Research for TRAN Committee - Transport in California

1. OVERVIEW

California: 4.4% of the area, 12.2% of the population and 14% of the GDP of the United States:

With nearly 40 million residents, California is the most populous state in the North American federation. Its population is growing at a rate that has currently stabilised at around 1% per year (+9 % between 2006 and 2016, i.e. over 3 million new residents) and is concentrated in the major urban coastal areas, leaving a vast part of the state almost deserted (the county of Los Angeles has over 10 million residents; the county of Alpine has barely 1 000).2

California is also the richest state in the Union. In 2016, its GDP in volume (USD 2 301 billion) was equivalent to that of the United Kingdom, making it equal to the fifth largest world economic power. In the same year, economic growth (+2.9 %) was higher in California than at federal level (+1.5 %)3. The unemployment rate (4.7% in June 2017) is, on the other hand, comparable to the national average (4.4%), and has dropped sharply since its peak in 2010. The transport and warehousing sector (including postal services) employs nearly 530 000 people in California (45 000 of whom work in public transport), representing 3% of the state’s total labour force4.

Strong transport demand and predominance of road transport:

Economic and demographic dynamism are generating a strong demand for transport. In 2015, the ports of Los Angeles and Long Beach were the largest and second largest container ports, respectively, in the United States (with Oakland port ranked eighth)5. In 2016, Los Angeles airport stood at second place nationally in terms of number of passengers flown, and in fourth place worldwide, while San Francisco airport was seventh nationally.6 In the same year, the Los-Angeles-San Francisco air route was the second busiest in the country7.

Globally, the impact of the 2008-2009 recession on mobility has been eliminated, following economic recovery from 2010 onward: whereas traffic volumes on Californian roads decreased by nearly 2% between 2007 and 2009, they rose by nearly 5% between 2009 and 2015 (the trend is similar for the US as a whole).

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1 In 2016.
2 Public Policy Institute of California (2017) and California demographics by Cubit (2017). It should also be noted that there are over 5 million people living in rural areas.
3 US Bureau of Economic Analysis
4 California Employment Development Department. The Californian minimum wage is currently USD 10.50 per hour. (In 2016, the average wage in industry was USD 21.90 per hour).
5 However, these two entry points for Asian imports were threatened by the enlargement of the Panama Canal, which enables charterers to send their goods directly to the eastern ports.
6 California has 12 seaports (11 public and 1 private). In 2015, the ports of Long Beach and Los Angeles were also in seventh and ninth place, respectively, by tonnage, across the nation. Source: American Association of Port Authorities
7 California has nearly 700 airports and heliports, all types taken together, of which 28 are platforms open to commercial traffic. Los Angeles international airport (LAX) has been experiencing very rapid growth in passenger traffic (+30% between 2007 and 2016), but is coming up against strong opposition from local residents opposed to the resulting expansions. Sources: Airports Council International and Federal Aviation Administration
8 Los Angeles-New York and Chicago-Los Angeles are the third and fourth busiest air routes.
Californians (25 million drivers; 33.5 million motor vehicles, of which 24 million are cars, and over 5.5 million are lorries\(^9\)) mainly get around by road, and mainly in cars: of every 100 journeys within state limits, 76 are made by car, 18 on foot or by bike and 5 in public transport. Los Angeles and San Francisco are therefore, respectively, the second and third busiest conurbations in the country, behind Washington and ahead of New York. The majority of freight transport within the state (96 billion ton-miles in 2015) is also by road (nearly 80% of volumes transported), followed by oil pipelines (17%) and train (3%). Trade with the rest of the country follows the pattern of national modal distribution, with road transport predominant, as shown by the following graphics:

\(^9\) As at 1 January 2015. (Source: CALTRANS)
The share occupied by public transport is not growing much:

Cars remain the preferred means of locomotion but, in California as in the rest of the country, car transport decelerated between 2004 and 2013, mainly to the benefit of soft transport modes (walking and cycling) and slightly to the benefit of public transport. The number of passengers per year in public transport thus grew by more than 11% between 2003 and 2015.

