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## **Mobility Analysis for three Swiss Cities in the Alpine Space in Switzerland**

### **Lugano, Lucerne and Chur**

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#### **Principal**

Report for the Swiss Federal Office for Spatial Development (ARE)

#### **Abstract**

This study examines the strengths and weaknesses of the transport system of three alpine cities in Switzerland, using criteria derived from a “sustainable urban transport” concept. By comparing the situations of Lugano, Lucerne and Chur, it should be possible to identify good practices in urban transport planning and discover areas where improvement is needed. To conclude, all three cities under consideration are moving in the right direction when it comes to sustainable transport and mobility management. However, further effort is required to reach the important stages on the way to this worthwhile goal.

#### **Keywords**

alpine convention, alpine space, mobility, accessibility, traffic management, mobility information, Lucerne, Lugano, Chur, Switzerland

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## Summary

This study examines the strengths and weaknesses of the transport system of three alpine cities in Switzerland. By comparing the situations of Lugano, Lucerne and Chur, it should be possible to identify good practices in urban transport planning and discover areas where improvement is needed. The criteria for this analysis are derived from the “sustainable urban transport” concept put forward in an international study of alpine urban centres by the “urban mobility” sub-group of the Alpine Convention’s Workgroup on Transport.

The analyses are based on the statistics, documents and expert interviews conducted with traffic planners of Lugano, Lucerne and Chur. The study focuses on several areas of the urban transport system, such as transport policy or the accessibility of the town from a national and European perspective.

The fact that Lugano suffers from a very intense urban sprawl poses a special challenge when it comes to reducing the use of individual motorised traffic and promoting other means of transport. Nevertheless, a main target of the regional transport plan is to facilitate public transport and improve the network of bicycle lanes. In Lucerne, the share of individual motorised traffic is quite low, and many commuters use the public transport system. Busses in Lucerne have separate lanes in the heavily used sections, and they have priority at some crossroads. The railway system in Lucerne is operating almost at capacity. Furthermore, Lucerne has no direct international connections. In Chur the rate of the public transport use is remarkably high. Moreover, according to the regional transport plan, walking and cycling are of high priority. Chur has a dense network of railway lines, there are no direct international connections. No traffic guidance or parking management system exists at this time.

To conclude, all the three cities analysed in this study are moving in the right direction when it comes to sustainable transport and mobility management. However, further effort is required to reach the important stages on the way to this worthwhile goal.

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## **1. Introduction**

### **1.1. Aim of the study**

This study examines the strengths and weaknesses of the transport system of three alpine cities in Switzerland. By comparing the situations of Lugano, Lucerne and Chur, it should be possible to identify good practices in urban transport planning and discover areas where improvement is needed. The criteria for this analysis are derived from the “sustainable urban transport” concept put forward in an international study of alpine urban centres by the “urban mobility” sub-group of the Alpine Convention’s Workgroup on Transport. The study was funded by the Swiss Federal Office for Spatial Development.

### **1.2. Method**

The analyses are based on the statistics, documents (transport strategies, schemes, studies) and expert interviews conducted with traffic planners of Lugano, Lucerne and Chur.

The study focuses on three areas of the urban transport system:

- The general conditions and given context of urban transport, such as population size, jobs, transport infrastructure, and air pollution (using data of the Federal Office for the Environment);
- The transport policy, transport planning processes and results, e.g. the municipality or urban area’s basic strategies and concepts, measures used to manage traffic, and the transport-related communication policy;
- The accessibility of the town from a national and European perspective.

An important fourth component concerning the impact of transport planning on travel demand could not be included in the analyses because of a lack of data, a major weakness shared by the three cities. The national survey on mobility provides a good database, but its limited samples offer information only on transport demand at the regional level (see Federal Office for Spatial Planning, 2003, data for 2000). The cities themselves conduct neither mobility surveys nor do they use data derived from surveys in previous years. Besides, the evaluations of traffic measures that were implemented seem inadequate. Therefore, the impact of the municipality’s transport policy cannot be fully ascertained.

The project budget did not permit calculations of the indicators for international and national accessibility using current timetables. Instead, results from existing studies were used (BAK Basel Economics, 2007; Federal Department of the Environment, Transport, Energy and Communications (DETEC, 2006).

The criteria of the three dimensions of the urban transport system being considered are listed in the Appendix. In the following chapters, the findings are mostly offered as descriptions on account of the qualitative differences in the data of the three towns and the criteria themselves.

### **1.3. Overview of the three cities**

The three cities selected for this mobility analysis – Lugano, Lucerne and Chur – have many things in common. They are all medium-size Swiss cities with between 30,000 and 75,000 inhabitants, and their surrounding area is larger than the core. They are all located at the foot of the Alps: Lugano to the south, Lucerne and Chur to the north. And they share a long tradition of tourism and cross-Alpine traffic. While Chur has long been associated with the San Bernardino and the Splügen

passes, Lugano and Lucerne are closely linked by the San Gottardo pass. All three cities now have national highways that follow these traditional routes across the Alps. Furthermore, they are located within easy reach of larger European cities (Zurich for Chur and Lucerne, Milan for Lugano). All three cities have a modern and well-functioning public transport system.

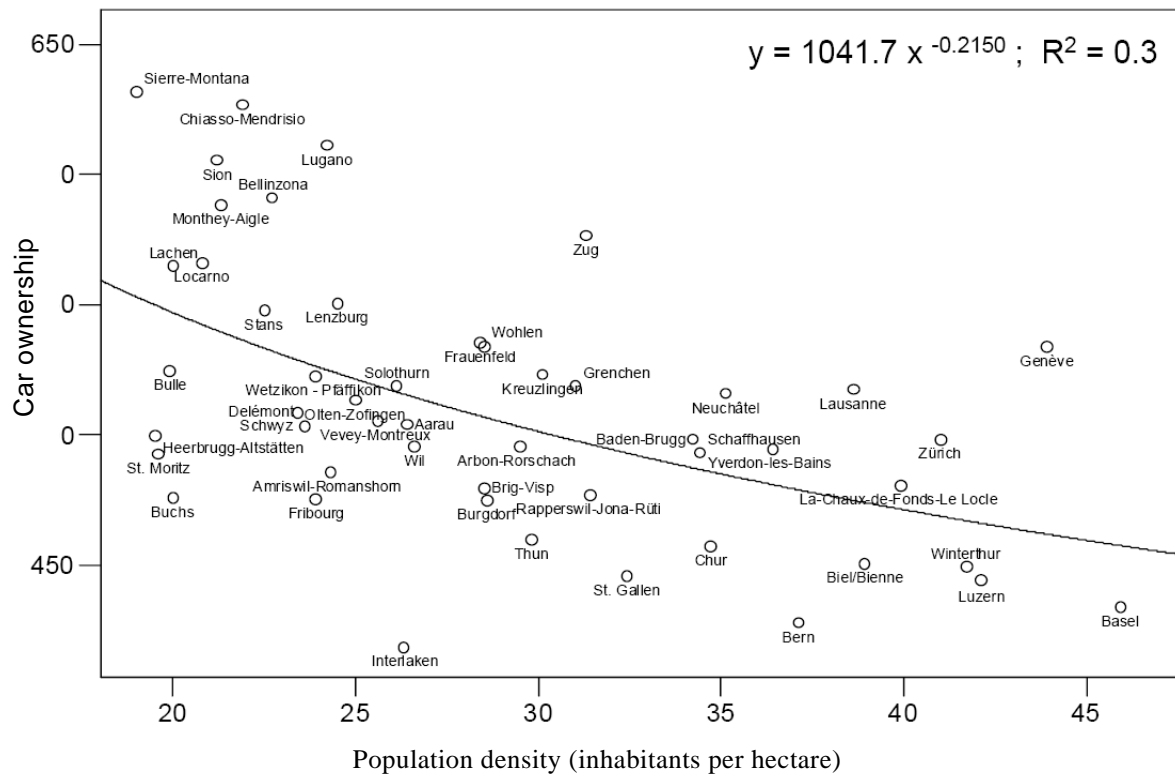
Even though it is a small country, Switzerland has a number of significant contrasts in its regions. While Lugano is in the Italian-speaking region with strong traditional links to northern Italy, Lucerne and Chur are in the German-speaking part and marked by different cultural identity. Chur, which used to be Romansh-speaking, currently has a population that is approximately half Catholic and half Protestant. Both Lucerne and Lugano are predominantly Catholic. Chur was the last city to permit cars in 1927.

The cultural background is important in terms of the choice of transport. The Lugano area has traditionally been very car-friendly, and its hilly surroundings and dispersed towns have led to a very heavy mode of individual transport. While Lugano's urban area has around 610 vehicles per 1,000 inhabitants, Lucerne has only approx. 450 cars per 1,000 inhabitants and is much more densely populated. In terms of population density, the ratio for Chur's urban area lies in between that of Lugano and Lucerne, with around 460 cars per 1,000 inhabitants. The chart below shows how these three cities compare to other Swiss urban areas.

The federal transport policy provides an important framework for the transport policy in all three cities. Responsibility for the motorways rests with the federal government, which coordinates transport planning among the cantons. Two main points of the federal transport policy are crucial for this analysis.

