604 or 13.9 percent). The main reason for these increases is likely to be the higher number of learners and new drivers.

## Non-recognition of foreign driving licences

Last year, recognition of 16,610 foreign driving licences was withdrawn, corresponding to an 8.5 percent drop versus 2020. The most common reason was speeding (8,151 non-recognitions, or –14 percent).

## Measures imposed against drivers

	2021	2020	+/-
Warnings to holders of a learner's licence	405	317	+27.8 %
Warnings to holders of a driver's licence	46,425	48,859	–5.0 %
Withdrawal of learner's licence	4,604	4,043	+13.9 %
Withdrawal of driver's licence	68,427	70,671	–3.2 %
<i>Of which withdrawal of provisional licence</i>	6,637	6,301	+5.3 %
Withdrawal of other licences	3,719	3,769	–1.3 %
Cancellation of provisional driver's licence	1,422	1,335	+6.5 %
Refusal of learner's or driver's licence	3,419	3,094	+10.5 %
Refusal to accept a foreign driver's licence	16,610	18,157	–8.5 %
Instruction in road use	1,614	1,783	–9.5 %
New driving test	3,561	3,003	+18.6 %
Examination by specialised psychologists	4,087	3,941	+3.7 %
Examination by specialised physicians	7,244	5,104	+41.9 %
Special requirements	6,666	6,382	+4.5 %
<b>Total</b>	<b>185,114</b>	<b>189,196</b>	<b>–2.2 %</b>

## 87,561 more driving licences

As of the end of 2021, 6,143,131 people held a driving licence for a private motorcar (category B), i.e. 87,561 more than in 2020 (+1 percent). A total of 107,130 people acquired a category B driving licence for the first time (+26 percent). This significant increase is probably attributable to the changes in the instruction regulations which entered into effect on 1 January 2021 (minimum driving age now 17). This increase was notable across all age groups, however. As of the end of 2021, 4,230,515 people held a motorcycle licence. This number has remained more or less unchanged since 2020 (+1 percent).

## Administrative measures

	2021	+/-*
<b>Reasons for withdrawal</b>		
Speeding offences	28,949	-2.0
Drink driving	10,591	-11.2
Inattention	7,402	-7.3
Failure to give way	3,967	-9.1
Failure to observe traffic signals	1,197	-0.4
Unlawful overtaking	1,000	-39.0
Other driving errors	4,493	+4.2
Alcohol addiction	1,391	+3.1
Influence of drugs	4,634	+5.3
Drug addiction	2,351	+8.3
Sickness or infirmity	5,114	+12.8
Other reasons	20,036	+3.7
<b>Duration of withdrawal</b>		
1 month	31,036	-3.5
2 months	1,440	+0.8
3 months	14,375	-8.0
4-6 months	6,553	-6.3
7-12 months	2,028	-6.1
More than 12 months	902	-4.7
Indefinite period	20,388	+6.5
Permanent withdrawal	28	+47.4
<b>Age of persons affected</b>		
Under 20	4,747	+11.6
20 to 24	10,196	-0.2
25 to 29	9,679	-4.0
30 to 34	8,386	-3.5
35 to 39	7,550	-4.0
40 to 49	12,547	-4.0
50 to 59	11,373	-6.6
60 to 69	5,649	-8.3
70 and over	6,623	+11.0
<b>Reasons for withdrawal or refusal of learner's/driver's licence</b>		
Learner driving unaccompanied	462	+22.9
Driving error**	3,031	+13.4
Drink driving	720	+3.4
Driving without a licence	2,916	+5.4
Failure to pass driving test	374	+25.1
Driving despite withdrawal of licence	166	+13.7
Theft	410	-0.2
Sickness or infirmity	137	+35.6
Other reasons	2,255	+17.1
<b>Reasons for warnings</b>		
Speeding	39,307	-8.7
Drink driving (> = 0.050 to 0.079%)	2,949	-17.6
Inattention	2,800	-10.4
Failure to give way	1,615	-8.8
Driving an unroadworthy vehicle	3,105	+25.9
Failure to observe traffic signals	501	-18.4
Unlawful overtaking	233	-17.4
Other reasons	8,500	+1.5