Source: California Transit Association

However, this increase should be seen in context: over the same period, the state’s population grew by over 10%. In fact, changes in habits over recent years have not been sufficient to significantly change modal distribution. Once the overall increase in the number of journeys has been taken into account, the public transport share is revealed to be stable.

Source: US Census Bureau, American Fact Finder, Means of Transportation to Work

10 The annual average distance travelled by US car drivers fell by 6.6% between its maximum in 2004 and 2013. It started to increase again in 2014 (+0.9%), after nine consecutive years of decline. Of each 100 journeys made inside California in 2000, 86 were made by car or motorbike, and 2 by public transport. In 2010, the corresponding proportions were 76 and 5. Source: 2010-2012 California Household Travel Survey (2013)

11 This increase was more marked for rail transport, but bus and coach remain by far the most popular public transport means. There are sometimes very heated battles between advocates of the bus and of rail (Los Angeles and San Francisco have experienced some), with ‘pro-bus’ leaders positioning themselves as defenders of the most disadvantaged sections of the population. On this topic, see: Bénit-Gbaffou Claire, Fol Sylvie, Pflieger Géraldine, ‘Le front anti-métro en Californie. Controverses autour des politiques de transport en commun’, L’Espace géographique, 2007/2 (Volume 36), p.115-130. DOI: 10.3917/eg.362.0115. URL: http://www.cairn.info/revue-espace-geographique-2007-2-page-115.htm
Investment in public transport is significant:

This nearly constant picture of modal distribution is seen at a time when, since the 1990s, local and regional authorities have invested significantly in public transport (and particularly in urban rail systems). This investment has been further accelerated by policies to reduce greenhouse gas emissions. However, with the notable exception of San Francisco, these efforts have not so far attracted the hoped for numbers of travellers, particularly to rail.

In Los Angeles, for example, considerable investment has been made since the early 1990s in the regional rail network (METROLINK) - but it was less well used in 2016 than in 2007 (-4.3%)\(^{13}\). In the more central parts of the city, development of the light rail network is accompanied by an increase in use, but also a decrease in bus use: in the final analysis, despite the increased population and the millions of dollars invested, the number of passengers has not increased. The same applies in the San Jose region\(^{14}\), where the number of travellers has fallen dramatically despite significant investment (more than USD 2 billion) in light rail (which does not serve the headquarters of the major hi-tech companies). As for light rail in Sacramento, the state capital, it has lost a third of its passengers since 2009 and is planning, as an economy measure, to temporarily close one of its lines which carries, on average, only 440 passengers a day! San Francisco has always been an exception, with its regional rail network, the ‘Bay Area Rapid Transit’ (BART) which, in 2016, carried 47% more passengers than in 2003\(^{15}\).

Despite the disappointing results achieved to date, investment in public transport is not expected to suffer, because it forms part of combating greenhouse gas emissions (GES), an area where California wants to be at the forefront. In 2011, the California Transport Commission estimated that a third of investment in the state’s transport system should be made in public transport (including inter-city trains) for the 2011-2020 period\(^{16}\). The Bay Area Metropolitan Transportation Commission, which plans transport in the San Francisco region, is set to allocate over 60% of its investments to it in the decades ahead. The Southern California Association of Governments (which includes Los Angeles, among others), evaluates the proportion at 47%. As for the state’s authorities, they plan to allocate to public transport 15% of the amounts invested under the Road Repair and Accountability Act adopted in 2017, i.e. nearly USD 8 billion\(^{17}\).

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\(^{12}\) Urban transport comes mainly under the responsibility of local and regional authorities (cities and counties). In agglomerations of more than 50 000 residents, the relevant authorities must cooperate within ‘Metropolitan Planning Organizations’ (MPOs), which are responsible for planning the organisation of transport. There are 18 MPOs in California. The Metropolitan Transportation Commission (MTC) is the agency responsible for planning, financing and coordinating transport for the nine counties in the San Francisco region (San Francisco Bay Area). For more information: [https://mtc.ca.gov/about-mtc/what-mtc/what-we-do](https://mtc.ca.gov/about-mtc/what-mtc/what-we-do)

\(^{13}\) Source: METROLINK, Annual financial report 2016

\(^{14}\) See, for example: The Mercury News, 25 years later VTA light rail among the nation’s worst (26.12.2012)

\(^{15}\) All the traffic data, broken down by transport organising authority, are available at: Federal Transit Administration, Table TS2.1. Some valuable information has also kindly been provided by Marc Levinson, from the Congressional Research Service.

