2005
THE ROAD TRANSPORT SECTOR
Sectoral Report
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Read more about developments in the road transport system and the SRA’s activities in Annual Report 2005

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Introduction

Throughout the years, the focus of the Sectoral Report for the road transport sector has varied greatly, from descriptions of a plethora of parties and measures to in-depth analysis of various long-range trends in the sector. This year’s report is based on a goal analysis of results in relation to the six road transport sector subsidiary goals, and the long-term interim goals that are related to these. We hope that this report will also be useful to SRA operational planning and the annual preparation of the SRA strategic plan, and thus be a part of the long-term efforts to achieve a more efficient road transport system and a more systematic approach.

A range of indicators shows us how the actual outcome is related to the goals, and deal with results that can be directly or indirectly measured against the goals. In those cases where there are no goals that are operational and expressed in measurable terms, the report instead describes the ongoing work of developing these goals.

The SRA’s appropriation letter for 2005 provides that the reporting should also include an analysis of the outcome – in other words, a goal analysis. The goal analysis should include:

- Actions taken by the SRA or other parties that are deemed to have significantly affected the results
- Other external factors that are deemed to have affected the level of goal achievement
- Actions that the SRA or other parties have taken or intend to take due to the 2005 results

Developing goal analysis is a prioritised area for the SRA. At present, however, the access to data and measurements varies, and methods and routines for analysis are of varying quality. There is development in these areas, as described in the Report of Results section.

The Basic Facts section includes a description of the general trends relating to the state of the road transport system.

A Sectoral Report usually focuses on a specific theme. This year’s theme is the environment, as many of the environmental goals were to have been achieved in 2005. The section, Theme: The Environment – an historical review, contains an in-depth analysis regarding these goals.

The report also lists the Government’s other feedback requirements according to the SRA’s appropriation letter for 2005.

The report concludes with Milestones, a compilation of events in the road transport sector in 2005.
This is the first time that goal analysis is so clearly emphasised. By its incisive and self-critical analysis, this Sectoral Report will play an important role in the long-term and systematic efforts for a more efficient road transport system. We continue to base our work on the in-depth analysis that has been done, and continually evaluate goal achievement.

This presents a difficulty, however, as the possibilities of performing a goal analysis vary considerably amongst the subsidiary goals. A complete analysis requires that goals are clearly measurable, and must be achieved by a given time. Generally, the possibilities of performing an analysis are greatest for the environmental and road safety goals, and more limited for the gender equality and favourable regional development goals. Nevertheless, this report, in itself, improves the quality of the goal analysis, and additional improvement in this respect is one of the SRA’s prioritised areas.

There were several examples of favourable trends in the road transport sector during the year. One is the decrease of the number of traffic fatalities from 480 to 440. This decrease is due to the SRA’s investment in median barriers and increased police surveillance, as well as the introduction of speed restricting measures by many municipalities and the development of safer vehicles. Things are moving in the right direction, even though that movement is slower than we would like it to be. It’s not certain whether we will achieve our 2007 goal of not more than 270 fatalities.

In the environmental area (to which this report devotes an in-depth analysis), the majority of the interim pollution emission goals have been achieved. One important reason for this is the technological development of engines, purification equipment and fuel.

Although significant progress has been made, a great deal of work remains in several areas. The SRA has a major responsibility for this work and development in the road transport sector. But this responsibility is shared by a number of other parties, such as automotive manufacturers, transport companies, the police, municipalities and interest groups, each of which performs important functions. In order to achieve the ambitious goals set, however, there must be well-functioning cooperation amongst the parties. Several important instances of cooperation were improved in 2005, such as the SRA’s collaboration with the police in the area of traffic control, and with the automotive industry on fuel issues.

I look forward to intensifying this kind of cooperation, which, together with the in-depth goal analysis presented in this report, will be a crucial factor in whether we will be able to achieve our ambitious goals.
Summary of Goal Achievement

This section summarises the SRA’s assessment of the degree of goal achievement of the six subsidiary goals, as well as the long-term interim goal of each subsidiary goal. A more comprehensive description of each subsidiary goal and interim goal can be found in the sections, Report of results and Theme: The Environment – an historical review.

<table>
<thead>
<tr>
<th>SUBSIDIARY GOALS AND RELATED LONG-TERM INTERIM GOALS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessibility</strong></td>
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<tr>
<td><strong>Subsidiary goal</strong></td>
</tr>
<tr>
<td>An accessible transport system with a road transport</td>
</tr>
<tr>
<td>system designed to meet the basic transport needs of</td>
</tr>
<tr>
<td>individuals and the business community.</td>
</tr>
<tr>
<td><strong>Interim goal</strong></td>
</tr>
<tr>
<td>Improved accessibility for individuals and the</td>
</tr>
<tr>
<td>business community between sparsely-populated areas</td>
</tr>
<tr>
<td>and central towns, and between regions and their</td>
</tr>
<tr>
<td>surroundings.</td>
</tr>
<tr>
<td><strong>Subsidiary goal</strong></td>
</tr>
<tr>
<td>A road transport system designed and functioning in</td>
</tr>
<tr>
<td>a manner that will promote a high level of transport</td>
</tr>
<tr>
<td>quality for individuals and the business</td>
</tr>
<tr>
<td>community.</td>
</tr>
<tr>
<td><strong>Interim goal</strong></td>
</tr>
<tr>
<td>A gradual improvement in the quality of the Swedish</td>
</tr>
<tr>
<td>road transport system.</td>
</tr>
<tr>
<td><strong>Road safety</strong></td>
</tr>
<tr>
<td><strong>Subsidiary goal</strong></td>
</tr>
<tr>
<td>Safe traffic, with no fatalities or serious injuries</td>
</tr>
<tr>
<td>as a result of traffic accidents on the road</td>
</tr>
<tr>
<td>transport system.</td>
</tr>
<tr>
<td><strong>Interim goal</strong></td>
</tr>
<tr>
<td>The design and function of the road transport</td>
</tr>
<tr>
<td>system shall be adapted to the conditions required</td>
</tr>
<tr>
<td>to meet this long-range goal.</td>
</tr>
<tr>
<td><strong>Subsidiary goal</strong></td>
</tr>
<tr>
<td>A good environment in which the road transport</td>
</tr>
<tr>
<td>system is responsive to providing good and healthy</td>
</tr>
<tr>
<td>living conditions for everyone, and where the</td>
</tr>
<tr>
<td>natural and cultural environments are protected</td>
</tr>
<tr>
<td>from injury. The promotion of good conservation of</td>
</tr>
<tr>
<td>land, water, energy and other resources. The design</td>
</tr>
<tr>
<td>of the road transport system shall contribute to the</td>
</tr>
<tr>
<td>achievement of the national environmental goals.</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>Interim goals</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide emissions from road traffic by 2010</td>
</tr>
<tr>
<td>shall not exceed 1990 levels.</td>
</tr>
<tr>
<td>By 2005, emissions of nitrogen oxides shall have</td>
</tr>
<tr>
<td>decreased by at least 40 per cent from 1995 levels.</td>
</tr>
<tr>
<td>By 2005, emissions of sulphur shall have decreased</td>
</tr>
<tr>
<td>by at least 15 per cent from 1995 levels.</td>
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<tr>
<td>By 2005, emissions of volatile organic compounds</td>
</tr>
<tr>
<td>shall have decreased by at least 60 per cent from</td>
</tr>
<tr>
<td>1995 levels.</td>
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<tr>
<td>Carbon monoxide levels in built-up areas shall be</td>
</tr>
<tr>
<td>below the established environmental quality standards.</td>
</tr>
<tr>
<td>Nitrogen dioxide levels in built-up areas shall be</td>
</tr>
<tr>
<td>below the established environmental quality standards.</td>
</tr>
<tr>
<td>Sulphur dioxide levels in built-up areas shall be</td>
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<tr>
<td>below the established environmental quality standards.</td>
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<tr>
<td>Soot levels in built-up areas shall be below the</td>
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<tr>
<td>limit value below the established environmental</td>
</tr>
<tr>
<td>quality standards.</td>
</tr>
<tr>
<td>Particulate matter levels in built-up areas shall</td>
</tr>
<tr>
<td>be below the established environmental quality</td>
</tr>
<tr>
<td>standards.</td>
</tr>
<tr>
<td>By 2005, emissions of carcinogens shall not exceed</td>
</tr>
<tr>
<td>half of 1998 levels.</td>
</tr>
<tr>
<td>By 2007, no one shall be exposed to traffic noise</td>
</tr>
<tr>
<td>exceeding a level equivalent to 65 dB (A) outdoors.</td>
</tr>
<tr>
<td>In cases where the outdoor level cannot be reduced,</td>
</tr>
<tr>
<td>the goal should be that the equivalent indoor level</td>
</tr>
<tr>
<td>shall not exceed 30 dB (A).</td>
</tr>
<tr>
<td>Environmentally hazardous material shall not be</td>
</tr>
<tr>
<td>introduced into the infrastructure, use of non-</td>
</tr>
<tr>
<td>renewable material shall be minimised, and material</td>
</tr>
<tr>
<td>should be recycled.</td>
</tr>
<tr>
<td>New road transport facilities shall be placed in a</td>
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<tr>
<td>way so they work in harmony with their surroundings,</td>
</tr>
<tr>
<td>and are designed to take into consideration natural</td>
</tr>
<tr>
<td>and cultural values.</td>
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</tbody>
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| **Regional development**                             |
| **Subsidiary goal**                                  |
| The road transport system should promote favourable  |
| regional development by helping to equalise the      |
| opportunities for development between the different |
| parts of the country, and to counteract the         |
| disadvantages of long-distance transport.            |

| **Gender equality**                                  |
| **Subsidiary goal**                                 |
| A road transport system that is designed to cater    |
| equally to the transport needs of women and men.    |
| Men and women should have an equal opportunity to    |
| influence the formation of the transport system, its  |
| design and management, and their values shall be     |
| accorded equal importance.                           |
Basic facts

Economic and population trends have a great impact on transport. In 2005, Swedish GDP increased by about 2.7 per cent and population by about 0.4 per cent. Vehicle mileage on state roads increased by about 0.4 percent for passenger cars and 4.3 per cent for heavy vehicles.

DEFINITIONS:
Vehicle mileage: Total distance driven by all vehicles (vehicle-kilometres)
Travel mileage: Total distance travelled by all persons (people-kilometres)
Goods transport mileage: The total amount of goods transported, multiplied by the number of kilometres (tonne-kilometres)

TRANSPORT IN SWEDEN

Road traffic represents 87 per cent of human travel mileage in Sweden.

Since 1996, human travel mileage on the roads has increased by 10 percent, air travel by 15 percent and rail travel by 30 percent. In 2005, human travel mileage by road increased by 1 per cent, and air travel by 4 per cent, while human travel mileage by rail remained unchanged. Maritime human travel mileage has remained unchanged for the past five years.

In 2005, road traffic represented 41 per cent (1996:40), maritime traffic, 37 per cent (1996:39) and rail traffic 22 per cent (1996:22) of total goods transport mileage.

ROAD TRAFFIC

Passenger car mileage was 63 billion vehicle-kilometres in 2005. This was an increase by 0.3 per cent since 2004 and by 11 per cent since 1996. Bus mileage in 2005 totalled 0.9 billion vehicle-kilometres.

Vehicle mileage by lorry has increased by 38 per cent since 1996. For light and heavy lorries, the increase was 54 and 20 per cent, respectively. The relatively large increase in light lorries is due to increased sales of these vehicles, and the reclassification of certain passenger cars and light lorries. In 2005, mileage by lorry was 10.4 billion vehicle-kilometres, of which heavy lorries accounted for 4.2 billion vehicle-kilometres.

On the state road network, vehicle mileage increased by 16.2 per cent since 1996. The greatest increase, 22.4 per cent, was on the European highways. In 2005 vehicle mileage increased by about 0.8 per cent (2004:1.0), with passenger cars increasing by 0.4 per cent (2004:0.9) and heavy vehicles by 4.3 per cent (2004:1.7).
BASIC FACTS

Total travel time (vehicle time) on the state roads is estimated at 620 million hours, with total travel cost (vehicle costs) at SEK 80 billion.