1. The national transport policy encourages the shift from individual motorised traffic to public transport, walking and cycling.
2. Most of the serious traffic problems are encountered in the urban areas. The Conurbation Programme, a new federal policy instrument, provides Swiss cities with federal funds in order to address urban traffic problems. Federal funding is directed at public transport, walking, cycling and important road infrastructure. Furthermore, it is contingent on coordinated transport planning and compliance with the federal policy as laid out above. The Conurbation Programme is financed with a tax on fuel.

**Fig. 1: Correlation between population density and car ownership in Swiss urban areas (2000)**



Source: Federal Office for Spatial Planning (2005, p. 19).

#### 1.4. Air pollution in Lucerne, Lugano and Chur

##### Fine particles

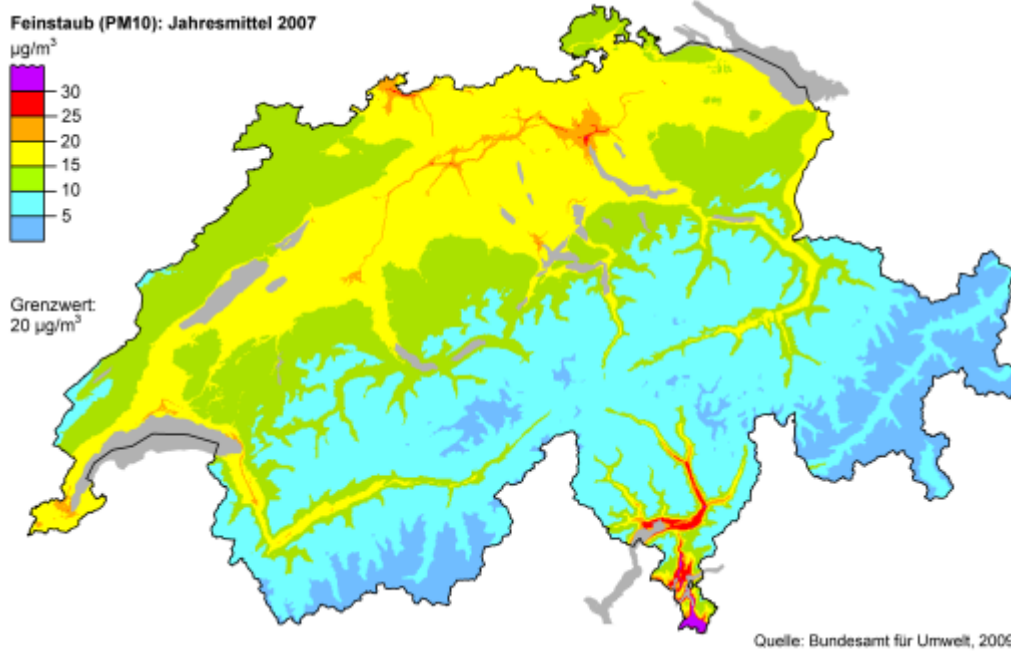
The following map shows the mean concentration of fine particles in Switzerland (in  $\mu\text{g}/\text{m}^3$ ) in 2007. The maximum allowable concentration is  $20 \mu\text{g}/\text{m}^3$  (legal basis: Federal Clean Air Ordinance).

The three cities in this study have the following concentration of fine particles (PM 10):

- Lucerne:  $20\text{-}25 \mu\text{g}/\text{m}^3$
- Lugano:  $25\text{-}30 \mu\text{g}/\text{m}^3$
- Chur:  $15\text{-}20 \mu\text{g}/\text{m}^3$

Lucerne and Lugano both exceeded the maximum allowable concentration in 2007.

**Fig 2: Fine particles (PM10): mean in 2007**

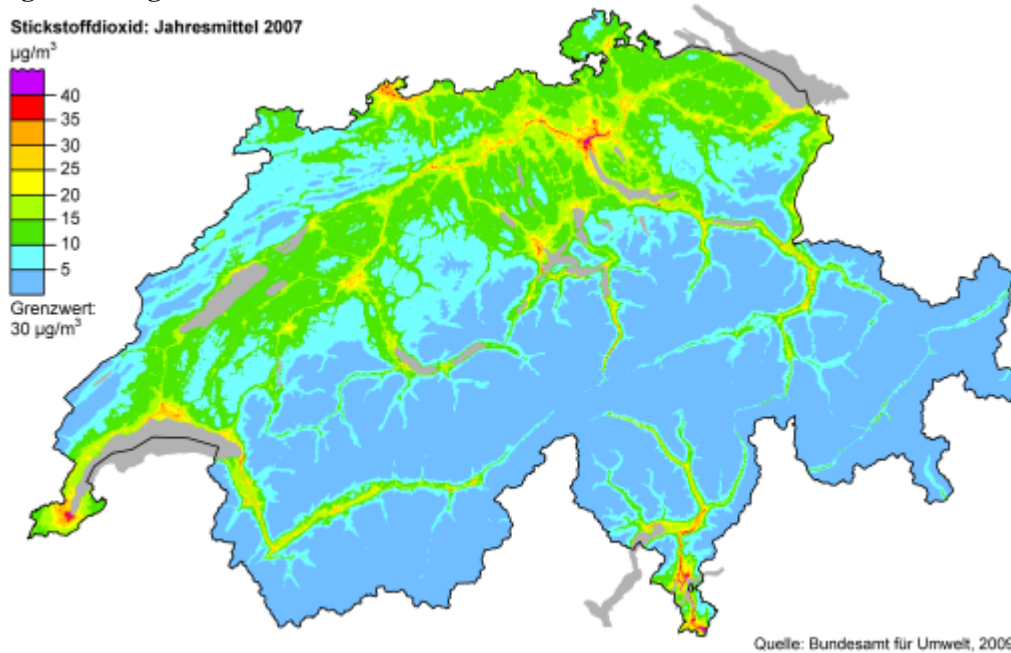


Source: Federal Office for the Environment

### Nitrogen dioxide

The following map shows the mean of nitrogen dioxide concentration (in µg/m<sup>3</sup>) in Switzerland in 2007. The maximum allowable concentration is 30 µg/m<sup>3</sup> (legal basis: Federal Clean Air Ordinance).

**Fig. 3: Nitrogen dioxide: mean in 2007**



Source: Federal Office for the Environment

The three cities had the following mean nitrogen dioxide concentration in 2007:

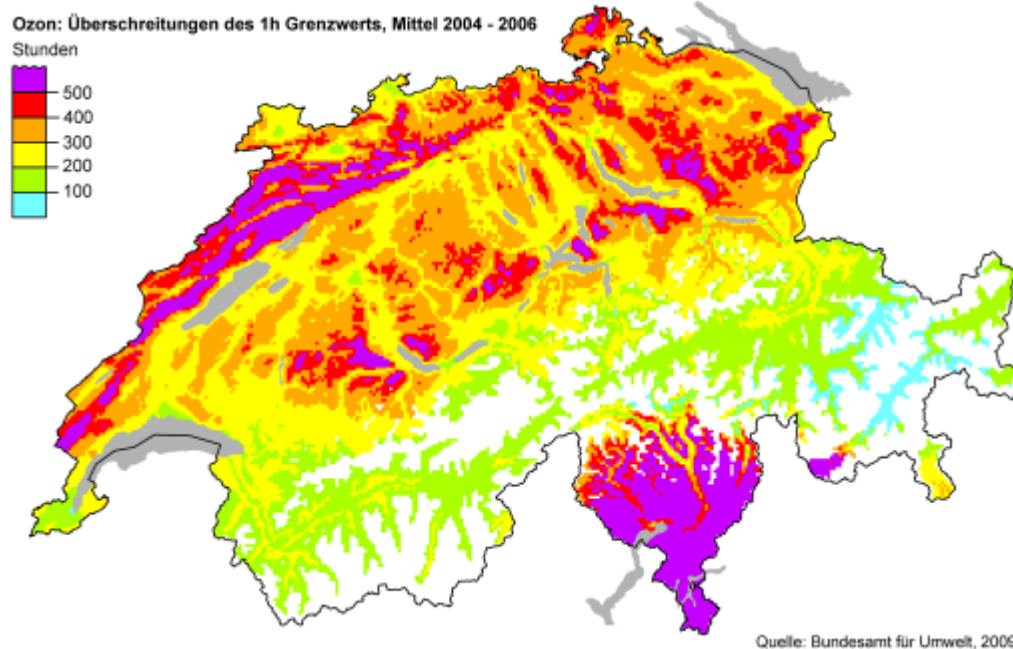
- Lucerne: 30-35  $\mu\text{g}/\text{m}^3$
- Lugano: 35-40  $\mu\text{g}/\text{m}^3$
- Chur: 20-25  $\mu\text{g}/\text{m}^3$

Lucerne and Lugano exceeded the maximum allowable concentration in 2007.

### Ozone

The following figure shows how the one-hour limit for ozone concentration in Switzerland was exceeded (mean 2004 – 2006). The one-hour mean of 120  $\mu\text{g}/\text{m}^3$  ozone must not be exceeded more than once per year (legal basis: Federal Clean Air Ordinance).