\(^{16}\) California Transportation Commission, 2011 Statewide Transportation System Needs Assessment

\(^{17}\) The Road Repair and Accountability Act establishes a programme of upgrading for Californian transport infrastructure, and it has been allocated USD 54 billion over 10 years (2018-2027), half of which will be provided by the state, and half by the local authorities. Financing arrangements will be put to a referendum in November.
In addition, the California State Rail Plan, adopted in 2013, provides for the modernisation of the whole of the state’s rail network, to improve its performance and appeal. The plan envisages, for example, total integration of the local, regional and inter-city networks, including timetabling and ticketing. Above all, by 2029, a high-speed train (travelling at 350 km/h) is set to (gradually) link San Francisco to the south of Los Angeles (Anaheim), a journey of over 800 km, in less than 3 hours (compared to the 11 hours plus required currently, because the rail link is not continuous, and part of the journey has to be made by road). The line could then be extended to Sacramento (in the north) and San Diego (in the south). It would also be integrated into the state’s rail system. However, the construction of this high-speed line, which is a first in the United States, has already been significantly delayed and is much criticised (although the Californians adopted the principle in 2008, by referendum). Environmental impact studies are yet to be carried out, and the high degree of earthquake-proneness of the zone between Bakersfield and Los Angeles appears to raise technical problems that have not yet been resolved. Finally, it is now estimated that the cost of the line will be over USD 60 billion, but it is unclear where the necessary funds will come from.

2. THE FINANCING OF TRANSPORT INFRASTRUCTURE

Source: California Transportation Plan 2040, Appendix 6.
Note: The share of the local authorities includes revenue from the public transport systems.

Most of the infrastructure is public and free:

Californians, like other Americans, seem to be attached to public ownership and management of transport infrastructure - and the efforts of successive administrations, both federal and local, that have mounted many initiatives to attract private investors, have to date been of little effect. This infrastructure remains almost exclusively financed by public funds (with the notable exception of the rail network for freight transport, which is entirely private) and there is rarely a charge for usage (in addition, in theory infrastructure which benefits

18 Three inter-city rail lines serve the state (Pacific Surfliner, San Joaquin and Capitol Corridor). Their traffic, taken together, has been at a standstill, at around 5.5 million passengers/year, for several years, despite significant and ever-growing operating subsidies (nearly USD 120 million in the 2014/2015 tax year). See: California Transportation Commission, 2016 Report to the California Legislature.

19 The California High-Speed Rail Authority.

20 See, for example: Los Angeles Times (‘California’s bullet train is hurtling toward a multibillion-dollar overrun, a confidential federal report warns’) and, in ‘response’, Streetsblog CAL (Will L.A. Times’ Irresponsible Coverage of High Speed Rail Doom the Project?).

21 The plan approved by the Californians in 2008 provided for the issue of bonds amounting to USD 10 billion. The operation of (future) high-speed services also raises questions, since the project, as adopted, stipulates that the high-speed train operators shall not receive any public subsidies.

22 This freight company network is also used for the majority of passenger services. It is interesting to note that, until the start of the 20th century, many roads in the north-east of the United States were private toll roads.

23 In 2014, in the US, toll infrastructure generated USD 14.4 billion, representing approximately 5% of the total annual cost of the transport infrastructure (construction, operation and maintenance). That proportion has remained stable for more than half a century. For a full description of the current situation, see: Congressional Research Service, Tolling U.S. Highways and Bridges (2017).
from federal funds cannot charge for use - but many exceptions have been made to the rule in recent years). Thus, in 2013, of the 175 000 miles of (all kinds of) roads in California, only 135 miles were toll roads (as well as eight bridges and a car-ferry service)\textsuperscript{24}.