Of human road mileage in 2005, 84 per cent was with passenger car, 10 per cent with bus, 3 per cent by foot, 2 per cent by bicycle and less than 2 per cent by motorcycle or moped.

USERS

Swedes travel an average of 43 kilometres per day, 32 kilometres of which are by passenger car. On average, men travelled 49 kilometres per person and day, while women travelled 37 kilometres. The total travel distance in 2004 for men and women respectively was 65 billion and 49 billion person-kilometres. These statistics relate to persons between the ages of 15 and 84 years.

Some 5.7 million persons, more than 80 per cent of the population above the age of 18, held a driving licence in 2005. The percentage of women holding driving licences has been increasing since 1996, from 70 to 74 per cent, while that of men decreased from 89 to 88 per cent. Among those older than 65 years, 71 percent held a driving licence at the end of the year, an increase of 10 percentage units since 1996.

The percentage of 18 year-olds with driving licences for passenger cars has fluctuated between 25 and 30 per cent since 1996, which can be compared with the early 1990s, when that figure was about 35 per cent. At the end of 2005, 29 per cent of the 18 year-olds held a driving licence. In that age group, 25 per cent of the women and 33 per cent of the men, held a driving licence at the end of 2005. For 19 to 24 year olds, the percentage was 59 per cent for women and 67 per cent for men. For the past 15 years, this difference between young women and young men has been about 8–10 percent.

As of 1 January 2005, 373 000 persons had been granted subsidised transport benefits. About one out of every six children between six and twelve used some form of school transport (April to October 2003).

VEHICLES

The number of new car and lorry registrations increased by 0.1 and 13 per cent, respectively, compared to 2004. The number of directly imported passenger cars in 2005 was 36 900, which represented a decrease of 21 per cent from 2004.

In 2005, the number of passenger cars on the road increased by 1 per cent, the number of light lorries by 6 per cent, heavy lorries by 1 per cent and buses by 1 per cent. Motorcycles also increased. On 30 June 2005, there were 250 000 motorcycles on the road, an increase of 6 per cent since 2004 and 37 per cent since 2001.

On 31 December 2004, 34 per cent of the passenger

Source: VTI, SCB, SIKA and SRA. Data are based on a revised vehicle mileage model which also uses the mileage database. Comparison with data from earlier annual reports should be avoided.

Source: SIK (unless otherwise indicated)
* Vehicles with mandatory insurance as of 30 June. Source: Swedish Insurance Federation
** Vehicles with mandatory insurance as of 31 December. Source: Swedish Insurance Federation
BASIC FACTS

cars and 30 per cent of the lorries on the road were older than 12 years.

Swedish passenger cars have become heavier. The percentage with a service weight of at least 1 400 kg increased from 16 to 48 per cent from 1990 to 2004.

Of light vehicles (passenger car, light lorry and minibus), 89.2 per cent operated on petrol (of which 0.1 per cent were electric hybrid cars) and 10.2 per cent on diesel. The remainder primarily used ethanol (0.5 per cent) or natural gas (0.1 per cent). The heavy vehicles (heavy busses and heavy lorries) were mostly (96.6 per cent) diesel-operated. The remainder are operated on petrol (1.9 per cent), ethanol (0.4 per cent) and gas (1.0 per cent).

Of those light vehicles first registered in 2005, 274 248 were petrol-powered (78.4 per cent), including 1 960 electrical hybrids (0.6 per cent). Of the remainder, 63 991 (18.3 per cent) were diesel-operated, 9 486 could be operated on ethanol (2.7 per cent), 1 945 on gas (0.6 per cent) and three were electric cars. Of those heavy vehicles first registered in 2005, 7 525 were diesel-operated (95.6 per cent), 197 used petrol (2.5 per cent) and 149 used gas (1.9 per cent). No ethanol, electric or electric hybrid cars were registered for the first time this during the year.

The amount of petrol (excluding ethanol mix) was about 1.2 per cent lower in 2005 than in 2004. This is a result of increased admixture of ethanol in petrol, and the replacement of petrol-fuelled passenger cars and light lorries by diesel-fuelled vehicles. Fuel consumption for new passenger cars in 2005 averaged 8.1 l/100 km. High fuel prices in combination with public debate resulted in the largest decrease in fuel consumption by petrol-driven passenger cars, since 2000. In addition, 2005 broke the trend of increasing fuel consumption by diesel-operated passenger cars for the first time since 1998. The amount of diesel fuel delivered in 2005 was about 5 per cent higher than in 2004 (this figure includes the total amount of diesel fuel supplied, which also includes purposes other than as fuel in the road transport section). In the road transport sector, diesel consumption increased due to the replacement of petrol-fuelled vehicles with diesel-driven ones, and the increased vehicle mileage of heavy lorries.

INFRASTRUCTURE

The Swedish road network is composed of about 139 000 km of public roads, of which 98 300 km are state-owned, and 40 300 km are municipal roads. In addition to the public roads, there are 75 000 km of state-subsidised private roads, as well as a large number of private roads without state subsidies. Most of the latter are forest roads. The length of pedestrian pavements and foot/bicycle paths in the municipalities is estimated at 33 000 km.

Fuel consumption and carbon dioxide for new passenger cars

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<tbody>
<tr>
<td>Petrol l/100 km</td>
<td>9.1</td>
<td>9.0</td>
<td>8.7</td>
<td>8.5</td>
<td>8.3</td>
<td>8.4</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Diesel l/100 km</td>
<td>7.1</td>
<td>6.6</td>
<td>6.5</td>
<td>6.5</td>
<td>6.7</td>
<td>6.9</td>
<td>7.1</td>
<td>7.2</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>Total petrol and diesel l/100 km</td>
<td>9.0</td>
<td>8.8</td>
<td>8.5</td>
<td>8.3</td>
<td>8.2</td>
<td>8.3</td>
<td>8.3</td>
<td>8.2</td>
<td>8.2</td>
<td>8.1</td>
</tr>
<tr>
<td>Total petrol and diesel CO2 g/km</td>
<td>216</td>
<td>210</td>
<td>204</td>
<td>201</td>
<td>197</td>
<td>198</td>
<td>197</td>
<td>198</td>
<td>197</td>
<td>194</td>
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Road length and vehicle mileage 2005

<table>
<thead>
<tr>
<th>Category</th>
<th>Road length km</th>
<th>Number of vehicle/km (billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE ROADS</td>
<td>98 300</td>
<td>51</td>
</tr>
<tr>
<td>Road category</td>
<td></td>
<td></td>
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<tr>
<td>European highways</td>
<td>4 900</td>
<td>19</td>
</tr>
<tr>
<td>Other national roads</td>
<td>10 500</td>
<td>14</td>
</tr>
<tr>
<td>Primary county roads</td>
<td>11 000</td>
<td>8</td>
</tr>
<tr>
<td>Other county roads</td>
<td>71 900</td>
<td>11</td>
</tr>
<tr>
<td>Speed limits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110 km/h</td>
<td>5 300</td>
<td>13</td>
</tr>
<tr>
<td>90 km/h</td>
<td>24 900</td>
<td>21</td>
</tr>
<tr>
<td>70 km/h</td>
<td>60 500</td>
<td>13</td>
</tr>
<tr>
<td>50 km/h</td>
<td>7 400</td>
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<tr>
<td>30 km/h</td>
<td>200</td>
<td>0.1</td>
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<tr>
<td>Road type</td>
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</tr>
<tr>
<td>Motorways</td>
<td>1 700</td>
<td>13</td>
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<tr>
<td>Undivided motorways</td>
<td>400</td>
<td>1.4</td>
</tr>
<tr>
<td>– with median barriers</td>
<td>360</td>
<td>1.3</td>
</tr>
<tr>
<td>4-lane roads</td>
<td>240</td>
<td>1.6</td>
</tr>
<tr>
<td>Ordinary roads</td>
<td>96 000</td>
<td>35</td>
</tr>
<tr>
<td>– with median barriers</td>
<td>950</td>
<td>2.3</td>
</tr>
<tr>
<td>Municipal streets and roads</td>
<td>40 300</td>
<td>21</td>
</tr>
</tbody>
</table>

*Figures for 2003.*
Report of Results

According to the appropriation letter for budget year 2005, the SRA, in its Sectoral Report, is required to describe and comment on transport policy subsidiary and long-term interim goal achievement. The interim goals for the year relate only to the activities of the SRA, and are reported in the SRA’s Annual Report.

This year marks the first time that the emphasis of the Sectoral Report is clearly and consistently on a goal analysis of transport policy subsidiary goals. As a result, these sections are somewhat more incisive, analytical, detailed and self-critical than in the reports of previous years. The intent was to formulate an exhaustive description that could be used as a basis for future Sectoral Reports, which would then need only a more general description. We hope that this report will also be useful in the SRA’s operational planning, and the preparation of the SRA strategic plan. This report could then serve not only as an annual report to the Government, but also as a part of the long-term efforts to achieve a more efficient road transport system and a systematic approach.

A range of indicators shows us how the actual outcome is related to the goals, and deal with results that can be directly or indirectly measured against the goals. In those cases where there are no goals that are operational and expressed in measurable terms, the report instead describes the ongoing work of developing these goals.

The SRA’s appropriation letter provides that the reporting should also include an analysis of the outcome – in other words, a goal analysis. The goal analysis should include:

- Significant reasons for the level of goal achievement
- Actions taken by the SRA or other parties that are deemed to have significantly affected the results
- Other external factors that are deemed to have affected the level of goal achievement
- Actions that the SRA or other parties have taken or intend to take due to the results of 2005.

In certain cases, actions intended to be taken based on the 2005 results are described. Routines for comprehensive reporting have not yet been fully developed.

The possibility of performing a goal analysis varies greatly among subsidiary goals. This is shown in figure 1. All the steps are required for a complete goal analysis. The steps symbolise how far each subsidiary goal has come in the process of achieving a complete goal analysis. A complete goal analysis firstly requires knowledge about the intentions behind the goal decision. The goals are often succinctly formulated. In order to be able to develop parameters that reflect the entire goal, it is necessary to go back and analyse the intent behind the goal formulation. For some of the subsidiary goals, the parameters that are measured today reflect only parts of the goal. This applies especially to the subsidiary goals of Accessibility, Regional development, Gender equality and several of the interim goals of the Environmental goal.

Once parameters have been formulated, they must be measured, which require measuring methods and instruments. Measuring the degree of goal achievement requires that the goal is linked to a time, such as the road safety goal of no more than 270 fatalities in 2007. A complete goal analysis also requires knowledge of various causal relationships, such as the results of actions taken on the outcome.

Figure 1 shows that the development of the environmental and road safety goals have progressed furthest toward a complete goal analysis, while the gender equality and favourable regional development goals still have four of the five steps left. In the case of the favourable regional development goal, the purposes and intentions behind that goal is the primary reason for the position of this goal. It should be underscored that this is a general description. In the case of some of the interim goals of the environmental goal, the development of parameters and measurements has not come much farther than has the gender equality goal.

![Figure 1. All steps are required for a complete goal analysis](image)
The development of goal analysis can be viewed as a chain that begins with the identification of the intentions behind the goal. This is followed by an illustration of the desired result, formulation of direct or indirect parameters, the measurement of these, outcome, assessment of the degree of goal achievement and finally, an analysis of the reason for the given degree of goal achievement. See figure 2.

Developing goal analysis is a prioritised area for the SRA, and a large amount of resources is devoted to further development.

ACCESSIBLE TRANSPORT SYSTEM

**SUBSIDIARY GOAL**
An accessible transport system with a road transport system designed to meet the basic transport needs of individuals and the business community.

**Intentions and purposes of this goal**
This transport policy subsidiary goal deals with the very purpose of the transport system, to meet the transport needs of individuals and the business community. This subsidiary goal means the maintenance of transport services that satisfy the all transport needs that must be met in a well functioning society. Every person has the right to a full life. This basic view of solidarity between people must also affect transport policy. However, the transport system alone cannot create accessibility to the important functions in life. The localisation of homes and other societal functions is also a crucial factor in creating good accessibility.

This subsidiary goal is closely related to the subsidiary goals of regional development and transport quality. These three subsidiary goals complement each other.