**Fig. 4: Ozone: Number of hours in which the one-hour limit was exceeded (mean 2004 – 2006)**



Source: Federal Office for the Environment

The three cities exceeded the one-hour limit as follows:

- Lucerne: 200-300 hrs
- Lugano: > 500 hrs
- Chur: 200-300 hrs

As those results indicate, all three cities exceeded this limit substantially.



## 2. Lugano

### 2.1. Background

Lugano is located on Lake Lugano and almost completely surrounded by mountains (Monte Brè and San Salvatore). It has a population of 55,100 in the core city and 133,400 in the greater area (BfS, 2008). This international urban area constitutes 77 communities, five of which are located in Italy. Average income is around EUR 24,300 per capita (for the Canton of Ticino, BfS 2005), somewhat below the average for Switzerland.

The financial sector, with many private banks and a vibrant tourism industry, forms the backbone of the regional economy and offers 27,000 of 40,000 jobs. Tourism brings around 440,000 arrivals and 890,000 overnight stays a year to the region. With 5,135 beds, the hospitality industry has an occupancy rate of 48.9%, largely on account of business travel, conventions and conferences. Lugano, as in the case of the other two cities as well, is mostly known as a leisure destination for summer travellers.

Lugano is an important regional centre when considering the full range of specialised economic activities it offers. The main commercial areas are in the city centre and to the north near the motorway. As regards the retail industry, Lugano exemplifies the concept of urban sprawl, with large shopping centres situated in the Grancia Valley and the plain near the town of Manno. The city also has a university (opened in the 1990s) with around 2,500 students. When including the 2,700 students at the more traditional University of Applied Sciences, with campuses in various places inside and outside the main centre, Lugano's tertiary education industry hosts approximately 5,200 students.

### 2.2. Transport policy

Lugano features an elaborate and comprehensive regional transport plan called "Piano dei trasporti del Luganese" (PTL), which was established so as to benefit from federal funding under the Conurbation Programme. The regional transport plan sets out to facilitate public transport and alleviate the main urban traffic problems by restricting access to the city and offering new connections to bypass the centres. The map below depicts this strategy, referred to as "Omega", with the following main measures aimed at the regional level:

- Construct the new Vedeggio-Cassarate tunnel to bypass the city (underway)
- Connect Milan Malpensa airport by rail
- Provide mobility programmes: Liberalauto (car-sharing, predominantly for commuters) and mobility consulting in firms
- Improve the regional rail system
- Reduce traffic in the city centre, offer park-and-ride services

**Fig. 5: The Omega strategy as a part of the regional transport plan**



Source: Piano dei trasporti del Luganese

### *Walking and Cycling*

Walking and cycling have not been a priority in transport policy so far. However, an equal treatment of all modes of transport is explicitly stated as basis for the transport policy. Measures for improvement have been formulated in the PVP, and improving the network of bicycle lanes has been given top priority. For walking, the responsibility rests with local government. Suggestions include:

- Appoint a committee of experts to the municipality
- Draft a local transport plan for walking
- Promote walking as a sustainable means of transport
- Walk to school
- Improve pedestrian safety

The documents supporting transport planning unfortunately do not mention the share of the non-motorised traffic. At 90% of the motorised traffic, the modal split of individual motorised traffic is quite high for the Lugano area. The table below shows the current modal split (only for motorised traffic), the trend scenario for future development, and the deviation from the objectives of transport policy.

**Fig. 6: Modal split in Lugano today and in the trend scenario (only motorised traffic)**

	State today		Trend scenario		Goals	
	Passengers	Modal split	Passengers	Modal split	Passengers	Modal split
IMT	421,500	90.00%	493,700	89.80%	477,000	85.30%
PT	46,800	10.00%	56,400	10.20%	82,000	14.70%

### **2.3. Urban traffic system**

The urban traffic system in Lugano continues to rely strongly on car ownership and use (see also fig. 1). The analysis below nevertheless focuses on public transport and on walking and cycling.

**Fig. 7: Overview of the urban traffic system**

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<b><i>Network for walking</i></b>	According to the PTL, the network for walking is not well developed. A basic network exists, especially in the historical city centre. Greater Lugano consists of many old villages, and walking remains an important mode of transport. However, there are few medium-distance and long-distance walking opportunities because the network among these central areas is not well developed.
<b><i>Network for cycling</i></b>	With only one main cycling route, Lugano falls short of offering an appropriate network, especially compared to other Swiss cities. All in all, Lugano is rather dangerous and inconvenient for cycling. Dispersed neighbourhoods, high affinity for cars and a particularly hilly topography make cycling a major challenge in the area. An improvement in the network is planned in the PTL.
<b><i>Network for in-line skating</i></b>	There are no official in-line skating paths in the Lugano area.
<b><i>Regional / national bicycle trails</i></b>	The E35, a national motorway, passes close to Lugano. No regional routes exist so far, which is extraordinary.
<b><i>Busses in the neighbourhoods</i></b>	None.
<b><i>Urban, regional, national and international bus routes</i></b>	Five urban bus routes and another six regional ones make up the suburban bus network. Two bus routes serve the park-and-ride platforms outside the city centre and approximately 20 regional connections. International connection to the airport of Milan in Malpensa, no national lines (prohibited in CH). There are plans to extend bus route no. 5 to Lamone.  The local bus company carried 2,250,000 passengers in 2008. By 2020, daily demand for transport is expected to rise by 20.5% from 46,800 to 56,400 passengers (Source: <i>Programma d'agglomerato di Lugano</i> )
<b><i>Trolley busses</i></b>	The trolley bus network continued to expand until June 30, 2001, after which all trolleys were replaced with coaches.
<b><i>Tramways</i></b>	There are no trams in Lugano (a historical line was in service until the 1970s). New lines are planned and partly under construction (predominantly an extension of the light train to Ponte Tresa).
<b><i>Urban railway system</i></b>	Especially the regional railway systems have improved significantly in the past, with an important light train to Ponte Tresa that now provides direct access to the city centre. Three urban funiculars (city centre to main railway station, to Monte Brè, and to San Salvatore) supplement the urban public transport service. Here, the funicular railway connecting the main station with the historical city centre is of particular importance.

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<b><i>Regional, national and international trains</i></b>	<p>Tilo is a subsidiary of the Swiss and Italian federal railways and offers regional train service throughout the Canton of Ticino. Its new trains and cross-border service have proven to be very popular. There is one light train from Lugano Main Station to Agno and Ponte Tresa.</p> <p>Situated on the main north-south axis through the Gotthard, Lugano station services all trains on this route, with connections in each direction every half hour.</p>
<b><i>New infrastructure for public transport</i></b>	<p>There are three main projects for PT in Lugano: An improvement in supply by the local bus company for CHF 4.5 Mio. (3.1 Mio. Euros), and a construction of a new light train connection to Ponte Tresa for CHF 343 million (240 million Euros) (Source: Programma d'agglomerato di Lugano)</p>
<b><i>Urban highways</i></b>	<p>The E35 motorway passes through the outskirts of the city and serves as an urban highway as well, with access roads reaching close to the city centre.</p>
<b><i>Other roads of national importance</i></b>	<p>The main north-south axis through Switzerland / the Alps and the connections towards Lake Como are of national importance.</p>
<b><i>30 km/h zones and pedestrian areas</i></b>	<p>The old town of Lugano – comprising the city centre – is accessible for pedestrians only. Pedestrian mobility plays an important role in Lugano, making it easy to reach all parts of the greater area and corresponding infrastructure, which is safe and adequate. The pedestrian area in the city centre is well developed, even though it includes an intersection. There are information panels indicating the directions to the various points of interest at all important locations. Speed in almost all streets in the neighbourhoods is limited to 30 kph.</p>

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Lugano has ten charging stations for electric cars, and there several charging stations in the neighbouring communities.

#### **2.4. Through traffic**

The main European route through the Alps, the E35 highway across San Gottardo, passes near the city and is used by some 60,000 vehicles a day. It is also used frequently by people in the area for local trips. Lugano's location on the lake poses additional problems because all east-west traffic must pass through the city (8,000 vehicles/day). Furthermore, the Ponte Tresa-Agno-Manno route to the west is crucial for commuters and through-traffic (26,000 vehicles a day). Although there is little congestion on the highways, traffic along the other two main axes has long since exceeded capacity.

#### **2.5. Accessibility**

Lugano's accessibility is slightly above the mean (0%-5%) found in other European regions. On a European Railway level, Lugano is 20% to 40% above the mean of the ESPON space. The city is directly accessible by train from Italy, and there is a national airport in Lugano-Agno (within 10 km) and the international airport in Milan-Malpensa (within 50 km). When comparing accessibility to other Swiss Cities, Lugano's ratio of travel time by train to travel time by car is between 0.9 and 1.2, making the train nearly competitive with the car.

## 2.6. Traffic management

Lugano has no general traffic guidance system, only one for the multi-storey car parks. A special traffic management measure involves regularly closing the main axis along the lake on Friday and Saturday evenings and on special occasions. This street then becomes a pedestrian zone for leisure activities by residents and tourists. Large parts of the old town are car-free, and commercial vehicles are not allowed to enter the city, except for making deliveries. Access times are strictly regulated.