The major issue continuing to dominate transportation policy is obtaining adequate, reliable funding to keep up with the state’s growing transportation needs\textsuperscript{25}

In California, as in the US as a whole, it is federal and local taxes on fuel that make up the backbone of the system for funding transport infrastructure. Over time, however, inflation, the improvement in vehicle energy performance and a decrease in road traffic (between 2004 and 2013) have reduced this resource, so that it was no longer sufficient for the maintenance of existing infrastructure and the development of new infrastructure. That was the cause of the notorious ‘infrastructure crisis’ that central government and the individual states are working to resolve, and are doing so effectively\textsuperscript{26}.

In California, as in the rest of the country, there is a need for new sources of financing, including, in particular, the use of private investment (which is still unusual). In many Californian counties, the revenue from ‘special levies’ and bonds issued by the state now exceeds that deriving from fuel taxes. However, these resources are not necessarily sufficient, nor stable, particularly since they are often dependent on decisions taken by voters. Thus, between July 2015 and July 2016, the additional taxes on fuel levied by the state of California were reduced by 8.2 cents per gallon by the State Board of Equalization\textsuperscript{27}.

In this context of inadequate financial resources, it is interesting to note that approximately a quarter of the nation’s public investment in its transport infrastructure goes to public transport. In California, the proportion amounts to as much as a third, with the implementation of the California Global Warming Solutions Act of 2006, the state’s plan to combat greenhouse gas emissions. This investment is therefore not going into the roads - which transport the majority of passengers and goods.

USA: Direct public investment in transport infrastructure in 2014, in USD billions and % of GDP\textsuperscript{28}

<table>
<thead>
<tr>
<th></th>
<th>Federal State</th>
<th>States/Counties</th>
<th>Total</th>
<th>% of US GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads, bridges, tunnels</td>
<td>46</td>
<td>118</td>
<td>164</td>
<td>0.96%</td>
</tr>
<tr>
<td>Land-based public transport</td>
<td>15</td>
<td>54</td>
<td>69</td>
<td>0.40%</td>
</tr>
<tr>
<td>Aviation, including airports and air navigation</td>
<td>16</td>
<td>19</td>
<td>35</td>
<td>0.21%</td>
</tr>
<tr>
<td>Transport by water, including ports and inland waterways</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>0.06%</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>197</td>
<td>278</td>
<td>1.63%</td>
</tr>
</tbody>
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\textsuperscript{24} Nevertheless, California has on several occasions been a pioneer in this area: in 1995, it introduced a traffic-based road-pricing scheme (State Route 91 - Orange County), and since 2011, in San Francisco, SFpark has been the first operator in the country to automatically adjust the price charged for parking in line with occupation levels. However, recent efforts by the authorities to encourage the construction of toll roads have met with no success. Operators have run into financial problems (one even went bankrupt [South Bay Expressway in San Diego]), and they are now calling for the state of California or local authorities to take on the financial risk where traffic does not meet expectations. A similar debate is taking place nationally.

\textsuperscript{25} California Transportation Commission, Annual Report to the California Legislature 2016, (page 10).

\textsuperscript{26} 16% of Californian roads were in poor repair in 2015, as compared to 28% in 2005 (Source: CALTRANS).

\textsuperscript{27} The State Board of Equalization is the committee responsible for tax in the state of California. This is the only such body in the United States whose members are elected by direct universal suffrage.

\textsuperscript{28} These amounts do not take account of tax exemptions granted by central government and local authorities to encourage private investment. See: Congressional budget office, Public Spending on Transportation and Water Infrastructure, 1956 to 2014 (2015)
Federal financing:
Federal government assumes about 40% of public investment in transport infrastructure. Since 1956, it has been financing the road network through the **Highway Trust Fund** (HTF). Since 1983, the HTF has also financed public transport infrastructure (except for ports and airports). The fund is mainly constituted by federal fuel tax - which has remained at the same level since 1993, at 18.4 cents per gallon\(^29\). The fund’s income has thus been eaten away by inflation\(^30\), reduced by the improvement in vehicle energy efficiency and regularly impacted by cyclical downturns in road traffic. Thus, since 2008, it has been necessary for the HTF to receive additional funds from the federal budget, since Congress has proved reluctant to increase fuel tax. The **Fixing America’s Surface Transportation Act** (FAST) of 2015 temporarily ‘fixed the problem’ by authorising the transfer of USD 70 billion from the federal budget to the HTF between 2015 and 2020\(^{31, 32}\). It should also be noted that the Trump administration is to allocate nearly an additional USD 1.5 billion for the rebuilding of roads and bridges, through the **Infrastructure for Rebuilding America Program** (INFRA)\(^33\).