## Driving licence statistics

Driving licences (cars)	2021	2020	+/-
<b>All licences</b>	<b>6,143,131</b>	<b>6,055,570</b>	<b>+1.4 %</b>
<b>By age group</b>			
18-24	395,326	380,296	+4.0 %
25-44	2,099,015	2,082,483	+0.8 %
45-64	2,373,422	2,367,406	+0.3 %
65-74	822,908	796,667	+3.3 %
75+	452,460	428,718	+5.5 %
<b>By gender</b>			
Female	2,861,981	2,814,462	+1.7 %
Male	3,280,888	3,240,482	+1.2 %
Unknown	262	266	-1.5 %
<b>New drivers</b>			
<b>All licences</b>	<b>107,130</b>	<b>84,872</b>	<b>+26.2 %</b>
<b>By age group</b>			
18-24	86,436	69,868	+23.7 %
25-44	19,067	13,927	+36.9 %
45-64	1,604	1,067	+50.3 %
65-74	21	9	+133.3 %
75+	2	1	+100.0 %
<b>By gender</b>			
Female	53,583	41,787	+28.2 %
Male	53,547	43,083	+24.3 %
Unknown	0	2	-100.0 %
<b>Motor cycles</b>			
<b>All licences</b>	<b>4,230,515</b>	<b>4,204,665</b>	<b>+0.6 %</b>
<b>By age group</b>			
16-17	5,456	4,774	+14.3 %
18-24	99,113	100,036	-0.9 %
25-44	1,036,435	1,061,869	-2.4 %
45-64	1,898,211	1,888,604	+0.5 %
65-74	749,117	730,392	+2.6 %
75+	442,183	418,990	+5.5 %
<b>New drivers</b>			
<b>All licences</b>	<b>32,510</b>	<b>30,472</b>	<b>+6.7 %</b>
<b>By age group</b>			
16-17	5,505	4,762	+15.6 %
18-24	11,165	11,416	-2.2 %
25-44	14,922	13,435	+11.1 %
45-64	913	854	+6.9 %
65-74	5	5	0 %
75+	0	0	0 %

[www.astra.admin.ch/admas](http://www.astra.admin.ch/admas)

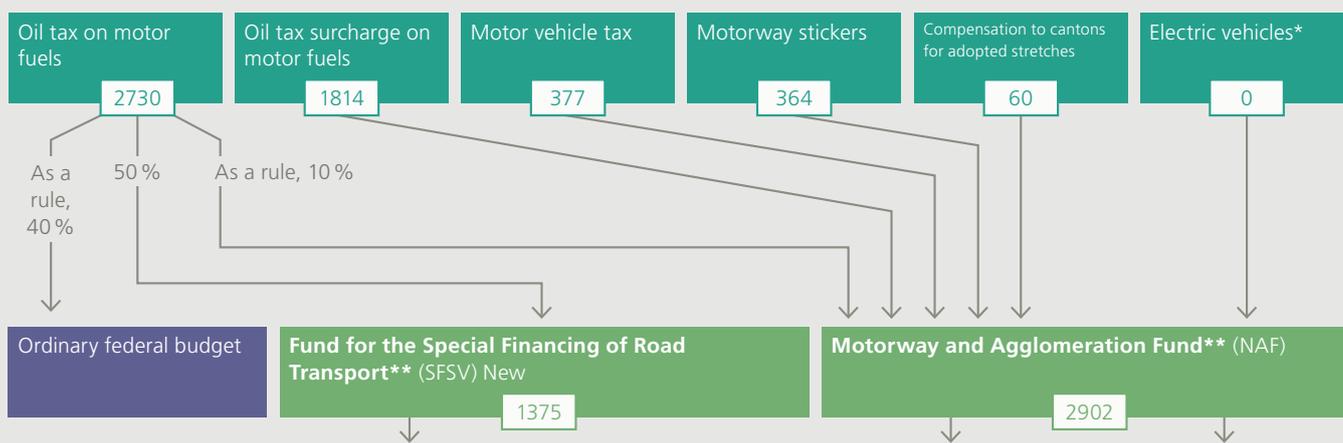
\* Change in percent versus 2021  
 \*\* Inattention, failure to give way, speeding, failure to observe traffic signals, unlawful overtaking, other reasons