The city also relies on a number of measures to manage public transport at its central locations. Busses generally have priority on three main crossroads in the downtown area; however, there are very few bus lanes. In some places, there is a well planned combination of lanes (i.e. public transport uses the less frequented routes). The only separate bus lane leads from Paradiso to the city centre along the lake (approx. 1.5 km). The urban transport company, *Trasporti pubblici Luganesi SA*, recently installed a traffic control system.

The cantonal mobility management strategy called *mobilità in aziende* for companies has been showing positive results. The regional organisation for public transport, *arcobaleno per aziende*, offers preferential terms to all firms for their employees under the programme. Mobility measures for events and other exceptional occasions have proven to be only marginally effective.

Only a few measures have been implemented for cyclists so far. At several traffic lights in the downtown area, cyclists have priority automatically. While there are plenty of outdoor bicycle parking facilities in open spaces, only a few have roofs. Service and maintenance remain a private matter entirely.

A number of private initiatives to foster two-wheel electric mobility have been launched very recently that include consulting services and sales support for private individuals and enterprises.

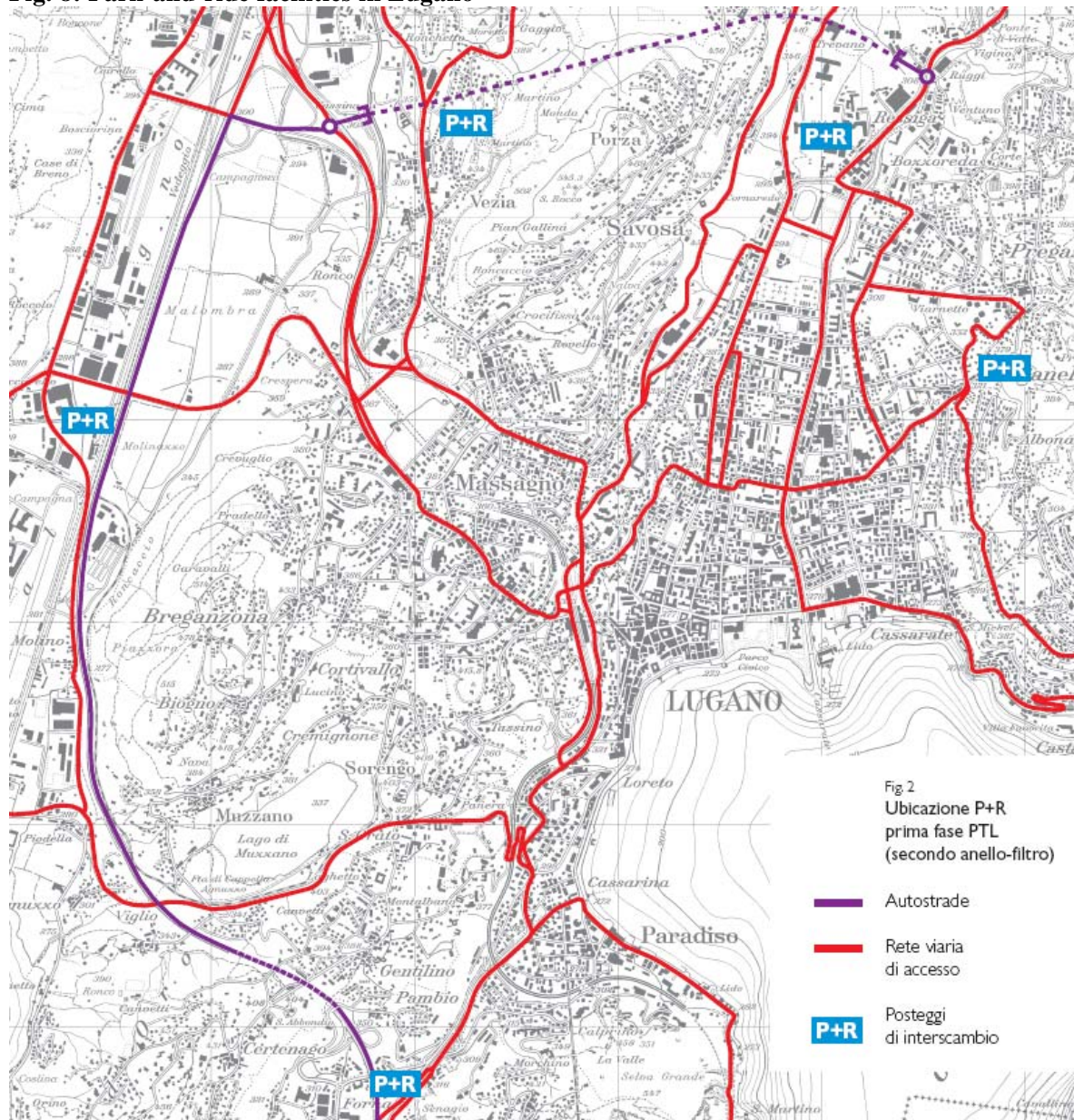
## 2.7. Parking management

Lugano has 2,759 parking spaces in multi-storey car parks throughout the city, 1,048 of which are located in the centre. General data on parking indicates that there are 7,200 public parking spaces in the city, 76% of which are for short-term parking. Additionally, there are around 39,000 private parking spaces, of which some are 2,000 permanently rented to commuters. Private parking spaces are more immune to parking management measures because of the absence of direct control by the authorities. Parking policy in Lugano aims to reduce the number of long-term public parking spaces, especially outside of the main city centre, and foresees a reduction of private parking spaces rented to commuters, stricter controls, and the introduction of standard (higher) parking fees.

Metered parking areas have been expanded under a rigorously pursued policy over the last two decades (-58% free long-term parking spaces since 1992), and free parking is being eliminated further under the federal policy to finance the tunnel bypassing the city. Short-term parking at shopping centres is usually free, while fees at public places (university, hospital etc.) vary. Free parking is usually available also at commercial centres outside the city. A parking guidance system for 1,048 parking spaces in multi-storey car parks is about to be installed in the downtown area, and there are plans to introduce it in the surrounding areas as well.

The park-and-ride system is an integral component of the regional traffic management system, and rapid bus routes connect some of these park-and-ride platforms directly to the city centre.

**Fig. 8: Park-and-ride facilities in Lugano**



## 2.8. Traffic integration

Lugano's history of integrated transport planning has not been particularly successful. The city has among the lowest population densities, widely dispersed residential areas, and the highest motorisation ratio in the country. Nevertheless, the PTL (cf. Section 2.2 "Transport Policy") marks a cornerstone in the transport policy of Lugano and the surrounding region in that it aims to integrate all modes of transport. A relevant example for the integrated planning is given by the relatively new park-and-ride facilities with direct bus connections to the city centre.

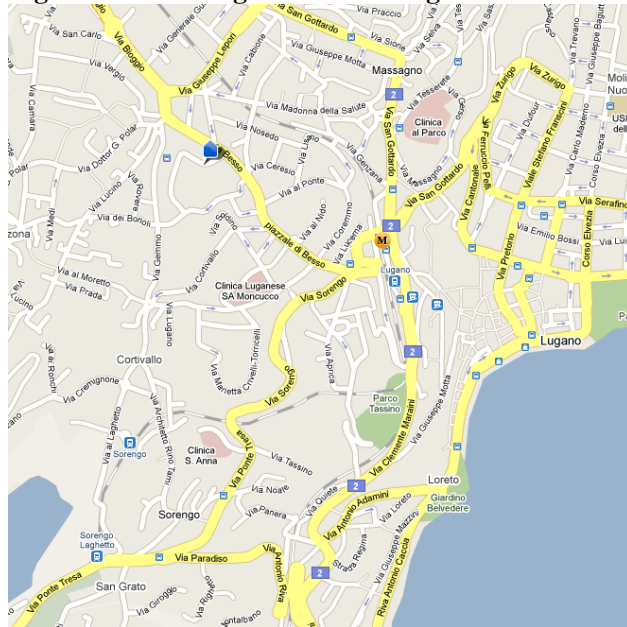
Arcobaleno, an organisation of municipalities, aims to organise public transport for all of Canton Ticino (incl. Moesano) and has fully standardised its fares within the region. Season tickets are already completely integrated and further steps, including a single ticket, are planned. In the central

area, including the main bus station, the integration of all transport modes has been organised to best effect, with national standards being applied at new railway stations. Thanks to the federal law on equal opportunity for the disabled, access for walkers and cyclists will improve as well in the coming years.

Nevertheless, the central connections in Lugano remain highly problematic for pedestrians, in particular the transfer from the FFS railway station to the Lugano – Ponte Tresa railway station. Park-and-ride is a key project of the PTL, with the two platforms offering 400 and 800 parking spaces respectively, each served by a separate bus route. An official at the cantonal department *del territorio*, section of mobility, is committed to formally institutionalising walking and cycling.

Lugano has two car-sharing stations with 15 cars of seven types. The stations are situated as follows (one is marked with “M” and the other with a blue sign):

**Fig. 9: Car-sharing stations in Lugano**



Source: [www.mobility.ch](http://www.mobility.ch)

## 2.9. Mobility information

Lugano has no mobility information centres. Public transport information offices are located in the city centre, at railway stations in the region (specific information) and at post offices, and they all offer only sales and information. Otherwise there is very little information on mobility available and there are no special efforts underway, such as information campaigns by the public transport company.