The concept accessibility is defined by the SRA and other traffic agencies as the ease with which facilities and activities in a society can be reached by individuals and the business community.

This definition emphasises that the purpose of the transport system is to enable various groups of individuals and businesses to reach their desired destinations, and thereby access various facilities and activities in a society. This requires a perspective that involves the “whole trip” from door to door, with individual transport solutions being able to comprise travel chains made of different modes of travel on the road transport system, as well as in combination with rail, air and maritime travel.

A transport system that allows good accessibility means speedy, inexpensive, safe and comfortable travel and transports to desired destinations. Such a system makes physical movement from one place to another as easy and painless as possible.

The term road transport system means the physical road system, vehicles, users of the system and the regulatory scheme, as well as the traffic management system and the information that can affect the system’s use. In other words, there are many components that can be changed and/or improved to make the system as efficient as possible.

The road transport system includes travel by foot, public transportation and passenger car and the various forms of heavy goods transport. Part of the development efforts should be to improve coordination between the various modes of travel. All forms of transportation are important for a well functioning road transport system.

Both individuals and businesses have a variety of transport needs. These can range from daily and very frequent transports to less frequent long-distance travel.

**Parameters for measuring an accessible transport system**
Measuring the accessibility goal uses various techniques and means of expression. The most common principle is the measurement of the price of travel in time or money. The most common parameter is travel time.

An example of a parameter for changes in accessibility is the number of persons whose travel time to important destinations has increased or decreased. A limited number of important destinations are chosen for purposes of analysis. The accessibility to these destinations will then represent a large number of other important destinations.

Another type of parameter is the average speed on certain transport links. A third type is the number of destinations it is possible to reach within a distance for a given travel time (i.e. the number of workplaces reachable by car within 45 minutes).

Additional parameters used to measure accessibility include the number or percentage of persons who,
according to statistical studies, have or do not have good opportunities to undertake travel.

Even though travel time is the most frequently used way of expressing the price of transport, there are other expressions as well, such as generalised transport cost (socioeconomic cost) and monetary transport cost (cost to the individual). Additional concepts that relate to accessibility are comfort, dependability and flexibility. Flexibility means the ability to change one’s trip or be able to choose alternative means of transport.

A completely different parameter of accessibility used is the number or percentage of trips made with various modes of transport. This is a consumption parameter that indirectly reflects accessibility. Changes in accessibility (i.e. changes in the price of transport), can be expected to affect people’s willingness to travel.

Degree of goal achievement
A comprehensive analysis of the road transport system would require a great many analyses. These might include various modes of travel on the road transport system, various types of transports (persons, goods), various distances (local, regional and national trips), various user groups and the ability of the road transport system to cooperate with other modes of travel. A great deal of data must be collected from year to year, if annual comparisons are to be made.

Today, we evaluate the degree of goal achievement of this subsidiary goal with the help of a comprehensive assessment of the goal achievement of the interim goals that related to it. Of the five interim goals monitored, three have been achieved and two have been partially achieved. Parts of the goal have therefore been achieved.

### INTERIM GOALS

A Improved accessibility for individuals and the business community between sparsely-populated areas and central towns, and between regions and their surroundings.

B Improved accessibility within major cities and between urban areas.

C The percentage of disabled persons who can use the road transport system, including public transport, on their own, shall increase. By 2010, a majority of the disabled should be able to use public transport.

D The percentage of children who can use the road transport system on their own shall continuously increase.

E The percentage of short distance travel represented by pedestrians, cyclists and bus passengers shall continuously increase.

This interim goal deals with accessibility to three different types of destinations. For the first part of the interim goal, travel times from residential locations in the inland areas of the forest counties to central towns were analysed. Two other analyses were done for the part “between regions and their surroundings.” The first of these concerns travel times from residential locations to regional centres, while the second one examines travel times from residential areas to a national centre.

For obvious reasons, changes during one year are quite small, as we already have a road transport system with a relatively high standard. In light of this, we choose to focus on the changes that have occurred during the past five years.
The analyses conducted relate to changes in accessibility based on changes in travel time for trips by passenger cars. Sampers, the National Public Transport Agency’s computerised traffic analysis model, has been used in the analyses. This computer programme can calculate accessibility to various destinations from about 8,700 areas in Sweden. Differences in accessibility from year to year can depend on changes in the transport system, as well as society’s geographical structure. During the years analysed in this report, however, conditions of demography and economic geography (localisation of homes and workplaces) have been unchanged. In this manner, changes in accessibility caused exclusively by changes of the road transport system can be isolated in the analysis.

Outcome – accessibility between sparsely-populated areas and central towns

This calculation concerns persons who have more than half an hour’s travel to the central towns, and who have experienced a change in travel time of more than half a minute during the year.

In the inland areas of the forest counties, about 1,000 persons have had their travel time to the closest central town reduced, and about 1,000 persons have increased travel time.

Changes from 2001 to 2005
Accessibility has increased for about 13,000 persons, and decreased for 24,000. An analysis of the past five years shows a slight decrease.

Outcome – accessibility between regions and their surroundings

Analysis of the outcome of this part of the interim goal has two parts: individuals’ accessibility to the closest regional centre and accessibility to the closest national centre.

Accessibility to regional centre
This estimate concerns persons who have more than half an hour’s travel to these locations, and who have experienced a change in travel time of more than half a minute during the year.

The map to the left shows accessibility to a regional centre at the end of 2005. Regional centres are indicated by dots. The map to the right shows areas where there have been differences in travel time during the year. The green areas indicate increased accessibility, while the red areas show decreased accessibility.

About 100,000 residents have shorter travel times to the closest regional centre and about 40,000 persons now have longer travel time.
Changes from 2001 to 2005
About 370 000 persons have increased accessibility and 410 000 persons, decreased accessibility. An analysis of the past five years shows a slight decrease.

Accessibility to national centre
This calculation concerns persons who have more than an hour’s travel to these locations, and who have experienced a change in travel time of more than four minutes during the year.

The reason the limit is higher than in trips to regional centres is justified by the lower frequency of trips to metropolitan areas in cases where they are not considered regional centres. For certain areas, a metropolitan area is also the closest regional centre.

About 150 000 residents have shorter travel time to the closest national centre.

Changes from 2001 to 2005
About 500 000 persons have increased accessibility and no one has decreased accessibility.

Degree of goal achievement – accessibility between sparsely-populated areas and central towns and between regions and their surroundings
The accessibility in forest counties’ inland areas is largely unchanged while accessibility between regions and their surroundings has improved. The net number of persons whose travel times have decreased is more than 200 000. The goal has been achieved.

Goal analysis – accessibility between sparsely-populated areas and central towns and between regions and their surroundings
The small changes in accessibility in forest counties’ inland areas are due to the small changes in the road network in sparsely-populated areas. The changes are largely due to changes in speed limits.

Changes in accessibility to regional centres result from changes in speed limits, as well as physical state of the road network. As the less-used roads often are of a lower standard with regard to road safety requirements, speed limits on some stretches have been lowered.

Speed limits are introduced on some road links once median barriers are erected. This is most often the case on larger, busier roads. These measures can have a significant effect on travel times as they often apply to fairly long road stretches.

A number of reconstructed roads have been opened for traffic, improving accessibility through shorter distances and higher speed limits. Actions taken on the national road network have made it possible to raise speed limits. These actions are important to a large number of persons, as these roads serve large geographic areas.

Many persons now enjoy increased accessibility to national centres by this road network.
This section describes accessibility within the metropolitan areas of Stockholm, Göteborg and Malmö and accessibility between urban areas, in the form of travel times between nodes in the national road network.

**Outcome – accessibility within metropolitan areas**

The effect of road congestion on speed is regularly measured in Stockholm and Göteborg. This is done on weekday mornings on a number of major arteries. Measuring the traffic situation on these arteries also provides indications of how well traffic flows on approach roads and street systems.

Within Malmö congestion is deemed to be less than in Göteborg and Stockholm. As a result, speeds and travel times have not yet begun to be measured systematically. Increased traffic is felt to have led to more congestion and less accessibility.

**Outcome – accessibility between urban areas**

The road network is the primary connection between the regional centres of Sweden and the urban areas. Consequently, travel times on this road network have been analysed.

A number of changes have been noted in 2005. These include a reduction of about four minutes between Umeå and Töre (E 4), more than three minutes between Eskilstuna and Södertälje (E 20) and more than two minutes between Ljungby and Kalmar (Nat. Road 25). No increases in excess of one minute have been recorded.

Changes involving longer time periods

Travel times have shown a significant long-term decrease between places along the national road network, as shown on the diagram.

**Degree of goal achievement – accessibility within metropolitan areas and between urban areas**

The part of the goal regarding changes in accessibility within metropolitan areas has been partially achieved. The part regarding changes between urban areas has been achieved. The goal has thereby been achieved.

**Goal analysis – accessibility within metropolitan areas and between urban areas**

The change in accessibility within metropolitan areas depends primarily on how the traffic, in general, has changed, and the actions taken with regard to the road transport and public transport systems.

**Stockholm**

Despite an estimated increase in traffic of about one per cent during the year, accessibility on the road transport system has increased somewhat. This is the result of a large number of preventive actions due, in part, to the Stockholm congestion tax test.

Stockholm Transport (SL) has enhanced public transport by adding about 15 direct bus routes (including lines to Nacka and Värmdö), and thereby placing about 200 more buses on the roads. In addition, frequency of service has been increased on regular bus routes and underground lines. Additional commuter train departures have also been scheduled.

To improve accessibility for buses, the City of Stockholm has implemented about 50 measures including the
additional bus lanes, more efficient traffic signals, widening of lanes, improvement of street design, additional no-stopping zones and stricter parking sanctions.

The SRA has widened the E 4 to six lanes between Rotebro and Upplands Väsby, and implemented about 20 more measures, such as additional public transport lanes, more efficient traffic signals, widening of lanes, more efficient traffic control at entrance ramps, better road assistance and signage.

Göteborg
The somewhat decreased accessibility is the result of traffic increasing during the year by a bit over two per cent. A great many measures have been implemented to decrease the effects of congestion, but these were not enough to compensate for the increase in traffic.

Many physical changes have been made on the E 6 and E 20, such as new lanes on three stretches totalling five kilometres. Traffic signal control at an entrance has been made more efficient, and one highway bus stop has been expanded.

Traffic management and the traffic signal system has been improved. The SRA, in cooperation with the City of Göteborg has developed and improved control of traffic disruptions.

Västrafik has improved public transport, with more frequent direct train service between Göteborg and Skaraborg, a new direct train line between Borås and Göteborg, new trunk bus routes, improved bus service frequency on many routes, and more night service.

Malmö
The observed worsening of the traffic situation is due to the 1 to 2 per cent increase in traffic combined with the construction work on the Citytunneln railway tunnel, has caused a number of traffic disruptions. Measures have been implemented, but these have not been sufficient. One such measure is a more efficient traffic signal system on major streets.

National road network
Accessibility between urban areas is largely the result of physical improvements on the national road network. Some of these are the results of major road reconstruction project, while others involved the construction of median barriers, sometimes in combination with faster speed limits. These measures have often resulted in faster traffic and improved accessibility.

Outcome – accessibility for the disabled
In a survey conducted in the autumn of 2005, 70 per cent of disabled people reported being able to travel without difficulties, 15 per cent can travel with some difficulty, while the remaining 15 per cent can not travel at all. Compared to 2004, the overall situation is unchanged, but there has been an improvement for blind persons and those with impaired mobility, as well as persons suffering from asthma or allergies. In contrast, the results show a slight worsening for hearing-impaired and multi-handicapped persons.

The year’s measurement included two new groups – persons with cognitive disabilities and deaf adults – which are reported separately. Of those with cognitive

| E14 Sundsvall–Östersund | 3.0
| Rv 40 Göteborg–Jönköping | 3.2
| E18 Norwegian border–Stockholm | 2.1
| E22 Malmö–Norrköping | 3.2
| E4 Stockholm–Haparanda | 2.3
| E4 Helsingborg–Stockholm | 1.7
| E6 Malmö–Norwegian border | 2.7

Travel time between cities on the national road network

The national road network
Estimated changes in passenger car travel time in minutes in 2005. Only changes of more than one minute are indicated. The numbers refer to decrease of travel time in minutes. Green links indicate shorter travel time.
disabilities, 53 per cent report that they can use public transport, while 43 per cent report not being able to travel at all. In the case of the adult deaf, the corresponding figures are 89 per cent and 10 per cent, respectively.