# Finance flows for the two road transport funds

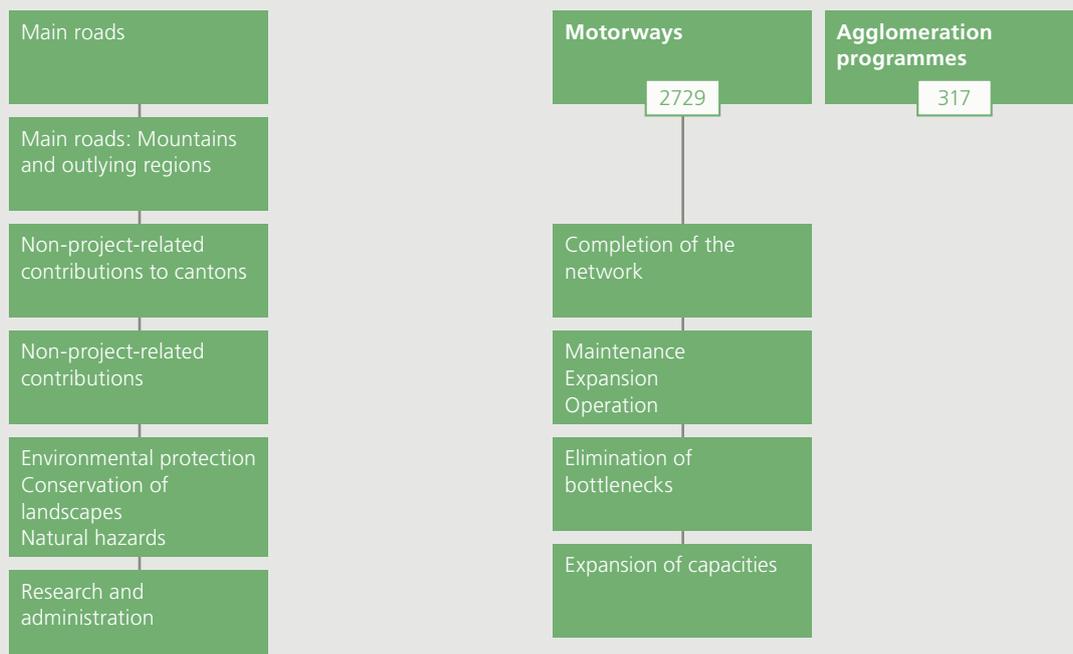
The Motorway and Agglomeration Traffic Fund finances the motorways and projects in the agglomerations. The Fund for the Special Financing of Road Transport mainly supports cantonal road transport infrastructure.

## Flows of funds in 2022 (in million Swiss francs): in accordance with 2022 budget

### Revenue



### Expenditure



\* Date of introduction still open  
 \*\* Including various smaller amounts (both funds)

Figures taken from the federal budget 2022.  
 Amounts in the totals may differ due to rounding up or down of the individual figures.

Expenditure for the motorways/national roads encompasses operation, maintenance, expansion, elimination of bottlenecks, capacity increases, major projects and completion of the network. All this expenditure is covered by the Motorway and Agglomeration Traffic Fund. This increases transparency and simplifies both the short-term and the medium-term control and 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. The increase in withdrawals is a result of greater demand owing to the incorporation of the adopted stretches, the commencement of construction of the second Gotthard tunnel tube and progress on current projects for the completion of the network in the canton of Valais.