Real-time displays at stops have been in place in the city centre since 2002. The Lugano Bus Company has started to install more displays, aiming to cover all important stops in the city. However, none of the other companies currently has such a system, although there are discussions on implementing it when new ticket machines are installed. Real-time information on mobile devices is not available.

Information for motorists remains at a basic level as well. As mentioned above, the multi-storey car parks in the city centre are all connected to an information system with displays in the street. This

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is important because they have exceptionally high average occupancy rates, operating at capacity every day, one of which is completely filled from 9:00 to 17:00 daily. Nevertheless, cars are permitted to enter the city during this time. An elaborate system of displays is being planned that will provide motorists with detailed information on the traffic situation. Dynamic information for motorists is being considered but is unlikely to be realised in the near future.



### 3. Lucerne

#### 3.1. General conditions

On 1 January 2010, the population of the core city of Lucerne reached 75,000, thanks to the merger with the neighbouring town of Littau. The greater Lucerne area includes 16 large suburbs and has 205,400 inhabitants, making it the largest of the three urban areas in this analysis and the sixth largest city in the country (with Lugano in ninth and Chur in twentieth place). Average income per inhabitant in the canton is EUR 29,100, at the national average. Lucerne offers 44,000 jobs – 70% in the tertiary sector, 15% in the manufacturing sector, and 15% in other sectors. Most jobs are in retailing, insurance, education, public administration and tourism, and they are predominantly found in the city centre and immediate vicinity.

The city of Lucerne has 1,884 hotel rooms that accommodated approximately 366,100 arrivals and 774,800 overnight stays in 2008. Between 4.5 and 5 million excursionists visit Lucerne each year, mainly from Switzerland and neighbouring countries. The city offers a wide variety of tourist activities (e.g. festivals, conventions, conferences, boat rides and trips to the mountains nearby). Especially relevant for day trips are the Swiss Transport Museum (with no less than 870,000 visitors per year), Lake Lucerne, and the historical city centre. Tourists are mainly from Switzerland (295,837 overnight stays), the US (134,866 overnight stays), Germany (112,695 overnight stays), Great Britain (76,198 overnight stays) and Australia (40,459 overnight stays).

The retail industry is also of great importance to the region, particularly the specialist shops in the city centre. Shopping centres, however, are found mainly in the surrounding communities near the motorways, but always within reach of the public transport system. Similarly to Lugano, Lucerne positions itself as an education centre. Of a total of 6,772 students, 2,240 are enrolled in University of Lucerne (founded in 2000) and 4,532 attend the more traditional Lucerne University of Applied Sciences and Arts.

No data is currently available on the modal split of traffic in Lucerne. Lucerne residents had the following modal split in 1996 and 2000, respectively:

- trips by residents in 1996: 32% walking, 13% cycling, 2% motorbike, 22% as car driver, 6% as car passenger, 25% public transport
- distances: 35%-45% share of public transport (2000)
- commuter trips: 55-70% of trips with public transport (2000)

Estimates for the greater Lucerne area indicate that motorised traffic will increase by 18% and public transport along the main axes by 25% to 50% in person-kilometres between 2000 and 2020.

### 3.2. Transport policy

The key elements and focus of the transport policy in the city, the urban area and the federal government are listed below.

- City of Lucerne:
  - Concept of road traffic restriction (“dosage”) at the edge of town, depending on road capacity rates in the city
  - Prioritisation of public transport in Lucerne
  - Integration of transport and urban planning
  - Speed limit of 30 km/h throughout the city
- Canton of Lucerne:
  - Implementation of transport measures and settlement plan of the urban area of Lucerne under the federal Conurbation Programme (see Lugano)
  - Successive implementation of the cantonal cycling network
  - Expansion of rail capacity to Lucerne central station, in collaboration with the federal government
  - Improvement of the access to motorways
- Federal government:
  - Expansion of rail capacity between Lucerne and Zurich
  - Expansion of national road capacity to bypass the city
  - New motorway accesses (Rothenburg and Buchrain)

From 2008 to 2011, major investments in several motorway ramps and access roads (Rental) were or will be made at a total cost of CHF 169 million (118 million Euros).

#### *Walking and cycling*

The municipal plan for pedestrian traffic has been implemented successively and a cantonal plan for hiking trails outside the city and development plan for a cycling network are in place. However, the implementation of the latter has been delayed, with emphasis being placed on eliminating the dangerous places along the roads. Further plans to expand walking and cycling include completing a route through the inner city, upgrading the lakeside area for pedestrians and cyclists (segregated areas), building a bicycle tunnel at the central railway station, and putting the railway lines of *Zentralbahn* underground (to be realised at a later stage). The estimated cost of several improvements within the cycling network, planned between 2011 and 2014, is CHF 16.5 million (11.5 million Euros), not including the bicycle tunnel at the railway station and a cycle lane by the lakeside (Schweizerhofquai, CHF 2.7 million).

The city of Lucerne has also decided to install a lighting design (“*plan lumière*”) in the city centre and some neighbourhoods in the coming years.

The city of Lucerne has no concept to promote two-wheel electric mobility; however, it is possible to recharge the batteries of e-bicycles at the central bicycle station, which also has a rent-a-bike station with eight electric bicycles. The number of e-bicycles owned by Lucerne residents is relatively high because of the numerous stores featuring a wide range of such products.

### 3.3. Urban traffic system

**Fig 10: Overview of the urban traffic system of Lucerne**

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<b><i>Network for walking</i></b>	The city centre has a well marked network of routes to tourism sites (target group tourists), however the area covered is very small. There are some signposted walking and hiking trails “green ways” for recreational walking from the city centre to the outskirts.
<b><i>Network for cycling</i></b>	As stated above, the network for cycling paths is being built more slowly than originally envisioned by the cantonal parliament. Cyclist federations rate the quality of the network as moderate.
<b><i>Network for in-line skating</i></b>	Formally there is one in-line skating path, but many more are used informally.
<b><i>Bicycle trails regional / national</i></b>	Lucerne is connected to a national and to several regional bicycle routes.
<b><i>Busses in the neighbourhoods</i></b>	The suburbs of Emmenbrücke and Kriens are accessible by bus.
<b><i>Urban, regional, national and international bus routes</i></b>	A single company (vbl) serves most of the urban and suburban bus routes (20 routes of 162 km, 6 trolley bus routes of 30 km, and night bus routes of 99 km). This network serves 58,800 residents of the city and a total of 177,900 residents of the surrounding area. Although national bus routes are prohibited under the transport law, some routes operate into Eastern Europe.
<b><i>Trolley busses</i></b>	Lucerne has six trolley bus routes.
<b><i>Tramways</i></b>	The tramway system was discontinued in 1961.
<b><i>Urban railway system</i></b>	Lucerne does not have urban railways, except for one stop near the Swiss Transport Museum, built in 2007 at a cost of CHF 2.4 million (1.7 million Euros). Seven urban railway lines connect the city with the surrounding area and other parts of the region.
<b><i>Regional, national and international trains</i></b>	There are direct international train connections to Italy and frequent national (e.g. Zurich, Berne, Basel) and regional connections (e.g. Sursee, Hochdorf, Schüpfheim, and Willisau).
<b><i>Urban highways</i></b>	The E35 motorway passes underneath the city centre (see transit traffic).
<b><i>Other roads of national importance</i></b>	The E35 is the only motorway.
<b><i>30 km/h zones and pedestrian areas</i></b>	The old town of Lucerne in the city centre is a pedestrian zone. Speed in almost all neighbourhoods is limited to 30 km/h, except on the main roads.

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In 2009, the public transport company VBL carried 43.5 million passengers over 102.3 million person-kilometres in the city and surrounding areas.

In 2009, VBL received CHF 25.8 million (50% of the total revenue) in public funding (CHF 25.1 million from the municipalities of the urban area), which breaks down as follows:

- CHF 0.60 (EUR 0.43) per passenger or
- CHF 0.26 (EUR 0.19) per passenger-kilometre or
- CHF 145 (EUR 104) per inhabitant.

A bus ticket (standard adult fare) is CHF 2.80 (around EUR 1.95<sup>1</sup>) in the city zone. A 30-day adult ticket within the city zone costs CHF 57 (about 40 EUR), and tickets are valid for all transport companies in the Lucerne region on the basis of a cooperation agreement.

Lucerne has only one charging station for electric cars.

### **3.4. Through traffic**

The E35 (A2), the main European passage through the Alps, passes near the city of Lucerne. In the tunnels bypassing the city, the E35 motorway carries 59,399 vehicles a day through *Sonnenbergtunnel* and 88,400 vehicles a day through the *Reussporttunnel*. Traffic is mainly local and regional, and only 16,500 of the vehicles actually cross the Alps at San Gottardo per day. Due to its location at the end of the lake, the Lucerne city centre also provides important connections at the regional level, especially for accessing the north-eastern parts of the urban area. Nevertheless, 180,000 vehicles a day pass through the inner city centre and 250,000 through the outskirts, exemplifying the high rate of individual mobility in Lucerne.