Measurement of the quality of mobility transport services concerning ordering, treatment and impressions of the trip shows that travellers give the service an excellent overall rating, consistently above 90 per cent.

**Degree of goal achievement – accessibility for disabled persons**

The measurement shows that accessibility for disabled persons is unchanged from the previous year. However, the opportunity for disabled persons to use public transport has improved, thanks to the measures taken during the year to increase physical accessibility.

The measurement of accessibility to the transport system is not perfect, and does not show a complete picture of the events of the year. The loss of information because of failure to reply is actually too large to allow reliable conclusions to be drawn.

Even though the figure is unchanged from the year before, accessibility to public transport may well have increased.

On a network of certain prioritised stretches, the interim goal for 2010 is considered possible to achieve. This assessment is based on the many measures already implemented, as well as on the national campaign by the SRA and the National Rail Administration for a user-friendly public transport system.

All things considered, parts of the goal are considered to have been achieved.

**Goal analysis – accessibility for disabled persons**

The measures that promote accessibility (adapted vehicles, lay bays, footpaths, bicycle paths, crossings, guidance systems for the visually impaired, tactile material, etc) have increased significantly during the year, accompanied by increased demand from the users of the system.

On the state road network, 100 transfer points and major bus stops with more than 20 boarding passengers per day were remodelled to afford disabled persons accessibility. The percentage of buses with low entrances increased somewhat in 2005, while there was no corresponding change for trams. The trend in recent years indicates a very slow improvement.

For the visually impaired, a prototype of an IT-based guidance system, Farms 3, has been developed and evaluated during the year. Additional measures to increase the orientation capability of visually impaired persons have been implemented as part of the “Cirkulationsplats” and “Ledstråk” projects.

The “Mobilitetscenter” co-ordination project in Göteborg has provided professional advice and support to persons with disabilities. This project is being concluded, and the work of establishing permanent activities has begun.

Three accessibility courses for future architects, planners and landscape architects have been held at universities and colleges.

A seminar in honour of the tenth year of the establishment of the SRA Handicap Council, “Halftime and five years to go: a day for increased accessibility”, and contributed constructive ideas and inspiration for achieving the goals of handicap policy.

**Implemented or planned measures based on the results for 2005**

In order to accelerate the achievement of the goal of accessible public transport for 2010, the SRA has begun a national campaign for the long-term development of public transport, in collaboration with the National Rail Administrations. Efforts are concentrated primarily in the areas of:

- Co-ordination of information, reservation and ticket systems
- Attractive, accessible and efficient transfer points
- Accessible public transport.

Prioritised networks and lines with many passengers in the vicinity of major urban centres will be chosen in order to achieve the greatest effect on accessibility.

In order to additionally improve the usefulness and accessibility of the state road network, a project focusing on “eliminating obstacles, one by one” in existing and newly-built environments will be started in 2006. This project will lead to an action plan that will formulate the ambition level and estimated costs to eliminate obstacles.

The SRA also has provided financial assistance for accessibility inventories to municipalities. All of the SRA’s regions have formulated plans for how to achieve the 2010 public transport goal regionally.

**INTERIM GOAL D**

The percentage of children who can use the road transport system on their own shall continuously increase.

**Outcome – accessibility for children**

No comprehensive measurement of the percentage of children who can use the road transport system on their own has been done during the year.

Results have been obtained from the accessibility model, “Accessibility conditions in Swedish cities” (TVISS). This survey shows that 93 per cent of the accidents involving pedestrians, and 91 per cent of cycling accidents occurred on what is described in TVISS as “unsafe networks.” These results should be examined with
caution, as “unsafe networks” account for significantly more distance than “safe networks.” However, we can assume that more children use the safe network.

**Degree of goal achievement – accessibility for children**
The goal has been achieved. This is based on a comprehensive assessment of the volume of measures implemented, as well as the number of children affected by the measures.

**Goal analysis – accessibility for children**
More than 300 traffic safety measures were implemented along the state road network, including footpaths and bicycle paths, speed-regulated crossings, footpaths to bus stops, improved lighting and tunnels and passages for pedestrians and cyclists. More than 1,200 children have benefited from these measures.

Child impact analyses have been fully or partially conducted in a total of 16 projects involving pedestrian and bicycle paths, possibilities for crossing major, urban projects and traffic flow separation measures (median barriers) on rural highways.

The SRA has collaborated with municipalities on issues regarding community planning for children. A project known as "secure accessibility" was conducted during the year. Status reports and proposed actions relating to accessibility for children were prepared in five locations. The SRA has provided support for school programmes regarding traffic, the environment and community planning. Project managers in SRA operations and contractors have been given information about children’s accessibility requirements.

In addition to the SRA, municipalities are the most important parties. However, there are still no routines for compiling the actions of the municipalities. The measure that has contributed most to the degree of goal achievement is the building to footpaths and bicycle paths.

A supplemental report of measures taken in order to increase traffic safety for children can be found under the heading "the Children’s Perspective," in the section "Other Feedback Requirements."

**INTERIM GOAL E**
The percentage of short distance travel represented by pedestrians, cyclists and bus passengers shall continuously increase compared to short-distance travel.

**Outcome – Movement on foot, by bicycle and by bus**
The percentage of short-distance travel on foot, by bicycle and by bus was not measured in 2005. Other statistics on transportation trends, however, show a slightly increasing trend for bus travel, and largely no change for pedestrians and cyclists.

**Degree of goal achievement – Movement on foot, by bicycle and by bus**
Part of this goal has been achieved. This is based on a slightly increasing trend for bus travel, and largely no change for pedestrians and cyclists.
Goal analysis – Movement on foot, by bicycle and by bus
The cooperation of the road management and the transport authority with other parties to improve public transport has resulted in an increase in bus riders. The higher petrol price has probably also affected the number of bus riders.

The measures that have been implemented to improve conditions for pedestrians and cyclists, however, have not affected the percentage represented by these forms of transport. Examples of measures that have been implemented to increase the percentage of short-distance travel by foot or by bicycle include speed-regulated crossings, safer bus stops, footpaths to bus stops, improved lighting and tunnels and passages for pedestrians and cyclists.

Making walking and cycling more attractive requires information and promotion efforts and well as measures to physically improve the pedestrian and bicycle network, including its maintenance.

**HIGH TRANSPORT QUALITY**

**SUBSIDIARY GOAL**
A road transport system designed and functioning in a manner that will promote a high level of transport quality for individuals and the business community.

**INTERIM GOAL**
A gradual improvement in the quality of the Swedish road transport system.

**Definition**
Transport quality can be defined as the relationship between a traveller’s expectations of a trip and his or her actual experiences. When the experience equals or surpasses expectations, the traveller experiences high transport quality.

Road management describes the conditions that travellers should be able to expect on different types of roads with regard to operational and maintenance standards and permitted loads. Road management provides this information in various ways, such as descriptions of service commitments, current information in the media and signage indicating permitted bearing capacity and other facts.

High transport quality may be said to prevail when a trip on a footpath, a bicycle path or a paved or unpaved road can be completed in a reasonable time, with safety comfort, and low environmental impact, and without unpleasant surprises.

**Functional conditions**
Experience of transport quality is largely the result of the functional condition of the road network, especially those properties that affect travellers. On a short-term basis, road conditions are affected by operational measures such as snow removal, skid prevention, cleaning, planning of gravel roads and maintenance of lay-bys and shoulders. From a more long-term perspective, the functional condition is maintained through measures such as repaving, bridge repairs and replacement of worn road equipment. Measures relating to bearing capacity, such as the adaptation of road and bridge design to today’s loads, are important for maintaining the state of the road network, and thereby promoting transport quality. The road network has been built up during a period of many years, and bearing capacity demands have gradually increased. This has meant that today’s roads must accommodate permitted loads much higher than what the load for which the road was built.

**Road conditions**
The road conditions that most affect the transport quality of public transport, goods transport and individual travellers (including pedestrians) are the state of the roads in winter, road surface roughness and friction, and bearing capacity restrictions.

**Winter road conditions**
Winter road conditions primarily affect accessibility. Speeds are slower in an effort to reduce the risk of accident.

**Road roughness and friction**
The roughness and surface structure of a road has a varying effect on travel time, road safety, vehicle costs and travel comfort, as well as on the noise caused by traffic.

**Road and bridge bearing capacity**
The bearing capacity of a road has both an engineering and a financial aspect. The maximum engineered bearing capacity is not difficult to ascertain, while this is less clear cut for roads. Heavier loads and increased traffic increase wear (damage) on both bridges and roads. As a result the gross load and load per axle that a road management will allow is based on a financial balancing

**Maximum permitted gross weight on Swedish roads**

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between maintenance costs and costs to society. The bearing capacity of a road also changes when the ground freezes or thaws. As a result, industries such as forestry need road management to be flexible so that transporters can move heavier transports when the road allows this.

Requirements, standards and goals

State roads

The SRA has specified an operations and maintenance standard for the state road network, based on the planning parameters of the Government’s National Road Transport Plan for 2004–2015. This standard should represent an optimal balance between various transport policy subsidiary goals and groups of road users (i.e. external efficiency). The goals also include the preservation of road capital, which also means long-term economic sustainability and consideration of the interests of future road-users.

This plan also contains the requirement that the standard should be achieved at the lowest road maintenance cost (i.e. internal efficiency). The internal efficiency for operations and maintenance should be increased by one per cent per year.

The bearing capacity appropriation in the plan includes six goals for the reinforcement of existing roads, with two of these goals time related. The purpose is to prevent and reduce bearing capacity restrictions on different types of roads.

The long-term plan also includes the following prioritisation:

- Operating conditions should be kept at current levels (i.e. maintain the same operating standard as before).
- The maintenance of paved road, as to roughness, is used as a regulator in times of short-term shortages of resources. Roughness then increases, especially on small and medium-sized roads, with an increasing lag between the maintenance standard and actual road conditions.
- The bearing capacity appropriation is used to gradually reinforce those roads that risk needing bearing capacity restrictions, and thereby reduce the amount of restricted road. Where maintenance is not kept after, however, other roads may end up in this risk zone. The amount of road subject to bearing capacity restrictions primarily depends on the weather.

Winter road conditions

The winter maintenance standard determines when snow removal or skid prevention measures should begin and end. The SRA’s new standard for winter road maintenance on state roads, including foot paths and bicycle paths is entitled Vinter 2003. The transition from the previous standard is a gradual one, with one-fifth of the road network moving to the new standard each year.

Winter road conditions are monitored as “operating conditions not achieved compared to current operating standard” (i.e. as a percentage of approved observations).

Criteria for state winter road maintenance

<table>
<thead>
<tr>
<th>Traffic flow (daily avg. through year)</th>
<th>Standard-class</th>
<th>Total Road length, km</th>
<th>Starting criteria Snow depth, cm</th>
<th>Maximum Time for completion</th>
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<tr>
<td>≥16 000</td>
<td>1</td>
<td>830</td>
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<td>8 000 – 15 999</td>
<td>2</td>
<td>3 300</td>
<td>2 cm</td>
<td>3 hours</td>
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<td>2 000 – 7 999</td>
<td>3</td>
<td>11 000</td>
<td>3 cm</td>
<td>4 hours</td>
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<td>500 – 1 999</td>
<td>4</td>
<td>35 000</td>
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<td>5 hours</td>
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<tr>
<td>&lt; 500</td>
<td>5</td>
<td>48 000</td>
<td>4 cm</td>
<td>6 hours</td>
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* Beginning with the winter of 2005/06, starting criteria and times for completion have been adjusted.
Road roughness
The SRA's standard for the roughness of paved roads depends on the announced speed limit and the traffic flow.