#### Composition of deposits:

- Oil tax surcharge on motor fuels (100%)
- Motorway sticker (100%)
- Motor vehicle tax (100%)
- As a rule, 10% of the oil tax on motor fuels
- Electric vehicles levy (100% – date of introduction as yet unspecified)
- Compensation from the cantons for the transfer of cantonal roads to the federal government as per the new federal resolution)

#### 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 oil tax on motor fuels and, where necessary, from vehicle tax revenue. As before, it is managed via the ordinary federal budget.

### Deposits into the Motorway and Agglomeration Traffic Fund (in million Swiss francs)

	2019 R*	2020 R*	2021 R**	2022 VA**
Oil tax surcharge on motor fuels	1,768	1,635	1,761	1,814
Motor vehicle tax	407	331	310	377
Motorway sticker (Vignette)	356	310	321	364
CO <sub>2</sub> reduction (passenger cars)	31	80	145	42
Oil tax on motor fuels (10%)	133	247	265	273
Temporary deposit from reserve (Special Fund for the Financing of Road Transport)	183	148	0	0
Revenue from third-party funding	46	47	50	35
Management income (Motorway and Agglomeration Traffic Fund)	9	10	10	9
Deposit from reserve (Special Fund for the Financing of Road Transport) (cantonal contribution)	0	60	60	60
Reduction of deposits into traffic fund as of 2020		-72	-72	-72
<b>Total deposits/revenue</b>	<b>2,933</b>	<b>2,795</b>	<b>2,850</b>	<b>2,902</b>

### Withdrawals from Motorway and Agglomeration Traffic Fund (in million Swiss francs)

	2019 R*	2020 R*	2021 R*	2022 VA**
Operation of motorways/national roads	371	402	425	445
Expansion and maintenance of motorways/national roads	1,577	1,628	1,637	1,600
Completion of motorway/national roads network	140	146	163	264
Elimination of bottlenecks	150	134	113	78
Capacity expansion of motorway/national roads network and large projects	–	75	193	342
Contributions for road infrastructure in towns and agglomerations	180	256	177	317
<b>Total withdrawals/expenditure</b>	<b>2,419</b>	<b>2,640</b>	<b>2,708</b>	<b>3,046</b>

\* Charged \*\* Budgeted

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

# FEDRO operated 14 photovoltaic facilities in 2021

In 2021, the electricity consumption for the motorways/national roads amounted to 165 GWh. A further 25 GWh were required for heating in the works depots. The electricity was produced entirely from renewable energy (Swiss hydropower and photovoltaics), while 56 percent 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 CO<sub>2</sub> emissions. By 2030, it wants to produce 35 GWh per annum of its energy requirement from its own photovoltaic facilities. 14 facilities were in operation in 2021.

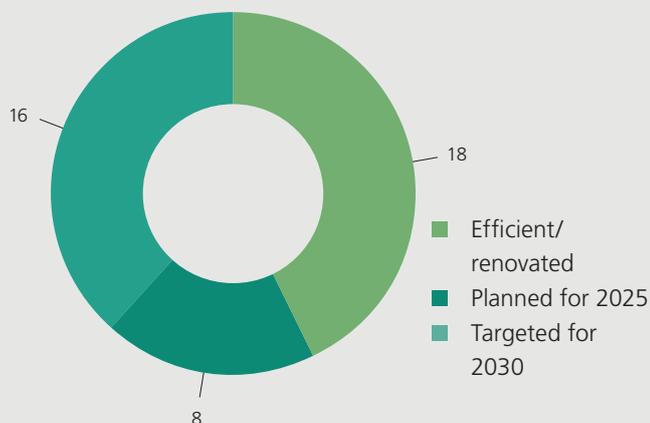
## Electricity production – Electricity consumption