Since 1998 there have also been two federal loan and guarantee instruments for supplementing/guaranteeing private investment: (1) the **Transportation Infrastructure Finance and Innovation Act** (TIFIA\(^34\)) and (2) the **Railroad Rehabilitation & Improvement Financing Program** (RRIF\(^35\)). Also with the aim of encouraging private investment, there is a programme (with funding of USD 15 billion) permitting exemptions from federal tax on the yield of bonds to finance certain types of land transport.

The 3 300 airports\(^36\) which form part of the ‘national airport network’ can benefit from federal subsidies through the **Airport Improvement Program** (AIP). The AIP (approximately USD 3.5 billion per year of which, in 2015, USD 247 million went to Californian airports) is mainly financed by the **Airport and Airway Trust Fund**, which receives various taxes on aeronautic activities (taxes on tickets, freight, fuel, etc.)\(^37\).

Inland waterways included in the ‘national network of waterways’ and ports benefit from the **Harbor maintenance trust fund** (HMTF) which is financed through a tax of 0.125% on the value of maritime freight and cruise tickets\(^38\). This fund finances maintenance work, but not new infrastructure, which is directly subsidised by the federal

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\(^{29}\) A tax of 24.3 cents per gallon is levied on diesel, but it is used very little by Americans, who primarily use it in heavy duty vehicles. The scandal provoked by Volkswagen’s cheating is expected to lead to the almost total disappearance of diesel for private cars: in April 2017, 9 313 diesel cars and light vehicles were sold in the US, i.e. 0.66% of sales for vehicles of this type (See: HybridCars). Approximately 10% of the HTF’s income comes from ancillary resources, including an additional tax of 0.1 cent per gallon of fuel which is allocated to the federal Environmental Protection Agency, and to combat pollution caused by hydrocarbons. The two branches of the HTF (roads and public transport) have separate accounts, and the branch for the road network has most of the funds (approximately 80%). (See: Congressional Research Service).  
\(^{30}\) Between 1993 and 2016, tax revenue lost 30% of its buying power.  
\(^{31}\) Thus, in total, approximately USD 144 billion will be transferred from the general budget to the HTF between 2008 and 2020. It should be noted that, as the economy has recovered, fuel sales have started growing again, reaching a peak in 2016.  
\(^{32}\) At the same time, Congress has initiated a review of changes to be made to the system for financing transport infrastructure. Several of the options envisaged are set out in detail in: Congressional Research Service, Funding and Financing Highways and Public Transportation (2016). For a full survey of the road network and its funding, see: Congressional Budget Office, Approaches to Make Federal Highway Spending More Productive (2016)  
\(^{33}\) US Department of Transportation, Build America Bureau  
\(^{34}\) The TIFIA may fund up to a maximum of 33% of the cost of the relevant infrastructure.  
\(^{35}\) The RRIF may fund, at a low rate, up to 100% of the cost of rail infrastructure.  
\(^{36}\) Of a total of over 19 000 airports, all types taken together, in national territory. Of the 3 300 airports in the network, only 77 are private, and the others belong to the local authorities. An indication of the preference for public infrastructure: just one airport has been privatised as a result of the 1996 Airport Privatization Pilot Program.  
\(^{37}\) The major airports in the network are mainly self-financing (fees, revenue from aeronautic activity and investments from the companies operating there). Between 2009 and 2013, the AIP covered, on average, 15% of investment in major airports and 69% of investment in secondary airports with less significant commercial activity. See: US Government Accountability Office, Airport Funding (2017)  
\(^{38}\) Over 90% of tax revenue is generated by imported goods. The tax is not levied on goods exported by water, following a judgment by the Supreme Court in 1998.
budget\textsuperscript{39}. The 19 200 km of inland waterways receive funding from the \textit{Inland Waterways Trust Fund} (IWTF), which is financed by a tax on fuel paid by boats using these canals and rivers (none of which is located in California).