Road roughness is currently measured with the help of an international index called the IRI, and can be converted into vehicle costs and speed. Road rut depth is measured in millimetres. Both roughness and rut depths are compared to the maintenance standard, and the result is indicated as a lag. Road roughness is measured in the summer, when roads are smoothest. Measurements in the spring show much more roughness, with 30 per cent higher average IRI values not at all unusual.

On gravel roads, it is generally more difficult to maintain smoothness and surface structure than on paved roads. The difference disappears however on snow roads. The conditions of gravel roads are subjectively evaluated with the help of a special method description. With the help of dialogue projects and special road user councils, the SRA attempts to reach greater mutual understanding and more satisfied gravel road users.

The percentage of paved road is also a rough parameter of transport quality. Since the 1980’s, the percentage of gravel roads has been halved, thanks to paving. The goal is to pave all roads used by at least 250 vehicles a day, or 125 vehicles a day, if the road passes through residential areas.

Bearing capacity of roads and bridges
The intended bearing capacity of bridges has been significantly improved during the past 15 years, as a result of various bearing capacity projects. According to the long-range plan for 2004–2015, by 2012, all the bridges in the road network designated by the business community should be able to manage vehicles with a gross load of 60 tonnes (BK1-road network).

Road bearing capacity has been improved at a much slower rate through reinforcement measures. While roads designated by the business community as major ones are strengthened so that they have full bearing capacity all year round, during spring thaw, the smallest roads have only a bearing capacity that allows light traffic at low speeds.

The bearing capacity is monitored in terms of normal permissible load (bearing capacity class), and regarding bearing capacity restrictions during spring thaw.

Municipal streets, footpaths and bicycle paths
It is not yet possible to produce uniform descriptions of the condition of municipal streets, footpaths and bicycle paths.

Private roads
Routines for repeated measurements of the condition of private roads have not yet been developed.

Parameters for measurement of transport quality
A number of road network properties are of special importance to transport quality:
- Winter road conditions in the form of snow depth and friction (skid)
- Longitudinal and transverse roughness
- Road and bridge bearing capacity if this justifies bearing capacity restrictions
- Cleaning, especially on municipal streets and roads.

Road management has chosen one or more representative parameters for each road property. Although objective parameters are preferable, sometimes subjective assessments will have to suffice. In some cases, a group of users can also assess the situation. The parameter is used for monitoring the situation, and for defining standards (i.e. the desired state). Monitoring often compares the current situation to the operating or maintenance standard.
The SRA has a uniform nationwide operations and maintenance standard for the state road network, which is monitored according to uniform methods.

Outcome
State roads
A follow up of operating conditions of winter road maintenance shows that in about 95 per cent of the randomly selected sample, the condition satisfied requirements of the standard. This can be considered a high level of goal achievement.

During the year, the total length of gravel roads decreased by about 200 kilometres. In recent years, longitudinal roughness has improved in the forest counties, but remains unchanged in the rest of the country. Today, there is no significant difference between these parts of the country (see graph). The percentage of wide roads with rut depths of more than 15 millimetres has increased in the forest counties since 2000, while remaining largely unchanged in the rest of the counties. On narrow roads, this parameter is not relevant.

In recent years, the total length of roads that do not allow the highest bearing capacity class has decreased by about 300 kilometres through both reclassification and reinforcement measures. It now totals 6 045 kilometres. This percentage still remains larger in the forest counties (9 per cent, compared to 4 per cent for the rest of Sweden).

The extent of thaw-related restrictions varies widely from year to year. In 2005, the thaw was fairly normal. A bit less than 14 000 km were covered by the restriction, but the thawing period was shorter than normal. Bearing capacity measures have reduced the total length of roads in the risk zone. In 2005, the SRA has made tremendous efforts to enable lightweight vehicles to use all the state roads, all year round, by 2007. In general, bearing capacity restrictions on the state road network have decreased.

In 2005, more than SEK 150 million from the bearing capacity appropriation was used to repair damage from Winter Storm Gudrun. The maintenance measures have not been sufficient to compensate for the damage to the road network.

Degree of goal achievement
Subsidiary goal
According to the high transport quality subsidiary goal, transport quality for individuals and the business community remains high, and viewing the outcome, the goal appears to have been achieved.

As there is still not enough necessary data on the municipal and private road networks, the assessment of the degree of goal achievement is based on the state road network.

Interim goal
The interim goal calls for a gradual improvement of transport quality. In comparison with recent years, operational winter conditions are somewhat worsened, as has roughness on paved roads. Bearing capacity has improved. According to a comprehensive assessment of the outcome the goal has not been achieved.

Percentage of roads with IRI > 4

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Percentage of roads with rut depth > 15 mm on roads with annual daily traffic > 2000 vehicles

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Bearing capacity on the state road network

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<th>Parameters</th>
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<td>Class 1, km</td>
<td>90 592</td>
<td>90 961</td>
<td>91 584</td>
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<td>92 255</td>
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<tr>
<td>Non-class 1, km</td>
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<td>6624</td>
<td>6262</td>
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<tr>
<td>Class 1 %</td>
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<td>93.2</td>
<td>93.6</td>
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<td>Restricted due to spring thaw, km*</td>
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<td>13 634</td>
<td>10 535</td>
<td>14 449</td>
<td>13 888</td>
</tr>
<tr>
<td>Restricted due to spring thaw, forest counties, km*</td>
<td>10026</td>
<td>9308</td>
<td>6465</td>
<td>7664</td>
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<td>Thousands of day/km restricted road</td>
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<td>509</td>
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<tr>
<td>Thousands of day/km restricted road, forest counties</td>
<td>468</td>
<td>437</td>
<td>330</td>
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As there is still not enough necessary data on the municipal and private road networks, the assessment of the degree of goal achievement is based on the state road network.

**Goal analysis**

*Significant reasons for the goal results for 2005*

Insufficient appropriations for operations and maintenance, coupled with Winter Storm Gudrun led to increased lags on the state road network. According to the view of the National Plan for the transport system 2004–2015, the SRA has prioritised operational measures, which have meant maintaining, but not improving, the operating standards. Bearing capacity, expressed as reduced restrictions, has improved, but not at the planned pace.

**Increased cost**

The costs of complying with National Plan for the Transport System 2004–2015 have risen considerably from 2004:

- Costs for road management materials have risen by more than 4 per cent for operations, and 10 per cent for maintenance of paved roads, between 2004 and 2005.
- New and improved road facilities, road information and median barriers have meant new costs of about SEK 100 million.
- Tougher environmental and road safety requirements relating to road measures have meant new costs of about SEK 30 million.
- Vehicle mileage, especially for heavy vehicles, has increased during the year, increasing the rate of damage to the road network. However, as the rate of damage is small, its effects will not be noticed in the short run.
- Winter Storm Gudrun in southern Sweden caused damage to the state road network of about SEK 600 million. Half of this damage was repaired in 2005.

**Increased efficiency**

According to the National Plan for the Transport System 2004–2015, the SRA is required to increase the efficiency of operations and maintenance by at least one per cent each year. In order to enable the delegation and follow-up of these efficiency efforts, internal efficiency parameters have been defined for operations and maintenance. These parameters, however, require a better monitoring of operations, and an initial estimate of these parameters is being conducted.

In order to gain time and quickly realise savings, the SRA has begun analyses of operations (GAD) and maintenance (GAU). GAD has resulted in a number of centrally adopted measures that are expected to result in savings of about SEK 200 million, half of which through lowered standards, and the other half through increased internal efficiency. However, as the maintenance standards are often fixed as a result of multi-year agreements, these measures will be introduced gradually. The effect of internal efficiency actions according to GAD in 2005 is estimated at SEK 25 million, which represents 0.6 per cent of the cost of operations.

GAU has resulted in a number of centrally-adopted efficiency measures for the procurement of maintenance for paved roads, and are expected to give rise to savings of about SEK 125 million for 2005. Here too, it is not yet possible to evaluate the effects of these measures.

Savings as a result of increased efficiency and other savings have not been able to compensate for increased costs.

**Shortage of resources**

The failure to have achieved the goal must be viewed in relation to accessible resources. In 2004, the SRA was too short by SEK 600 million, and the same shortfall (not including the costs of Winter Storm Gudrun) applied in 2005, to implement the National Plan for the Transport System 2004–2015 operations and maintenance standard. In compliance to the plan’s strategy, the SRA prioritised the operating standard in 2005. The shortfall has therefore affected the maintenance standard (i.e. road capital), and primarily the technical situation that affects damage.

**Parties and measures that are deemed to have affected goal results for 2005**

Transport quality can be defined as the relationship between a traveller’s expectations of a trip and his or her actual experiences. This experience is primarily the result of measures by Road Management (i.e. state, municipal and private road managers). Travellers’ expectations about a trip will depend on the information that the road manager suppliers, and the other information channels that the traveller chooses.
The measures that have had the greatest effect on travellers’ experience, is the operations and maintenance of the existing road network. Improvements and new building often mean local improved transport quality. The handling of thaw restrictions and exemptions also can affect transport quality goal results.

Implemented or planned measures based on the results for 2005
In 2006, as well, there is a large shortfall of resources to the state roads to implement the National Plan for the Transport System 2004–2015 operations and maintenance standards. As a result, the SRA, according to its commitments in the plan, have now prepared a strategy to solve the problem. Three alternatives have been considered:

- Continuation of the present strategy that means primarily “borrowing” from road capital to satisfy today’s travellers at the expense of tomorrows’. Road smoothness, however, must be impaired in order to limit this “borrowing.”
- An unconditional examination of all operations and maintenance standards to better balance various transport policy goals. This will mean that operations standards, including winter operations, will be adversely affected, and travellers will experience a generally impaired transport quality.
- Transfer of funds from the new programme for construction, in order to cover the shortfall.

The SRA supports the option of transferring funds from the construction programme, unless increased appropriations for operations and maintenance can be obtained.

A campaign to increase operating and maintenance efficiency is being discussed. This campaign will be a continuation of the GAD and GAU analyses. No decisions have been made yet, and these efforts will not yield results before 2007.

A new, more generous approach to thaw restrictions started in 2005. This should improve transport quality, especially in the Northern region, but will mean increased road maintenance costs.

ROAD SAFETY

SUBSIDIARY GOAL
Safe traffic, with no fatalities or serious injuries as a result of traffic accidents on the road transport system. The road transport system shall be adapted to the conditions required to meet this long-range goal.

Intentsions and purposes of this goal
Based on the goal, the degree of road safety is defined using the parameters of fatality, serious injury and minor injuries. ‘Serious injuries’ involve injuries such as fractures, crushing injuries, impairment of bodily parts, serious cuts and abrasions, concussion and internal injuries. Other injuries that are expected to necessitate admission to hospital are also regarded as serious injuries. Road safety can be defined as the absence of fatalities or serious injuries resulting from road accidents.

The goal can be divided into two parts:

- The first part defines the desired result: “Safe roads, where the long-term goal of road safety is that nobody should be killed or seriously injured as a result of accidents in the road transport system”.
- The second part provides guidance about how the goal is to be achieved: “The design and function of the road transport system shall be adapted to the requirements arising from the first part of the goal”.

The two parts of the subsidiary goal are shown in Figure 3, which illustrates the estimated causation chain of the road transport system. User conditions are the different conditions arising in the traffic when the road transport system is used, such as vehicle speed, road comfort, noise and emission of vehicle exhaust. Consequences for society are consequences that affect society beyond the traffic system itself, such as injured people, polluted lakes, and increased or decreased growth.

First part of the goal: fatalities and serious injuries
In October 1997, the Government decided on a subsidiary goal in conjunction with a new policy for road safety known as Vision Zero. The goal for Vision Zero is that, in the long term, nobody will be killed or seriously injured as a result of road accidents.
The decision also implies that it is not necessary to prevent all material damage or minor injuries, even though these cause substantial costs to society and the individual. Eliminating the number of deaths and serious injuries is the most important priority.

Parameters – first part of subsidiary goal
The first part of the subsidiary goal is expressed in terms of parameters, i.e. “fatality” and “serious injuries”. Elaborate measurement systems are in place for the “fatality” parameter, and work is under way to define and measure “serious injuries”.