### **3.5. Accessibility**

Lucerne's accessibility is slightly above the mean (0%-5%) of other European regions. In terms of levels found among European railways, Lucerne is 40%-60% above the mean of the ESPON space. Direct trains arrive from Italy. By air, Lucerne can be reached from the international airport in Zurich-Kloten (within 50 km). When comparing accessibility from other Swiss cities, Lucerne's ratio of travel time by train to travel time by car is between 0.9 and 1.2, making the train nearly competitive with the car. All in all, Lucerne is very similar to Lugano in terms of accessibility.

### **3.6. Traffic management**

Lucerne provides its citizens and visitors with a guidance system to multi-storey car parks. A dosage system limits motorised traffic volume at the edge of the city in order to reduce congestion in the centre. Lucerne uses no other forms of transport telematics. The pedestrian zone in the old town is only open to delivery vehicles until 10 a.m. There are no further restrictions on commercial traffic as in the case of Lugano.

Busses have priority at some crossroads, and *Verkehrsbetriebe Luzern (vbl)* has installed an elaborate control system for urban public transport. Two major investments to give busses priority at the outskirts are due in 2012 (cost: CHF 13.4 million, 9.4 million Euros).

Although a mobility management programme is in place for companies and industrial zones, it is of a very basic level. Other sources of traffic are subject to mobility management as well, i.e. major events – concerts at the Lucerne Culture and Convention Centre, the *Luzerner Fest*, events at the Swiss transport museum – with tickets that combine the train fare and admission to the event or museum.

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<sup>1</sup> 1 EUR = 1.43 CHF

Regarding traffic management for walking and cycling, bicycles have priority at some of the traffic lights in the city, and some streets feature a separate bicycle lane. Lucerne has a policy of separating pedestrian and bicycle areas, and it attempts to restrict cyclists to lanes in the roads. The central railway station has a bicycle rental outlet with a range of services. Besides, open spaces for bicycles are available at several places, including railway stations at the outskirts. Nevertheless, covered spaces are scarce, especially close to the main railway station.

### **3.7. Parking management**

Lucerne offers some 3,000 parking spaces in multi-storey car parks that are all connected to a real-time information system posting the number of available spaces. There are no figures on the total number of parking spaces in the urban area. The areas with metered parking was expanded only recently in 2009. All parking spaces on public roads in Lucerne have time limits and most of them are metered. In the central areas, parking fees are charged around the clock; in other areas only from 7:00-19:00. No special taxes apply to important sources of traffic, such as large employers and hospitals, but nearby public car parks charge a fee.

### **3.8. Traffic integration**

Urban planning and transport planning is continuously being integrated into the city's development plan for settlement and transport, as prescribed under the federal Conurbation Programme. The authorities rely on the cantonal plan for spatial development to coordinate settlement and transport. Intermodal transport planning has been applied only in part (as in park-and-ride facilities at suburban railway stations) so far. For the most part, planning continues to rely on separate measures for the various means of transport. Public transport, cycling and walking are central to the city's intermodal mobility strategy.

In comparison, integration within the public transport concept is more advanced. Fare cooperation has been established by the Canton of Lucerne and the neighbouring cantons. A new cantonal management authority for public transport has been established as of 1 January 2010, and tickets are now sold by numerous organisations and even provided by the ticket machines of the local transport company and Swiss Federal Railways. Walking and cycling at bus terminals and railway stations is a priority to local traffic planners.

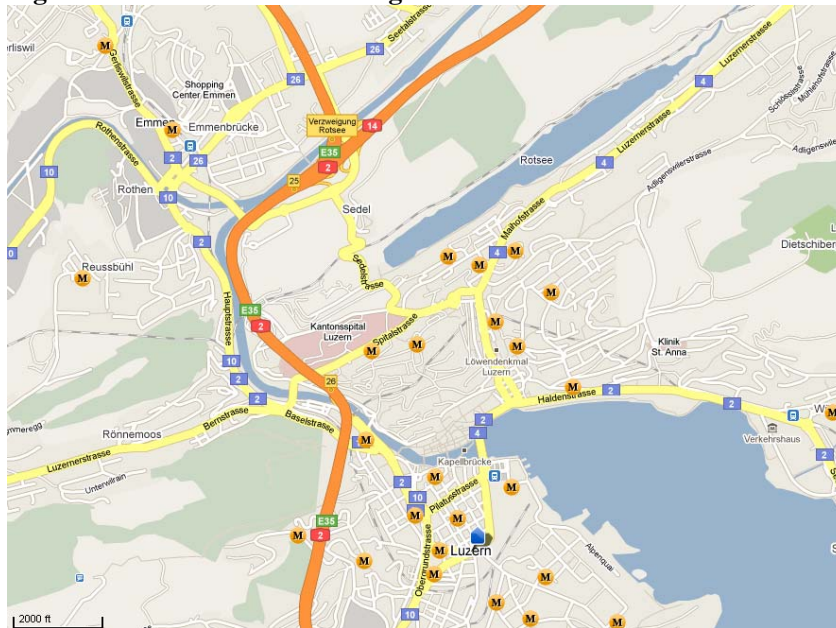
Improving access to the platforms of Lucerne's central station is considered an important measure (completion in 2011, cost: CHF 5.0 million, 3.5 million Euros). Second priority is given to a bicycle station at the railway station (completion in 2015, 2.0 million CHF, 1.4 million Euros). There currently is a rent-a-bike station near the central railway station with 59 bicycles, including 8 electric bicycles, and the youth hostel also has a rental service with five bicycles.

By 2006, there were 300 park-and-ride spaces at regional railway lines outside the city (CHF 1.1 million, 770,000 Euros). There are plans to build another station in 2011 (CHF 1.5 million, 770,000 Euros).

The institutionalisation of walking and cycling is guaranteed by a person at the municipal planning authority (civil engineering department).

The city of Lucerne has 32 car-sharing stations with 80 cars of ten different types. The stations are roughly situated as follows (marked with "M"):

**Fig. 11: Location of car-sharing stations in Lucerne**



Source: [www.mobility.ch](http://www.mobility.ch)

### 3.9. Mobility information

While the city does not have a single mobility centre as an integrated hub, there are separate customer centres of public transport companies and a tourist centre. There is also no mobility consulting service by telephone. However, information is available from several public transport companies and via the hot-line of Swiss Federal Railways.

There is no multi-modal website (this service is planned in the next years), but unimodal websites of the suburban railway (*S-Bahn* of Lucerne; <http://www.s-bahn-luzern.ch>) and the national railway company ([www.sbb.ch](http://www.sbb.ch)) are available. A mobility map is available for residents and visitors, containing all relevant information on mobility (roads, cycle paths, walking paths, car-sharing sites) (cost: CHF 200,000, 140,000 Euros). Information for new residents is also available, with details on public transport routes and tickets to encourage them to try out public transport system. Most major bus stops have real-time schedule displays.

There are plans to establish a mobility centre between 2011 and 2014 (costs: CHF 1 million, 700,000 Euros). The emphasis is initially being placed on a virtual mobility centre with web-based information and services.

There is no dynamic traffic management system (from the surrounding network into the local network) at this time, no systematic connection of information on the national, cantonal and local road network, and no real-time information displays at the city level. A conventional traffic management concept will be implemented in 2011 (costs: CHF 5 million, 3.5 million Euros).

## 4. Chur

### 4.1. General conditions

Chur has a population of 33,700 in the core city. As in the case of Lugano and Lucerne, the population of the greater area is larger than that of the city itself, with a total of 69,100 inhabitants in 15 communities. Chur's urban area has a rather high population density of about 35 inhabitants per hectare. At EUR 28,900, aggregate income per inhabitant (in the Canton Grisons) is similar to that of Lucerne.

The main economic sectors are winter and summer tourism, chemical industry, construction industry, and beverage production. Chur also has some international companies. Around 167,000 annual overnight stays (2007) underscore the lasting importance of tourism for Chur. Apart from business travel, Chur also has an important segment of travellers seeking outdoor activities – mainly hiking and cycling during summer and snow activities (e.g. snowshoeing) during winter. Chur has direct access to numerous ski slopes.

Chur is the main business centre of Canton Grisons, Switzerland's largest canton. With its 300 shops, it has a high density of retail outlets. Unlike Lugano and Lucerne, Chur has no liberal arts university; however, its University of Applied Sciences (HTW Chur) has a long tradition, with current enrolment at 1,580.

#### *Modal split*

The modal split in 2000 was as follows:

- 20%-25% share of public transport (person-kilometres by residents)
- Commuter trips: 23% of trips with public transport (2000)

### 4.2. Transport policy

At a regional (cantonal) level, the Canton Grisons considers three aspects as crucial for its transport policy:

1. High tourism volumes.
2. The regional distinction due to its geographic location in Switzerland (located on the eastern part of Switzerland).
3. The difficulties due to the topographical situation, special weather conditions and the risk of natural disasters.

As in the case of Lugano and Lucerne, Chur also developed a settlement and transport plan in order to benefit from federal funding under the Conurbation Programme. Chur aims to make two major improvements:

1. Chur (and its surroundings) needs to be well connected not only with Zurich, Munich and Milan, but also regionally with St. Gallen and Bregenz.
2. Within the city (and its surroundings), the different districts and centres need to be well connected with improved conditions for individual traffic, public transport and walking and cycling. This will be achieved by improving public transport and, if necessary, by developing the traffic infrastructure.