**Local financing:**

The federated states and (primarily) local authorities (cities and counties) assume responsibility for approximately 60\% of public investment in transport infrastructure, using the financial instruments of their choice (additional taxes on fuels\textsuperscript{40}, vehicle taxes, toll infrastructure \textsuperscript{41}, etc.). One of the interesting initiatives is the \textbf{mileage-based tax currently being tested in Oregon and the state of Washington - and on which preliminary work is being done in California}\textsuperscript{42}. The majority of states (including California) have also put in place public banks to guarantee the loans of private investors to transport infrastructure. However, the main resources of states and local authorities are now:

1. Issues of bonds whose revenue is exempt from federal and local taxes: through this exemption, local authorities may offer interest rates that are lower than market rates and thus gain access to long-term cheap credit. This easy access to cheap credit is also the main explanation for the low take-up of public-private partnerships (PPPs). These remain rare, despite the encouragement from successive federal administrations, which see them as a way to mitigate the burden on the HTF\textsuperscript{43}. (Scarcely 0.5\% of the amounts invested in road infrastructure over the past 25 years have been through PPPs - but the trend is accelerating, as two thirds of this amount has been invested in the last five years\textsuperscript{44}). It should be noted that in 1989 California was the first state to equip itself with enabling legislation for PPPs.

2. The \textbf{Half Cent Sales Taxes}, which are the additional taxes of 0.5\% on all commercial transactions, levied by a city or county to finance specific projects in that city or county. This type of tax is flourishing throughout the country. In many Californian counties, the \textbf{Half Cent Sales Taxes (which have to be approved by two thirds of voters)} constitute the main source of financing for transport infrastructure (the \textit{Southern California Association of Governments} projects, for instance, that the sales taxes will cover 52\% of the funds it plans to allocate to transport between 2016 and 2040\textsuperscript{45}).

The \textbf{Cap-and-Trade} programme should also be mentioned. This aims to reduce greenhouse gas emissions by the main emitters in California (-2\%/year in 2013 and 2014, and then -3\%/year between 2015 and 2020)\textsuperscript{46}. This programme establishes a scheme for selling emissions permits. The revenue from sales is, in part (40\% in 2016), allocated to the financing of public transport. Transport fuel manufacturers are subject to \textit{Cap-and-Trade}.

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\textsuperscript{39} Congressional Research Service, \textit{Harbour maintenance finance and funding} (2013)

\textsuperscript{40} Additional taxes applicable in California, per gallon: petrol: 42.35 cents; diesel: 39.38 cents. \textbf{These are the highest additional taxes in the country.} The Californian constitution stipulates that fuel tax revenue may only be used for road transport.

\textsuperscript{41} The arrangements for infrastructure charging are a matter for the individual states. There is no federal jurisdiction relating to this subject. The states are therefore free to adjust charges to give preference to their residents.

\textsuperscript{42} \textbf{These tests have highlighted the difficulties and the cost of the collection of the taxes. Above all, the tracking of vehicles is seen as an intrusion on privacy.} Thus, GPS technologies have been banned during the current stage of testing in Oregon (where the tests started in 2006) and a similar scenario is envisaged in the preliminary work being done in California. For further details, see: Congressional Research Service, \textit{Mileage-Based Road User Charges} (2016). For California, see: California Road Pilot Charge Program. European car drivers will note with envy that these mileage-based taxes are set to replace fuel taxes, not to be introduced alongside them!

\textsuperscript{43} Details in: US Department of Transportation, \textit{Successful practices for P3s} (2016)

\textsuperscript{44} Council on foreign relations, \textit{Road to Nowhere} (2016)

\textsuperscript{45} Southern California Association of Governments, \textit{2016-2040 Regional Transportation Plan}

\textsuperscript{46} California Air Resources Board, \textit{Cap-and-Trade Program}
3. COMBATING GREENHOUSE GAS EMISSIONS CAUSED BY TRANSPORT

The transport sector is the leading source of greenhouse gas emissions in the state\(^7\) (nearly 40% of the total), and the majority (88%) of its emissions come from road transport\(^8\).