However, the parameters of fatality and serious injury have weaknesses. The random variation is large, and the statistics provide imprecise data about the specific measures that have impacted the number of fatalities. Furthermore, the parameters cannot be used to precisely prioritise measures for the subsequent year.

Second part of the goal: the design and function of the road transport system
Under Vision Zero, concern for human life and health is an absolute requirement in the design and function of the road transport system. The design of the safe road transport system is therefore scaled to allow for human tolerance of external impact.

Parameters – second part of subsidiary goal
In this case, the subsidiary goal is not expressed directly in terms of parameters, so design and function must be translated into parameters. To allow this translation, design and function must be defined for the safe road transport system.

Development of parameters for measuring the second part of the subsidiary goal
The SRA is currently developing parameters for measuring the second part of the subsidiary goal for road safety. The safe road transport system and the criteria for design and function have been defined, so proposals for parameters that reflect these criteria can be developed.

In principle, the safety problem in road traffic can be attributed to an imbalance between the kinetic energy permitted in the traffic and the safety that is built in to the system. Human tolerance of external impact is the fundamental and limiting factor. This can be assumed to be a given and a constant, even though there are variations with gender, age, etc. A goal of all work on designing the road transport system is that nobody is to be subjected to injuries that result in an unacceptable loss of health.

A safety philosophy to eliminate the number of fatalities and serious injuries in road traffic is based on preventing accidents as far as possible. However, in spite of these efforts, the system is also designed to accept that accidents will occur nevertheless. The road traffic system must therefore ‘forgive’ people. The principle is similar to the critical loading limits applied in the environmental field.

The design of the road transport system is based on a regulated usage with allowance for normal human error and incorrect actions. The safety then relies on the users of the system keeping within the defined framework, and the designers dimensioning the system in relation to the weakest users.

In a road transport system designed according to these principles, it is crucially important, for example, to keep speeds within the limit for which the system has been dimensioned. Speed is the regulating factor that can be used to compensate for deficiencies in the design. Every deficiency in the design of the vehicle or the road environment, or a combination of these, can be compensated by lower speeds.

Development of a safe road transport system, and parameters for measuring this, requires an understanding of the complicated relationship between the behaviour of road users, protection systems, safety standards of vehicles and road speed, and so on. A model for road safety has been developed.

Figure 4 on the next page shows an example of a model applied to safe car travel. Similar applications can be made for other road users, such as pedestrians and cyclists.

Examples of parameters
There are already parameters that can be used to measure the development for the second part of the subsidiary goal. However, the parameters are not used consistently, are not compiled in reviews, nor are they used in planning activities.

The parameters should provide information about the safety-related components in the system, and should be usable in the annual analysis of goals and planning.
Examples of such parameters are shown in the box. Some are already in use, but most are examples that need to be developed further in terms of definition and measurement method.

1. Human tolerance of external impact is a given, and is the fundamental and limiting factor for safe car travel
2. The road user makes conscious or unconscious errors and mistakes in road traffic. In a safe system, we plan for this. Certain incorrect actions are more frequent, while others are less common.
3. What is important is that the road users are largely willing to comply with the rules that have a major impact on the kinetic energy in the system.
4. The three factors that determine the overall passive safety in the system are the road’s safety standard.
5. The vehicle’s safety standard.
6. The use of safety systems. In the case of car travel, this entails the use of seat belts, and for cyclists the use of helmets, etc. The division of responsibility between these components can vary. If roads are built for people not wearing seat belts, in cars that are unsafe in crashes, this then places a greater demand on the safety standard of the road, compared with roads that are built for people wearing seat belts in modern cars.
7. The unconscious mistakes that people can make, along with the accidents resulting from the mistakes, and the overall level of the passive safety, determine the safe speed.
8–9. Deficiencies in the design may be compensated by lower journey speed. Generally speaking, at lower journey speeds, the emphasis lies on the car’s ability to protect, while higher speeds place greater demands on the system’s overall level of safety.
10. Surveillance and driver support are also needed so that the road users, for example, can keep speed at a safe level. When we have succeeded in identifying the most important factors, and the correct relationships between them, and there is no gap in the assumption of responsibility, we will attain safe car travel.

In this way, work on traffic safety that currently uses fatalities and serious injuries as the reference can use the road safety system as the reference instead. This can reduce the randomness and increase awareness about which measures have been effective, or which measures need to be taken, to most efficiently achieve the desired changes in the design and function of the road transport system. A more systematic way of working can be introduced.

If the Government chose to define goals linked to the function of the road transport system instead of the number of people killed, it would also make it possible to decide on areas of priority. This would also make it possible to review the results annually, and exert pressure on different parties to take responsibility for the degree of goal achievement.

Outcome – subsidiary goal
First part of the goal
An estimated 440 people were killed in traffic in 2005. In 2004, 480 people were killed and in 2003, 529.

Second part of the goal
Parameters and data need to be further developed in the way described above. Parameters are needed that show developments in the design and function of the safe road system.

Degree of goal achievement - subsidiary goal
The outcome is far from the goal of zero fatalities and zero serious injuries, which also means that the design and function of the system is far from adapted to the Vision Zero decision.
The subsidiary goal is neither quantified nor associated with a given time. The trend is that the number of fatalities is falling, which also indicates improvements in the design and function of the system. Overall, the goal has been achieved.

**Goal analysis – subsidiary goal**

Relevant parameters for design and function are somewhat lacking, so the goal analysis is limited to the first part of the subsidiary goal, which is an attempt to explain the statistics regarding fatalities.

An external factor that affects the outcome is the vehicle mileage, i.e. the total driving distance for all vehicles. Other external factors include the age structure of the population, the climate, and indirect factors such as the consumption of alcohol.

In recent years, the SRA has analysed in detail the numbers of fatalities and serious injuries for the period since traffic switched to the right side. Over this period of time, fatalities have shown a stepped downward curve, and the number has fallen by an average of 3 per cent per year in spite of constantly increasing vehicle mileage. Factors thought to be most significant are fewer unprotected road users, expansion of infrastructure, increased use of seat belts, and increasing passive safety in cars.

If road safety continues to be a priority in planning, indications are that we can ultimately get close to the goal of zero fatalities.

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**INTERIM GOAL**

Reducing the number of fatalities and serious injuries resulting from road accidents, so that the number of fatalities from road accidents will be fewer than 270 in 2007, throughout the entire road transport sector.

The interim goal of 270 fatalities in 2007 stems from the ambition to halve the number of fatalities in road traffic in relation to 1996.

**Outcome – interim goal**

In 2005, an estimated 440 people died in road accidents. In 2004, the figure was 480, and in 2003, 529 people were killed. In the period 2003–2005, the number of fatalities has fallen by 89.

**Degree of goal achievement – interim goal**

In 1996, 537 people were killed. A linear downward trend to 270 fatalities in 2007 would mean that fatalities would need to decrease by about 25 per year. This linear annual decrease has not occurred, so the requirement becomes tougher by the year.

Viewed from the 2004 level, fatalities need to fall by 70 per year in order to achieve the goal of 270 fatalities in 2007, so a maximum of 410 could be killed in road accidents in 2005. The estimated figure was 440 for 2005, so the interim goal for 2005 has not been achieved.

**Goal analysis – interim goal**

The trend is in the right direction, but is too slow and it is uncertain whether the interim goal will be reached in 2007. There are many explanations for the year’s outcome, but the dominating factors are the speed limits and the number of drunk drivers.

Strictly speaking, nothing definite can be said about the statistics concerning the number of fatalities in 2005. The outcome is largely within the variations that can be explained by randomness, but underlying long-term trends can be identified.

However, 89 fewer fatalities in the last two years cannot be regarded as a random outcome. Instead, consistent road safety measures by all parties must be the reason for the decrease. The SRA has contributed by implementing a greater percentage of physical measures on the state road network than it did a decade ago, and more municipalities are improving street and road environments by physical measures to improve road safety. Police surveillance has resulted in more violations being reported, which has a positive effect on general road user behaviour. Actions taken by parties also coincided with other favourable factors, such as safer cars.

The numbers killed in head-on collisions and overtaking accidents has fallen dramatically since 2002. This is the single most discernible trend, and supports the argument that crash barriers on roads with two-way traffic significantly reduce the risks. At the same time, accidents involving single cars have not decreased, which can very probably be attributed to increased alcohol consumption, excessive speeding, and low passive safety in the areas beside roads. If the number of people killed in single-car accidents had fallen in the same way as for head-on collisions, the deaths resulting from single-car accidents would have fallen by 75 a year. Fewer pedestrians were killed, because more built up areas now have speed-reduction measures and separation of motor traffic from unprotected road users.

**Areas of activity thought to have a significant impact on the goal outcomes in 2005**

It is very difficult to judge the importance of measures taken by individual parties in a specific year based on the changes in the number of fatalities. In those cases where the direct association between an action and its impact on the number of fatalities is not known, changes in the function of the road transport system can be used as a bridge to calculate this impact. This particularly applies to measures taken to promote changes in behaviour. An example is the effect of a seat belt campaign on the number of fatalities. This connection is not known, but what is known is the relationship between a change in the percentage of people wearing seat belts and change in the number of fatalities. Using measurements of the campaign’s effect on the percentage of people wearing seat belts, the impact on the number of fatalities can be calculated.
Using parameters linked to the design and function of the road transport system, parties and the measures they take can be more clearly linked to changes in the number of fatalities from one year to another. Using current measurements of changes in the design and function of the road transport system, and knowledge about different effects, it is already possible to show the theoretical impact of the different measures taken in 2005. The reality is so complex that it is not possible to simply use the statistics regarding the number of fatalities to make such a division. Division of the calculated effects for different areas of activity is shown in Figure 5, (page 28). The estimated causation chain of the road transport system – the theoretical contribution of different areas of activity to the achievement of goals in 2005.

Road safety measures on the state road network

Measures taken on the state road network in 2005 are expected to reduce fatalities by an estimated seven per year. Work on creating dual carriageways has continued, and in 2005 approximately 240 kilometres of road were fitted with a median barrier. Other physical conversions include clearing roadside areas from dangerous, fixed objects, rebuilding junctions, and building footpaths and cycle paths.

Measurement of the percentage of vehicle mileage on roads of a four-star standard according to Euro RAP would give a more accurate picture of the outcome regarding physical traffic safety measures than information about road length on which measures had been taken or statistics about injuries. The statistics about the percentage of vehicle mileage on roads of a certain safety standard are not random, and also give an indication of the efficiency of the work, i.e. how much vehicle mileage has benefited from the measures taken.

Road safety measures on the municipal road network

On the municipal road network, there is no overall picture of the nature and scale of measures taken. Today, for example, the total number of speed-reducing activities implemented is not measured, nor are the number of junctions that have been replaced with roundabouts. Furthermore, there is no information about how much remains to be done before the municipal road network is safe.

However, data is available that indicates that the municipalities have systematically focused on physical measures in street environments in recent years, and which have made a major contribution to improving the safety of unprotected road users. In 2005 the number of fatalities on the municipal road network fell by 33 compared with 2004.

On the municipal road network too, the parameter of the percentage of vehicle mileage on roads and streets with improved safety standard would give a better picture of the effectiveness of the measures taken than the current measurement of the number of fatalities.
The following measure can indicate how road safety can be improved in built-up areas: the parameter of the percentage of vehicle mileage with mixed traffic (i.e. where protected and unprotected road users travel on the same traffic surface) with a speed limit of 30 km/h. The percentage of vehicle mileage where protected and unprotected road users are completely separated at speeds of over 30 km/h would also give an indication of how the problem of road safety in built-up areas can be solved.

Measures to increase the use of seat belts
In collaboration with the Police and the National Society for Road Safety, the SRA has continued to campaign for increased usage of seat belts. Directed surveillance was combined with various information campaigns at national, regional and local level. In 2005, the police reported 53,322 car drivers and passengers for seat belt violations, which is an increase of 10 per cent compared with 2004. Police measures increase the use of seat belts by an estimated 0.5 per cent, a figure that also corresponds with the actual statistics recorded on seat belt use. An increase of 0.5 per cent in the use of seat belts is estimated to result in four fewer fatalities.

An increasing number of new cars are equipped with seat belt reminder devices. This is highly significant as studies show that seat belt use in such cars is 99 per cent. Of the cars that Euro NCAP tested in 2005, 80 per cent had such systems.