FEDRO	Electricity volume / year
Electricity requirement in 2021	165 GWh
Photovoltaic production by FEDRO in 2021	1.1 GWh (14 facilities)
Targeted production from FEDRO's own photovoltaic facilities by 2030	35 GWh (90 facilities)
Third-party photovoltaic production in 2021	3 GWh (13 facilities)

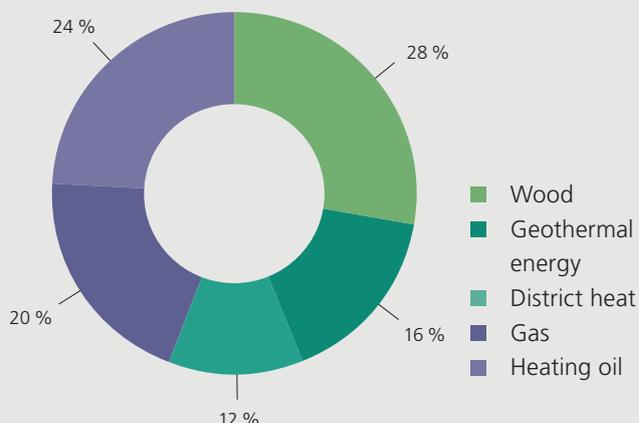
FEDRO has set itself the following objectives for 2030:

- 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.

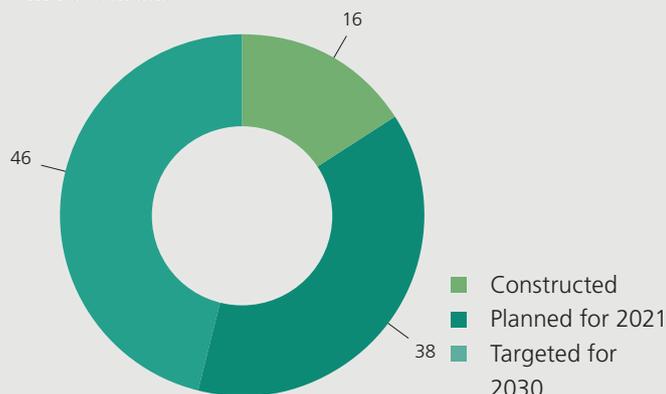
## Renovation of buildings



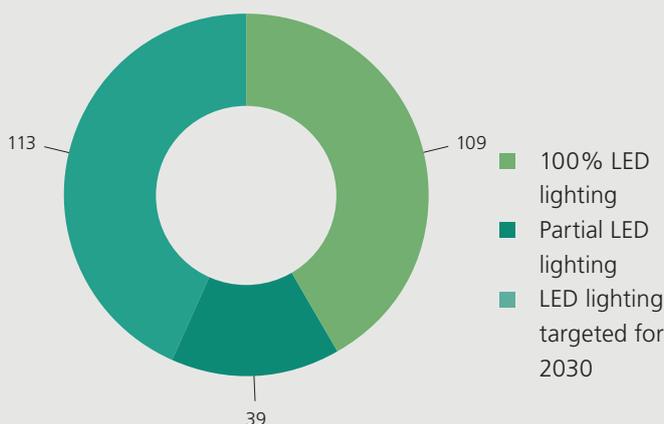
## Heating in buildings (in percent)