Greenhouse gas emissions in California, broken down by sector of activity, in 2015

As a general rule, greenhouse gas emissions from transport are decreasing at the same rate as those from other sectors (-5.6% between 2000 and 2015, compared with -5.7% for the Californian economy as a whole). Their share of total emissions is therefore fairly stable (it has risen slightly as a result of the strong recovery in road transport since 2013\(^9\)).

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\(^7\) Road transport is also the leading source of emissions of NO\(_x\) (80%) and particulates (95%) in California.

\(^8\) In 2000, the share of road transport was 90.5%. In addition to the improvement in vehicle energy efficiency, the increasingly intensive use of biodiesel by lorries accounts for the fall of this proportion to 88% in 2015, despite the strong upswing in road traffic since 2013. This use of biodiesel is mainly the result of the **Low Carbon Fuel Standard Program** which makes a decrease in the carbon content of fuels mandatory. In 2016, California consumed 40 million gallons of biodiesel.

\(^9\) The return of vigorous economic growth and the fall in fuel prices have led to a strong upswing in road transport. As a result, emissions from transport rose by 3.9% between 2013 and 2015.
California wants to be at the forefront of combating global warming. Its economy is one of the least energy-intensive in the country\(^50\) and it has set itself more ambitious greenhouse gas emissions reduction targets than those of central government\(^51\).

### The state of California’s greenhouse gas emissions reduction targets:

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<th>2020</th>
<th>2030</th>
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<tbody>
<tr>
<td>1990</td>
<td>431 million t CO2eq</td>
<td>= 1990 - 40%</td>
<td>= 1990 - 80%</td>
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To that end, the transport sector has been given the target of halving its fossil fuel consumption between 2016 and 2030 through: (1) a decrease in the carbon intensity of fuels (the Low Carbon Fuel Standard (LCFS) already mandates a decrease in the carbon intensity of oil-based fuels of 8.2% between 2016 and 2020); (2) a decrease in road traffic and an improvement in the efficiency of the transport system as a whole; (3) the use of cleaner vehicles in all modes of transport.\(^52\)

It is within this context that the flagship Zero Emissions Vehicle Program has been put in place. This programme, which has been copied by nine other states, creates a (complex) mechanism\(^53\) to compel car manufacturers to make an increasing proportion of the vehicles they put on the market zero emission (ZEVs). Through this scheme, **by 2025 approximately 8% of vehicles sold in California should be ZEVs**\(^54\). (In 2016, 3% of vehicles sold in the state were ZEVs, compared with less than 1% for the US as a whole).

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\(^{50}\) In 2015, total energy consumption per resident in California was 35% lower than the national average. Only Rhode Island and New York did better.

\(^{51}\) The national contribution to which the United States committed at COP 21 set the following targets: by comparison with 2005 emissions: -17% by 2020 and -26% to -28% by 2025.

\(^{52}\) See: California Air Resources Board, [Economic Sectors Portal](https://www.arb.ca.gov/)

\(^{53}\) For a good summary, see [ucususa.org](http://ucususa.org). Each manufacturer can buy or sell ‘credits’ in line with the performance of all the vehicles it sells. Tesla, which only sells ZEVs, would thus have reaped over USD 600 million by selling environmental credits to its ‘traditional’ competitors. Currently, there are 3 000 charging points in California for electric vehicles and 20 charging points for hydrogen vehicles.

\(^{54}\) Originally, the promoters of the project hoped for (and the manufacturers feared) a target of 15% of ZEVs by 2025. This target had to be almost halved, due to the improvement in performance of the new combustion/hybrid models, since it is the performance of the entire range of each manufacturer that is taken into account.
4. THE DEVELOPMENT OF NEW TECHNOLOGIES

Silicon Valley, the epicentre of new technologies in the US, is overflowing with plans (with varying degrees of feasibility) to improve the environmental performance and efficiency of transport systems. While its entrepreneurs attract expertise and capital with an ease that is at times disconcerting, their start-ups, contrary to what is often suggested, are far from developing outside any framework of rules: the implementation of intelligent transport systems (ITSs) must comply with a federal framework; tests of autonomous land-based vehicles are strictly regulated, as is the use of drones.