Today, there are parameters and ways of measuring the percentage that use seat belts in road traffic. Unfortunately, the degree of coverage is unsatisfactory, and it is not possible to measure the status on a regional basis. If the Government set up goals to increase the usage

Figure 5. The estimated contribution of different areas of activity to the results for 2005. A question mark indicates that no information is available.
of seat belts, these would promote more precise management of the work on road safety. It would probably also increase the incentive to develop measurement methods that would improve the degree of coverage. This would give the regional and local parties more information about the outcome of their measures, and thereby help to improve the efficiency of the work.

Effect on speeding
In 2005, the police fined approximately 10,000 more drivers for speeding offences than in 2004, which is an increase of 3.5 per cent. It is estimated that this reduces the number of fatalities by two a year.

The National Police Board and the SRA are working on a joint project for automatic traffic surveillance using cameras (ATK). The purpose is to reduce vehicle speed on stretches of road where accidents are especially common. By the end of the year, 418 camera boxes had been installed on 9,630 km of road. In 2005, the work was largely aimed at new technology using completely automated surveillance. The new technology will not be commissioned until 2006, so ATK has not improved road safety in 2005.

When measuring the impact of speeding on traffic safety, the parameter of average speed is preferable to the percentage of speeding offences, because the former is not affected by changes in the speed limits. The percentage of vehicle mileage exceeding the speed limit, and the travel speed, has been measured up to 2004. Here too, the Government can choose to introduce deadlines these parameters to direct more specifically the work on road safety. The statistics can be collected annually, they are not affected by randomness, and a direct link can be made to the number of fatalities.

Alcohol in traffic
The 1.76 million breathalyser tests conducted by the police in 2005 were 200,000 more than in 2004. This should result in an estimated eight fewer fatalities.

Apart from routine checks when cars are stopped on the road, the police have also conducted a number of directed campaigns. Further measures include reducing the safety margin deduction in Evidenzer (instrument that provides evidence of drunken driving) and purchasing new alcometers for all police officers on outdoor duty.

“Don’t drink & drive” is a joint nationwide project that aims to influence young people into refraining from using alcohol when on the roads. Surveys of attitudes show that the project was much more effective with young people in 2005 than in 2004. Important collaboration partners are the SRA, the Swedish Abstaining Motorists’ Association (MHF), the National Society for Road Safety (NTF) and the police.

The “Skellefteå model” is a project run jointly by the SRA, the police, the health services and the social services. The aim is to offer drunk drivers contact within 24 hours.

The SRA has estimated that each day in Sweden, there are approximately 14,000 car journeys made with a driver intoxicated with alcohol. However, this information is based on old data, and data collection is not continuous. A study of fatal accidents in southern Sweden showed that approximately 25 per cent of the accidents were alcohol or drug-related. There is no continuous follow-up at national level. Parameters must be developed that measure the use of alcohol in traffic, and not just in accidents. Certain analyses have been started, aimed at identifying better parameters.

Use of cycle helmets
Twenty-four per cent of cyclists used helmets in 2005. An increase of 3 percentage points is estimated to reduce fatalities by one, and serious injuries by four, each year.

On 1 January 2005, a new law came into effect making the use of cycle helmets compulsory for children under 15. Results indicate a clear increase in the use of helmets by children, but use of helmets by adults remains at the same level as last year. Young children that cycle in residential areas used cycle helmets much more than in 2004. The use of helmets has also increased among children who cycle to school.

There are already methods for measuring the percentage of cyclists that use helmets in road traffic. However, measurements of helmet use, like seat belts, have an unsatisfactory degree of coverage. Parameters need to be developed at regional and local levels.

Safer cars
The greater safety of new cars has a growing impact on the risk of being killed or seriously injured in road traffic. Since Euro NCAP started testing in 1996, the average result has improved by 2.5 units on a five-point scale. This improvement is estimated to lead to seven fewer fatalities per year. The percentage of new cars with anti-skid systems (ESC, electronic stability control) that are sold in Sweden will reduce the number of fatalities by an estimated three per year.

The advantage of using a parameter like the percentage of new vehicles of a certain safety standard in traffic is that it is possible to calculate the total vehicle mileage driven using safe and unsafe vehicles respectively. However, in this case, sales statistics can be used as an indirect parameter of the vehicle mileage, because the investment in a new car is so big that it can be assumed that the car will be used. Consequently, the percentage of safe cars sold is sufficient in this case.
GOOD ENVIRONMENT

SUBSIDIARY GOAL
A good environment in which the road transport system is responsive to providing good and healthy living conditions for everyone, and where the natural and cultural environments are protected from injury, and where the natural and cultural environments are protected from injury. Good conservation of land, water, energy and other resources shall be promoted. The design of the road transport system shall contribute to the achievement of the national environmental goals.

Degree of goal achievement – the subsidiary goal
Developments have moved in the right direction regarding some areas, mainly through new and improved exhaust purification technology. Other areas, such as emissions of the greenhouse gas carbon dioxide and the environmental and cultural area, have seen less positive development. Overall, development is moving towards a partial achievement of the goal.

INTERIM GOALS
A Carbon dioxide emissions from road traffic by 2010 shall not exceed 1990 levels. By 2005, there shall be a decrease of emissions from 1995 levels of nitrogen oxides by at least 40 per cent, of sulphur by at least 15 per cent and of volatile organic compounds by at least 60 per cent.
B Levels of carbon monoxide, nitrogen dioxide, sulphur dioxide, soot and particulate matter in built-up areas shall be below the limit values and established environmental standards. Emissions of carcinogens in 2005 shall not exceed half of the 1998 values.
C By 2007, no one shall be exposed, in their residence, to traffic noise exceeding a level equivalent to 65 dB (A) outdoors. Along state roads, this shall be achieved by 2005. In cases where the outdoor level cannot be reduced, the goal should be that the equivalent indoor level shall not exceed 30 dB (A).
D Environmentally hazardous material shall not be introduced into the infrastructure, use of non-renewable material shall be minimised, and material should be recycled.
E New road transport facilities shall be placed in a way so they work in harmony with their surroundings, and be designed to take into consideration natural and cultural values.

Outcomes and analysis as well as the degrees of goal achievement for the five interim goals for a healthy environment follow below. For a deeper analysis regarding the goals set for 2005, see the theme chapter on the environment, starting on page 48.

Climate impact: Carbon dioxide – outcome and analysis

INTERIM GOAL A
Carbon dioxide emissions from road traffic by 2010 shall not exceed 1990 levels.

The environmental impact of road traffic depends on the vehicle mileage, the proportion of various fuels and the emissions per driven kilometre. Engines have become more efficient during recent years, but this has been counterbalanced by increases in engine output and vehicle weights. The average engine output for newly registered passenger cars increased by 10 per cent between 1999 and 2003, whereas the proportion of cars heavier than 1.5 tonnes increased from 35 per cent to 50 per cent. The proportion of light goods vehicles that are diesel driven rose from 28 per cent in 1995 to 59 per cent in 2004. Of passenger cars, 5 per cent are currently diesel driven. Diesel driven vehicles usually consume less fuel and emit less carbon dioxide and hydrocarbons than corresponding petrol driven vehicles. However, they usually emit more nitrogen oxides and particulate matter.

The average per-kilometre fuel consumption of new passenger cars in 2003 was the highest amongst the old EU member countries (24 per cent higher than the EU average). The differences are explained by heavier cars, a smaller proportion of diesel engines and higher engine output.

Carbon dioxide – degree of goal achievement
The emissions of carbon dioxide are proportional to the consumption of fossil fuels. Carbon dioxide emissions are estimated to have increased by 1 per cent during the past one-year period. From 1990, carbon dioxide emissions have increased by 11 per cent, largely due to
increased emissions from heavy goods vehicles. In 2005, emissions from both heavy and light goods vehicles grew due to increased vehicle mileage. 18

The forecast for vehicle and fuel development that has been for calculating future emissions of carbon dioxide, nitrogen oxides, sulphur, volatile organic compounds and carcinogens is conservative, highly simplified and has been based on today’s conditions. At the oil price, USD 50 per barrel, estimated in the transport forecast, many alternative fuels will be able to compete, especially in the long run. This, which has not been taken into account in the forecast. This year, estimates of carbon dioxide, hydrocarbon, sulphur dioxide and nitrogen oxide emissions are based on a new model, ARTEMIS. The model previously used was the EMV. For carcinogens, the TCT model is still used.

The mixing of ethanol into petrol has now in effect reached the 5 per cent limit allowed within the EU. Currently, 91 per cent of the motor petrol used in Sweden contains 5 per cent ethanol. The proportion of biofuel of the total fuel consumption in the road traffic sector saw a modest increase between 2004 and 2005 – from 2.6 to 2.7 per cent. Without increased use of biofuel and other measures, such as more fuel efficient vehicles and controlled traffic growth, it will not be possible to achieve the interim goal for the transport sector. For the goal to be achieved, emissions will have to decrease by slightly over 2 per cent per year. 17

Air quality – outcome and analysis

INTERIM GOAL A
By 2005, there shall be a decrease of emissions from 1995 levels of nitrogen oxides by at least 40 per cent. For sulphur the decrease shall be at least 15 per cent. For volatile organic compounds at least 60 per cent.

INTERIM GOAL B
Levels of carbon monoxide, nitrogen dioxide, sulphur dioxide, soot and particulate matter in built-up areas shall be below the limit values and established environmental standards. Emissions of carcinogens in 2005 shall not exceed half of the 1998 values.

The impact of road traffic on air quality depends on vehicle mileage, the proportions of various fuels and the emissions per driven kilometre. Air quality is also affected by the amount of particulate matter generated by tyre-road surface wear and the whirling up of this matter from the road area. Overall, the air quality in Swedish built-up areas has improved, and the levels of some of the pollutants most harmful for health and the environment have been reduced by half since the 1980s. Despite this, exceeding of limit values and environmental quality standards continues to occur. Currently, Swedish legislation contains environmental quality standards for sulphur dioxide, nitrogen dioxide, nitrogen oxides, particulate matter (PM 10), lead, benzene, carbon monoxide and ozone. The standards most important for the road traffic sector are the ones concerning nitrogen dioxide and particulate matter, although the ones concerning benzene and ozone are also relevant. The limit value for soot is still effective.

Surveys indicate that it will be very difficult to achieve the environmental quality standards for nitrogen dioxide and particulate matter (measured as PM10) in some cities. Meeting the requirements for other regulated pollutants, such as sulphur dioxide and carbon monoxide, is not believed to be difficult. In 2005, the standard for carbon monoxide was exceeded on Sveavägen in Stockholm due to a vehicle event, but the goal for the gas was considered achieved.

Air pollution levels depend on the amount of local emissions and the amount of pollutants transported by the wind from other areas. Temperature and ventilation conditions also affect local air pollution levels.
Pollution level measurements for the winter half 2004/2005 show that the previous rapidly decrease has slowed, so that air quality has improved less during the past few years. Road traffic emissions have continued to decrease during the past few years, despite increased vehicle mileage. The sections below will report the emissions of each substance from the road traffic system (interim goal A) and to some degree B), as well as the levels of these substances in the built-up areas where measurements are carried out. A more detailed description of the respective substances as well as development analyses can be found in the chapter Theme: The Environment – a historical review, starting on page 48.

Nitrogen oxides
Nitrogen oxide emissions decreased by 45 per cent since 1995, and so the interim goal was achieved. In 2005, emissions decreased by 4 per cent. There has so far been no effective way of purifying nitrogen oxides in diesel driven vehicles, and this vehicle group currently accounts for 60 per cent of emissions. However, new exhaust requirements that will be introduced from 2005 to 2009 are expected to significantly reduce both particle and nitrogen oxide emissions from new heavy vehicles. However, whether this will become reality depends heavily on whether the advanced exhaust purification systems SCR and EGR will work as planned.

During the winter 2004/2005, street-level nitrogen dioxide measurements in cities including Stockholm, Göteborg and Mölndal showed an exceeding of the environmental quality standard. According to estimates, a fifth of Sweden’s municipalities have built-up areas with nitrogen dioxide levels above the standard. The goal has not been achieved.