## No. of fast-charging stations in rest areas



## No. of tunnels with LED lighting



# No. of personnel in 2021

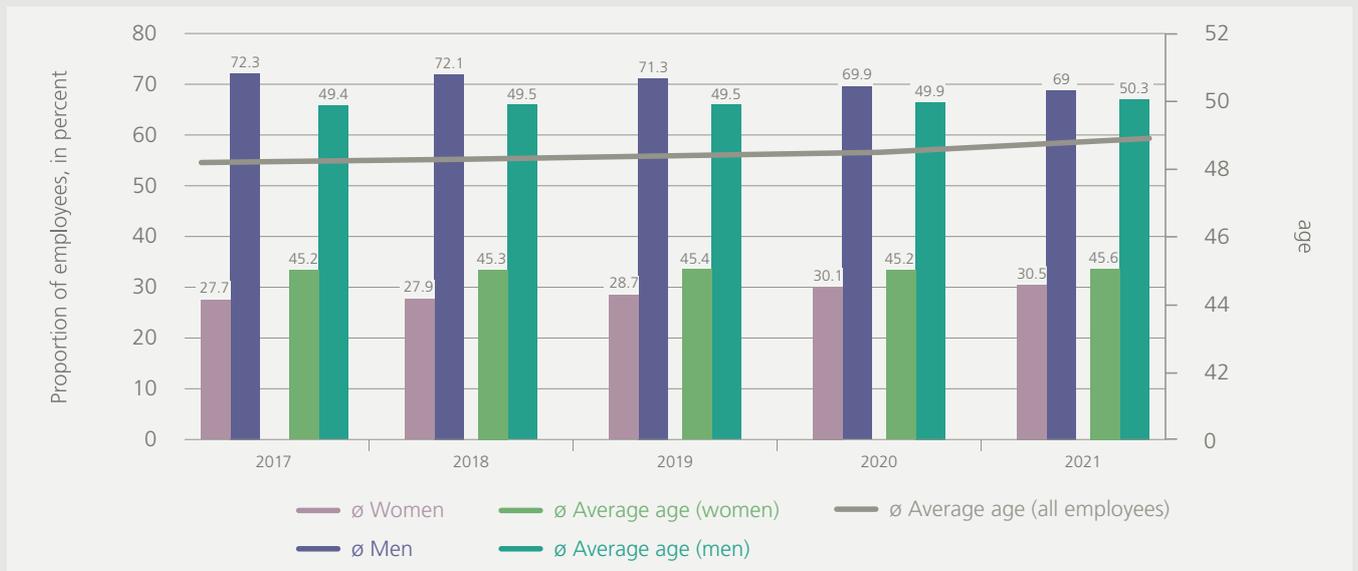
## Trend

Year	No. of employees	Apprentices	University-level trainees
1.1.2008	363	–	–
1.1.2018	523	19 commercial/2 mediamatics	5
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
31.12.2021	636	16 commercial/2 mediamatics	11

## Employees by profession in 2021

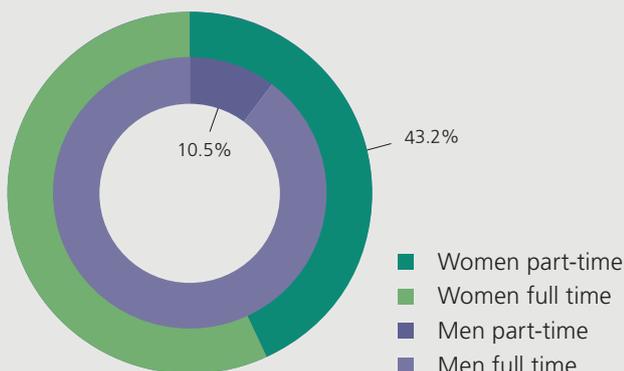
Employees by profession	No. of employees
Engineering	260
Law	90
Business and finance	100
IT	95
Administration	70
Communication, language services	20
Apprenticeships	18

## Proportions of employees and their average ages



As of 31 December 2021, 194 women and 442 men were employed by FEDRO. Average age: 48.9 yrs.

## 20.5 percent of the employees work part-time



## Employees by nationality in 2021

FEDRO's workforce comprises employees of 17 different nationalities. 88 percent are Swiss. Other nationalities: German, Italian, French, Austrian, Spanish, Serbian, Finnish, Polish, Dutch, Canadian, Slovakian, Ukrainian, Hungarian, Romanian, Swedish and Greek.

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