Intelligent transport systems:

The Department of Transportation has produced a national framework (which is evolving on an ongoing basis) for the definition, development and implementation of ITSs, including standardisation of the systems (The National ITS Architecture). The framework covers all current ITSs; it details their functions and aims. It serves as a model for local authorities (states - including California - counties, MTOs, etc.) which must use it to produce their own local frameworks (of which there are already over 300 - see, for example, for the San Francisco region, the Bay Area ITS Architecture). Compliance with the national architecture is mandatory for any operator receiving federal subsidies.

Autonomous land-based vehicles:

Regulation of motorised land-based vehicles is shared between central government (which issues safety standards - the Federal Motor Vehicle Safety Standards) and the individual states (which are responsible for the rules on driving and registration of vehicles). As things stand, there is no federal regulation of autonomous vehicles. At most, the tests carried out on them must comply with ‘guidelines’ issued by the Department of Transportation in September 2016. However, 20 states and the District of Columbia have adopted measures (which vary considerably) to regulate tests and/or the use of autonomous vehicles (Michigan and Florida permit them on their roads - which is a moot point since these vehicles are not yet on sale - and certainly cannot be, in the absence of federal safety standards). The federal authorities now wish to legislate, in order to avoid the creation of disparate rules across the country. The (new) safety standards (including cyber-safety standards) would be federal (as for ‘traditional’ vehicles); those relating to the ‘driving’ of the vehicles would remain within the jurisdiction of the states.

California is the state with the highest number of autonomous vehicle manufacturers. Tests on these vehicles are, however, regulated more strictly there than in other states. Thus, for example, autonomous vehicles may be tested on California public roads provided that (1) they possess prior authorisation (issued within 180 days!), (2) there is a ‘driver’ on board, and (3) accidents/incidents are publicly reported. Manufacturers protest that this regulatory framework is too inflexible, and prefer to test their vehicles in states with less rigorous legislation, such as neighbouring Arizona. However, Californian law is in the course of being amended, notably to authorise tests without a driver on board.

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55 Department of Transportation National ITS Architecture. Autonomous connected vehicles are the priority in the federal architecture.

56 On 12 September 2017, the Department of Transportation amended its guidelines slightly, to simplify applications for testing permits.

57 In September 2017, 40 companies were authorised to test autonomous vehicles on public roads in California.

58 In addition, it is also necessary for the counties to authorise any testing of this type on their roads.

59 In the county of Contra Costa (to the east of San Francisco bay), tests of vehicles ‘without a steering wheel, without an accelerator and without brakes’ are permitted on certain public roads.

60 See: California Department of motor vehicles
States which have adopted rules on autonomous land-based vehicles

Source: Congressional Research Service, Issues in Autonomous Vehicle Deployment (2017) (The states underlined in grey have no regulations on autonomous land-based vehicles.)

Drones:

The use of drones is (strictly) regulated by the Federal Aviation Administration (FAA), on the basis of the rules applicable to other aircraft: specific regulations for drones are still under development. Meanwhile, the professional use of these devices has been made possible through derogations from the rules in force. These derogations are issued by the FAA, on a case by case basis. It should be noted that, in fact, the delivery of goods by drone is not permitted, as no derogation from the obligation to keep the device in the line of vision may be issued for operations of such a type.

The states/local authorities have no jurisdiction over the use of airspace, which is a matter for which central government is responsible. They may, however, prevent the takeoff/landing of a drone, or prevent it being flown, from land belonging to them (such as a public park). They may also issue rules to protect privacy and security. In California, it is thus prohibited to use a drone to record images or sound in a private property. However, industry is strongly opposed to local laws which could obstruct its national development, and it finds a friendly approach in California (which is the state with the highest number of drone manufacturers): Governor Brown has on three occasions opposed restrictive measures adopted by the state’s senate (which would have prohibited overflying of fire zones, prisons and schoolyards).

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61 See: FAA

62 In 2012, Congress mandated the FAA to develop specific regulations to incorporate drones into the airspace, while guaranteeing the security and safety of goods and persons, and respect for privacy. These aims are difficult to achieve, and work on the regulations is still in progress (See: Congressional Research Service, Unmanned aircraft operations in domestic airspace).

63 Two draft laws currently being debated in the House of Representatives (H.R. 2997) and the Senate (S. 1405) call on the FAA to develop rules to permit deliveries using small-sized drones.