Planned transport measures over the next five years include:

- A bus route to the city
- A three-rail track: Chur-Domat-Ems-Ems Werk
- New access to Chur and upgrading the railway line between Chur and Arosa (RhB)
- Resolving important price conflicts

- Park-and-ride facilities in the north of the city
- New access to the E43 (A13) in Chur (south)
- New access to the city centre via the city-bypass to the south
- Improved access to Chur West
- Connecting the railway station Chur-Wiesental to the cycling and walking network
- Improved cycling and walking connections to Chur West
- A new route for cycling and walking in Rossboden
- Cycling and walking connections between Domat/Ems south and Chur West

According to the regional transport plan, a well established and attractive network of walking, hiking and cycling routes is important for residents and the tourism industry. Therefore a regional (cantonal) network of hiking trails and a concept for cycling routes, especially for commuters and students, has been put in place. The cycling routes are mainly being used by tourists. The main objective as regards walking, hiking and cycling is to ensure safe, attractive and comfortable connections that meet the needs of users. Walking and cycling will be developed as follows:

1. Create opportunities for walking and cycling in the immediate vicinity.
2. Provide incentives to increase the use of walking and cycling.
3. Improve the infrastructure for cycling and walking for long-distance trips.

Currently there is no representative from the city of Chur assigned to the non-motorized traffic in the city.

#### 4.3. Urban traffic system

Considering its rural and alpine character, the Canton of Grisons developed a very dense network of railway lines in a very short time around 1900. As a consequence, driving a private car was prohibited until 1927.

#### **Fig. 12: Overview of the urban traffic system of Chur**

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<b><i>Network for walking</i></b>	The city centre has no network for walking but there are some signposted walking and hiking trails in the surrounding area.
<b><i>Network for cycling</i></b>	There are two national cycling routes crossing the city, both of which are signposted. The cycling trails in the city are not signposted for the most part, and hardly any of them are separated from the other city traffic.
<b><i>Network for in-line skating</i></b>	There are no official in-line skating paths in Chur. There is one national route starting from Landquart (to Kreuzlingen), about 16 km from Chur.
<b><i>Regional bicycle trails / national</i></b>	There are eight regional bicycle trails around Chur. There is no information available for national bicycle trails.
<b><i>Busses in the neighbourhoods</i></b>	There are some busses to the neighbourhoods (e.g. bus no. 1 – Domat/Ems – Tamins – Rhäzuns)
<b><i>Urban, regional, national and international bus routes</i></b>	There are five urban bus routes. Numerous regional bus routes connect Chur to other centres, and the one to Bellinzona in Ticino is the only cross alpine route open all year long.
<b><i>Trolley busses</i></b>	Chur has no trolley busses, only coaches.

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<b><i>Tramways</i></b>	Chur has no tramways.
<b><i>Urban railway system</i></b>	Chur has no urban railway, although some regional trains have stops on the way to the city.
<b><i>Regional, national and international trains</i></b>	Although there are no direct international train connections, there are eight regional trains and three trains to other Swiss cities per hour: one to St. Gallen and two to Basel SBB (both via Zurich).
<b><i>Urban highways</i></b>	The E43 (A13) motorway passes close to the city and is connected with a feeder. The connection to the highway in the south of Chur will be rebuilt between 2013 and 2015.
<b><i>Other roads of national importance</i></b>	Only the E43 (A13) motorway is of national importance.

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In 2008, *Stadtbus AG*, the public transport company, carried 10.1 million passengers. In 2008, it AG received a CHF 9 million (44% of total revenue) in public funding (CHF 2 million from the city of Chur). A standard adult bus ticket costs CHF 2.5 (around EUR 1.75<sup>2</sup>) and is valid for 30 minutes. A 30-day adult ticket valid within the city costs CHF 54 (around EUR 37.75).

According to the settlement and transport plan of Chur, all development measures are estimated at CHF 162.15 million (113 million Euros), of which the city will pay CHF 17.5 million (12.2 million Euros).

Chur has only one charging station for electric cars.

#### **4.4. Through traffic**

The E43 (A13) motorway, which bypasses the city, is among the most important routes through the Alps. The traffic count station closest to Chur recorded 26,170 vehicles a day (Domat/ Ems). Approximately one-sixth of the total annual kilometres driven in the Canton of Grisons is through traffic.

#### **4.5. Accessibility**

Chur's accessibility is slightly above the mean (5%-10%) found in other European regions. Compared to European benchmark, Chur is 20%-40% above the mean in terms of rail accessibility of the ESPON space. However, there are no more direct international trains after the recent discontinuation of the TGV to Paris. Chur can be reached by air via the international airport in Zurich-Kloten (within 120 km), but there are no direct train connections. When comparing accessibility from other Swiss Cities, Chur's ratio of travel time by train to travel time by car is between 0.9 and 1.2, making the train nearly competitive with the car.

#### *Accessibility of the city centre*

Accessibility is convenient for motorised traffic, except for the streets around the pedestrian zones. There are six multi-storey car parks near the historical area (pedestrian zone) 100-300 metres from the city centre.

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<sup>2</sup> 1 EUR = 1.43 CHF

#### **4.6. Traffic management**

Chur has no traffic guidance system, congestion management concept, or other forms of transport telematics. A road capacity management system to the city is not yet in place, but such a system is scheduled to be approved in the near future. The historical centre and some residential areas have restricted access for vehicles. Even though there is no management or logistics concept for transporting goods to the city, access for commercial vehicles is restricted in the historical centre as well.

In Chur, busses and railways (on the road) have the right of way at crossroads and further prioritisation measures are being planned and/or underway. Furthermore, there are separate lanes for busses and an operational control system for urban public transport. There is no special mobility management concept for firms and industrial zones, only for exhibitions and events.

There are many bicycle lanes on main roads, but no prioritisation of bicycles at traffic lights. Moreover there are bicycle storage facilities on both sides of the railway station and additional bicycle stands in the city centre.

One goal of the city's settlement and transport plan is to establish a 30 km/h speed limit throughout the area, except on the main roads.

#### **4.7. Parking management**

Chur is planning a city-wide parking space management concept that gives preferential treatment to residents. Parking fees are levied by time, and large companies that are a major source of traffic are required to pay a special tax.

Although there is no parking management system in the city centre at this time, there are plans for such a system, affecting some 1,600 parking spaces. While Chur has a total of 1,800 parking spaces in multi-storey car parks in the city centre, the total number of parking spaces in area is approx. 34,000, of which approx. 5,000 are in the city centre.

#### **4.8. Traffic integration**

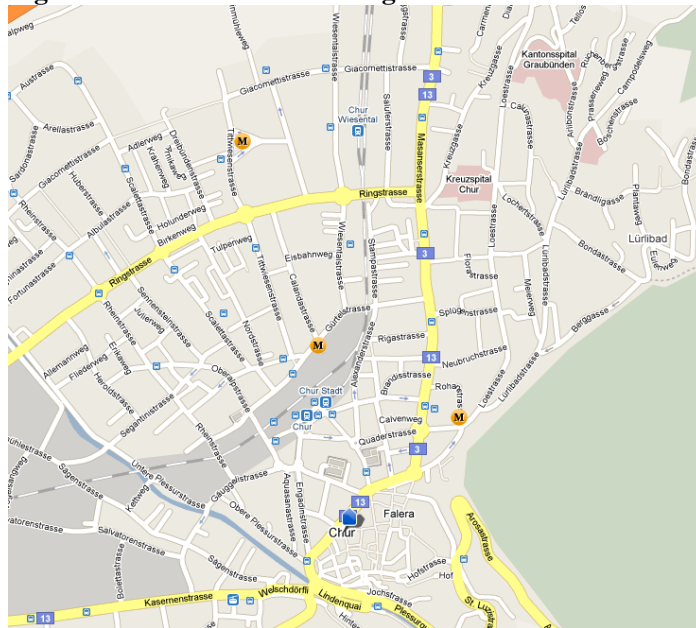
A main target of the Conurbation Programme is to align urban planning and development with mobility and traffic requirements. The new bike-and-ride facilities at public transport stations and systems to transport bicycles in busses are examples of intermodal transport planning as foreseen under the Conurbation Programme.

Chur is similar to Lugano in terms of design of its public transport network. Although all fares are now integrated in the Trans Reno, there is no transport association or joint public transport management authority at this time.

There are plans to extend park-and-ride facilities into all regional centres. Chur currently has one park-and-ride station next to the E43 (A13) motorway exit no. 17 (Chur south), which connects to the city centre with bus no. 2.

Chur has three car-charging stations with thirteen vehicles of eight types. They are located as follows (marked with "M"):

**Fig 13: Location of car-sharing stations in Chur**



Source: [www.mobility.ch](http://www.mobility.ch)

In Chur, visitors and residents can hire 15 bicycles from Rent-a-Bike, a national provider. The bicycles (ten country bikes, four e-bikes and one children's bicycle) can be picked up and returned at the railway station or at any other Rent-a-Bike station in Switzerland.

#### **4.9. Mobility information**

A new information centre on urban and regional public transport for tourists has been in operation at the main station since November 2006, the result of the initiative by two public transport companies (bus and train) and the Chur tourism organisation. It also features a booking service for hotels, etc.

Chur offers no specific information on mobility for new members of the community, nor is there a telephonic service for general mobility information. Furthermore, there is no specific mobility management concept for companies/employers.

*Stadtbus Chur AG* uses a mobility management concept during exhibitions and other events; however, it organises no regular general information campaigns.

Chur has real-time public transport displays and schedules and offers real-time information by cell phone.

## 5. Conclusion

Lugano features an elaborate and comprehensive regional transport concept, even though average income is somewhat below the national average. Although the modal split of individual motorised traffic and the number of vehicles per 1,000 inhabitants are quite high, a number of measures for public transport, walking and cycling are being planned or have been implemented. The fact that Lugano suffers from a very intense urban sprawl poses a special challenge when it comes to reducing the use of individual motorised traffic and promoting other means of transport. Nevertheless, a main target of the regional transport plan is to facilitate public transport and improve the network of bicycle lanes. The city centre is restricted for pedestrian use and the corresponding infrastructure is safe and adequate. There are information panels at all important locations, with directions to different points of interest, and access for commercial vehicles for deliveries is strictly limited. The network for walking is not yet well developed and will require additional resources. Lugano does not have a well developed network for cycling and is a rather dangerous and inconvenient for cyclists. Most streets in the neighbourhoods have a 30 km/h speed limit. The city is easily accessible by train and plane and there are direct connections to Italy. Although there is little congestion on the highways, traffic along the other two main axes has long since exceeded capacity. Lugano also suffers from the fact that all east-west traffic must pass through the city. The regional railway systems have been improved significantly in recent years. Busses have priority on three main crossroads in the urban area, but there are only a few bus lanes. Some fast bus routes connect the park-and-ride platforms directly with the city centre. The city centre has a number of real-time displays, and Lugano Bus Company has started to install units in the surrounding area. Lugano has ten charging stations for electric cars, and two car-sharing stations with 15 cars. According to the Swiss Federal Office for the Environment, Lugano exceeded the maximum allowable concentration of fine particles (PM10) and nitrogen dioxide in 2007. It also exceeded the one-hour limit for ozone (mean 2004 – 2006).

Lucerne is quite densely populated and has only around 450 vehicles per 1,000 inhabitants. The share of individual motorised traffic is quite low, and many commuters use the public transport system. Individual motorised traffic into the city centre is regulated by a dosage system. Most streets in the town, except main roads, have a 30 km/h speed limit. Busses in Lucerne have separate lanes in the heavily used sections, and they have priority at some crossroads. There is a transport association in the greater Lucerne area. For important events and functions at the Swiss Transport Museum, there are tickets that combine train fare with admission to the event or museum. Unfortunately the mobility management concept for firms and industrial zones remains at a basic level. The railway system in Lucerne is operating almost at capacity. Furthermore, Lucerne has no direct international connections. The city has a comprehensive parking management system, and all multi-storey car parks are connected to a real-time information system posting the number of available spaces. Nevertheless, there is no additional real-time information system for individual motorised traffic. At the municipal planning authority, a planer is responsible for institutionalising walking and cycling within the city. The city centre has a well marked network to tourist sites; however, it covers only a very small area and does not include all the relevant points of interest. The network for cycling paths is being realised slower than was originally planned. The Lucerne railway station has bicycle rental shop, and there is a city-wide bicycle renting system with many stations. Lucerne has 32 car-sharing stations with a total of 80 cars, and the system is quite heavily used. Lucerne is about to implement a lighting design ("*plan lumière*") in the city centre and some neighbourhoods. So far, Lucerne does not have strategy for electric mobility. Lucerne exceeded the concentration of PM10 and nitrogen dioxide in 2007, the maximum allowable concentration. The one-hour limit of ozone was also exceeded (mean 2004-2006).

Chur has a relatively high population density and a strong concentration of retail outlets in the city centre, and its rate of the public transport use is remarkably high. Moreover, according to the regional transport plan, walking and cycling are of high priority. Unfortunately there is no representative from the municipality assigned to manage a non-motorised traffic concept. In the city centre, few cycling trails are signposted and hardly any of them are separated from the other city traffic, although there are bicycle lanes on the main roads. Moreover there is no prioritisation of bicycles at traffic lights. There are two bicycle storage facilities, bike-and-ride facilities at public transport stations, and a rent-a-bike station. There is no official in-line skating network in the city. The city centre is easily accessible for motorised traffic, except for the pedestrian zones. Moreover, there is restricted access for commercial vehicles in the historical city centre. The settlement and transport plan prescribes a 30 km/h speed limit throughout the area, except for the main roads. The park-and-ride facilities are well connected with busses to the city centre. Although Chur has a dense network of railway lines, there are no direct international connections. Nevertheless, accessibility of Chur is slightly above the mean found in other European regions. City busses have separate lanes, and both busses and railways, some of which share normal roads, have priority at crossroads. In Chur there are three car-sharing stations with a total of thirteen cars, and there is one charging station for electric cars. No traffic guidance, congestion management, or parking management system exists at this time, and there is no special mobility management concept for firms and industrial zones. There is a new information centre for urban and regional public transport at the railway station, and real-time information on public transport is available by cell phone. Chur also exceeded the concentration of PM10 and the maximum allowable concentration of nitrogen dioxide in 2007. The one-hour limit of ozone was not exceeded (mean 2004-2006).

To conclude, all the three cities analysed in this study are moving in the right direction when it comes to sustainable transport and mobility management. However, further effort is required to reach the important stages on the way to this worthwhile goal.

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- Interview with Pius Stadler, traffic planner for Chur.
- Interviews with Roland Koch, Building Department of the City of Lucerne.

## Appendix

Table A1: Criteria concerning general conditions of transport

Domain	Criteria
Population	Population of core city
	Population of urban area
Aggregate income	Aggregate income per inhabitant (canton)
Originators of traffic	Number of jobs in the city and labour force
	Important employers and most important working areas
	Number of students
	Number of tourists per year
	Tourist activities and origin of tourists
	Population during day (if known)
	Importance of retail business, most important locations
Transit traffic accessibility	Importance of transit traffic
	At European level by rail
	Direct trains from European origins
	Direct trains to the airport
	Ratio of travel time with train versus car to other Swiss towns

Table A2: Criteria concerning transport policy and planning/traffic management

Domain	Criteria
Transport policy	Key elements and focus of transport policy in the city and the urban area
	Importance and contents with regard to walking and cycling
	Planned measures (projects) in transport planning for the next five years (realisation)
Modes of transport	Modal split
Traffic management on roads	Traffic guidance system
	Capacity management on roads to the city (dosage)
	Congestion management
	Other forms of transport telematics
Traffic management for urban transport of goods	Limited access for vehicles (in time)
	Management for urban transport of goods
	Limited access for lorries (in time or space)
Traffic management for public transport (PT)	City logistics system
	Priority for busses and tramways at crossroads
	Separate lanes for busses and tramways
	Operations control system for urban PT
	Mobility management schemes for firms and industrial zones
Mobility management for other originators of traffic, such as events	



Table A2 – part 2: Criteria concerning transport policy and planning/traffic management

<b>Domain</b>	<b>Criteria</b>
Traffic management for cycling	Bicycle lanes on roads
	Infrastructure for bicycles: parking spaces, service and maintenance utilities
	Rental of e-bicycles
	Network scheme for walking
Parking management	Extension of the area of parking fees
	Differentiation of parking fees in space and time
	Taxes for important originators of traffic such as big employers, universities, hospitals etc.
	Established parking management system, included parking space
	Number of parking spaces in multi-storey car parks
	Number of parking space in the urban area and city in total
Car-sharing	Car-sharing: sites and number of cars
Electrically powered car	E-car plug-in sites
Transport expenses	Transport expenses (traffic on roads, public transport)
Integrated transport planning	Integration of urban planning and development of mobility and traffic (integrated scheme)
	Intermodal transport planning, intermodal mobility schemes
Integration within public transport (PT)	Integration of fares of different public transport companies
	Organisation of the PT in a transport association or in a joint PT management authority
	Integrated ticket sales
Interface management	Consideration of walking and cycling at bus transport terminals and railway stations with special schemes
	Priority of park-and-ride
Institutionalisation of walking and cycling	Member of the municipality designated for walking and cycling issues
	Strategy to develop walking and cycling
Mobility consulting	Established mobility centres in city area
	On-site mobility centres (firms, event sites)
	Mobility consulting by phone
	Intermodal media in mobility consulting, such as website or mobility map
	Mobility information of newcomers
Information	Information campaigns by the local public transport provider on a regular basis
Information on PT	Real-time display at stops, real-time timetables
	Real-time information on the mobile phone
Driver information (passenger cars)	Occupation rate in multi-storey car parks
	Dynamic traffic management system (from superior into the local road network)
	Dynamic information on congestions (in the road)
	Road information on the mobile phone

Table A3: Criteria concerning accessibility

<b>Domain</b>	<b>Criteria</b>
Accessibility	At European level by rail
	Direct trains from European origins
	Direct trains to the airport
	Ratio of travel time with train versus car to other Swiss towns
	Accessibility to city centre from outer part of town