Between the winters 1986/1987 and 2004/2005, nitrogen dioxide levels in built-up areas decreased by about 40 per cent, according to a population weighted index. However, these levels are decreasing at a declining rate due to increased levels of ground-level ozone. Another reason for the decline is a growing number of diesel driven vehicles with catalytic converters, as the nitrogen oxide emissions from these vehicles containing a higher proportion of nitrogen dioxide.

In 2005, the Government decided that action programmes will be prepared for Malmö, Helsingborg, Uppsala and Umeå. Action programmes have already been prepared for Stockholm County and the Göteborg region. The measures so far mainly concern the road transport sector.

Sulphur – sulphur dioxide
Sulphur emissions from road traffic have decreased heavily during the past 15 years and are now only 1 per cent
of what they were in 1990. Since 1995, emissions have decreased by 95 per cent. The interim goal has thus been achieved. 20

The environmental quality standard for sulphur dioxide levels was also met during the winter half. The goal has been achieved.

**Volatile organic compounds**

According to estimates based on the ARTEMIS model, hydrocarbon emissions have decreased by about 60 per cent since the base year. However, due to the large margin of error for the calculations, it is uncertain whether the interim goal has been achieved. 21

In 2005, emissions decreased by 6 per cent. Passenger cars are responsible for 85 per cent of current emissions. Driving with a warmed-up engine causes only 27 per cent of current emissions, whereas cold starting and evaporation are responsible for 40 per cent and 33 per cent respectively. Evaporation is sensitive to fuel vapour pressure. Changes in the vapour pressure explain the emission peak between 1986 and 1990.

The levels of the volatile organic compound benzene in built-up areas were lower in the winter 2004/2005 than the year before. According to the IVL air quality index, benzene levels decreased by about 80 per cent between 1992 and 2005. However, calculations show that 5–10 per cent of built-up areas risk exceeding the next environmental quality standard for benzene, effective from 2010.

**Particulate matter and soot**

Particle emissions from road traffic are partly a result of exhausts and partly a result of road surface wear caused by studded tyres, tyre wear, brake wear and gritting. Near roads, whirled up wear particles can be responsible for 50–80 per cent of total air particle levels (calculated as PM10).

According to legislation, the environmental quality standard for particulate matter (PM10) was to be met by 2005. This goal was not achieved. Particle levels have exceeded the standard especially in narrow street environments and on heavily used traffic routes.

During the winter 2004/2005, the standard was exceeded in Stockholm, Uppsala and Kristianstad, and probably in street environments in several other cities which did not measure their levels. According to the National Environmental Protection Agency’s estimate, built-up areas in at least a fourth of Sweden’s municipalities risk exceeding the standard. So far, the Government has decided that action programmes will be prepared for Norrköping, Uppsala and Göteborg. An action programme has already been prepared for Stockholm County. The measures so far mainly concern the road transport sector.

Soot levels decreased by 58 per cent between the winters 1986/1987 and 2004/2005, and the 2005 levels were below the limit value at all measuring points. The goal has been achieved.

**Carcinogens**

Carcinogen emissions have decreased by 57 per cent since 1998. The goal has been achieved.

The EMV model supports this by showing a 58 per cent reduction for the same period. During 2005, emissions decreased by 13 per cent. 22

**Ground-level ozone**

In many Swedish built-up areas, ozone levels currently exceed the environmental quality standard for protection against health effects, which is to be met by 2010. In addition, at least Southern Sweden is probably not expected to meet this standard by 2010.
Measures – carbon dioxide and air quality

A broad arsenal of measures will be needed to decrease the emissions of climate affecting gases and to improve air quality, as well as to determine levels of goal achievement. In 2005, several bodies carried out measures that contributed significantly to these objectives. What follows are examples of both measures and important studies and new methods for calculating outcomes.

Vehicles and fuels

Environmental issues relating to vehicles and fuels received considerable attention in 2005. The SRA carried out several Government assignments within the area. These included preparing a proposal for a new environment class for light goods vehicles with low particle emissions, and studying the possibility of converting passenger cars so that they can operate on alternative fuels, such as ethanol and gas. The SRA also investigated the possibility of increasing the percentage of biofuel in Environment Class 1 diesel and formulated specifications for an environmentally-friendly car for state procurement. Several of the SRA’s studies during the year garnered a great deal of attention within the transport sector.

Between 2004 and 2005, registrations of new passenger cars able to operate on Ethanol E85 increased from 5 200 to 9 500 vehicles. The corresponding increase for methane gas (biogas or natural gas) was from 1 000 to 1 800 vehicles and for hybrid fuel from 700 to 1 900 vehicles.

Economical driving

In 2005, there were seven companies providing education in economical driving for light and heavy vehicles according to the SRA’s criteria.

On 1 March 2006, new regulations came into effect regarding the training of Class B driving license applicants. The regulations include the addition of economic driving to the training curriculum. Driving students are to receive, and be tested on, both theoretical and practical knowledge of environmentally-friendly driving. There are around 100 000 Class B driving licence applicants annually.

Quality assurance of transports

The SRA assures the quality of transports through a joint traffic safety and environmental project. The aim of the project is to enable various bodies to make sure their own and contracted transports are environmentally friendly and safe, and to help these bodies work according to the principle of constant improvement. During 2005, the SRA collaborated with 526 companies, municipalities, county councils and authorities. This included helping the various bodies carry out transport studies and current situation analyses, create journey and transport policies and carry out follow-ups and educational efforts. These measures will contribute to improvements in the areas of carbon dioxide emissions, health-impairing emissions, speed, seat belt use, alcohol and drugs and vehicle safety.

Sustainable travel

The SRA collaborates with various bodies to establish long-range mobility efforts that these bodies can then carry on with on their own. These cooperative projects aim at decreasing the demand for individual transports, improving accessibility and increasing the proportion of safe and environmentally friendly journeys. During 2005, the SRA cooperated with 217 municipalities, sports organisations, companies and authorities. Efforts have focussed on commuting, work related travel, travel to and from school and sport and event related travel.

Local investment programmes

To speed up the transition towards an ecologically sustainable Swedish society, support has been given to local investment programmes (LIP). Within the framework of these programmes, 180 different traffic projects were carried out during the period 1998–2002. Most of them included measures to persuade road users to choose environmentally friendly modes transport. Around a fourth of the projects entailed investments in various kinds of emission control technology. In 2005, an evaluation of the LIP traffic projects showed that most measures had led to positive results.

Climate investment programme

The SRA’s climate investment programme (Klimp) includes measures to reduce greenhouse gas emissions, such as promoting the use of biogas, mobility offices and other mobility management measures. Since the programme started in 2003, over SEK 270 million has been distributed through grants to a large number of projects connected to the road transport system. The sum represents 30 per cent of the total SEK 804 million distributed so far. Many municipalities also work with the climate issue without receiving funding support from the state.

A new European emission model for the transport sector

In 2005, the SRA introduced the new European emission model for the transport sector, ARTEMIS, making Sweden the first country to use the model. The model contains the latest knowledge of vehicle emissions and activity data. The emission calculations for air pollutants for this Sectoral Report were made using ARTEMIS.

New model tool for calculating air quality

During the year, a new model tool for calculating air quality near roads was developed and introduced – the Swedish Internet Model for Air Pollution (SIMAIR). Swedish expertise in the fields of traffic simulation, traffic emis-
Sions, long-distance transports and local model tools was applied in the development of the model. Some 40 municipalities have registered with the service so far. The SRA financed the project together with the National Environmental Protection Agency and carried it out together with the Swedish Meteorological and Hydrological Institute (SMHI).

Trials with dust binding
During the year, the SRA carried out several demonstration projects in cooperation with municipalities to study the effect of operation measures on particle levels near roads. The trials included dust binding by calcium magnesium acetate (CMA) and magnesium chloride (MgCl2) and flushing of road edges. The results from the tests showed that CMA and MgCl2 used on paved roads resulted in 20–40 per cent lower particle levels (PM10) during at least a few days.

Study on wear particles and their effects in lung cells
Assigned by the SRA, the WearTox project studied inhalable particulate matter from tyres, road surfacing and friction materials, and how wear particles from different surfacing types affect the inflammation mechanisms in human lung cells. The project was carried out by the Swedish Road and Traffic Research Institute, Linköping University Hospital and the Lund University Faculty of Engineering. One conclusion of the study was that road dust caused by wear can be at least as harmful to health as the particulate matter produced by combustion in a diesel engine. The project also showed that the choice of rock material in road surfacing significantly affects both the amount of wear particles and their harmfulness. In addition, the study indicated that there is a large difference between studded and non-studded tyres regarding the amount of wear particulate matter they generate.

Economical driving is now part of the training for Class B (passenger car) driving license applicants
Road traffic noise – outcome and analysis

INTERIM GOAL C
By 2007, no one shall be exposed, in their residence, to traffic noise exceeding a level equivalent to 65 dB (A) outdoors. Along state roads, this shall be achieved by 2005. In cases where the outdoor level cannot be reduced, the goal should be that the equivalent indoor level shall not exceed 30 dB (A).

The transport policy interim goal focuses on improving conditions for the persons most exposed to noise. These persons comprise slightly over 10 percent of those disturbed by noise levels above the Government’s guidance values for satisfactory sound quality. Totally, there are about 39,000 persons along state roads who are exposed to outdoor road traffic noise levels exceeding 65 dB(A). However, the SRA’s policy has been to prioritise the reduction of indoor noise levels. According to the interim goal, there was to be no more residents along state roads exposed to indoor traffic noise levels equivalent to 65 dB(A) outdoors by the end of 2005. This goal was not achieved. Along state roads, especially in metropolitan areas, there were some 9,000 residents at the end of the year who were exposed to outdoor levels over 65 dB(A) and had not received measures to reduce their indoor noise levels below 30 dB(A). As some property owners either fail to reply to or refuse to accept, measures offered, it is impossible to fully achieve this goal. Moreover, as traffic increases, additional people are exposed to noise.

For approximately 5,100 persons along the state road network who were previously exposed to road traffic noise above 65 dB(A) outdoors, measures were taken during the year to bring their indoor noise levels below 30 dB(A). About 1,600 of these persons have also experienced a reduction of outdoor noise.

The SRA does not have any continuous monitoring of the number of people exposed to noise on municipal roads. According to an earlier study, there were just under 200,000 people exposed to outdoor noise above 65 dB(A) for whom no measures had been taken to bring the indoor noise level below 30 dB(A). With the help of state subsidies, some 800 persons along municipal roads received a quieter indoor environment in 2005. However, new persons have been exposed at the same time due to increasing traffic and subsequent noise emissions. The SRA does not believe the interim goal for 2007 regarding municipal roads will be achieved.

The next stage
A large part of the problem with very high equivalent levels along state roads has now been solved. Consequently, a new objective has been set, which is to improve noise conditions for residents exposed to high maximum levels (over 55 dB(A) more than five times per night). Subsequent measures will focus on persons disturbed by high maximum levels and primarily aim to decrease indoor noise levels.

Trials with quiet road surfacing
During 2005, a test commenced regarding low-noise asphalt on roads with high noise levels. At Albyberget in Botkyrka, the SRA paved an approximately one-kilometre stretch with a sound absorbing and draining surfacing. 1,700 residents who were previously exposed to outdoor equivalent levels over 55 dB(A) – 500 of whom were exposed to levels over 65 dB(A) – now have 5–7 dB(A) lower outdoor noise levels. The test will be evaluated annually during a six-year period. The test surfacing will also be studied with regard to particulate matter and wear. During 2006, the SRA will prepare advice for choosing road surfacing.

Read more about the noise goal and related development on page 54.

Materials, chemicals and water – outcome and analysis

INTERIM GOAL D
Environmentally hazardous material shall not be introduced into the infrastructure, use of non-renewable material shall be minimised, and material should be recycled.

Many chemicals and materials are used, and spread, in road and street maintenance and in the manufacture and use of vehicles. To ensure a sustainable use of natural resources and to protect the environment, it is important that these are recycled or re-used. Drinking water is our most important food product and is obtained from surface and ground water. The quality of surface water varies according to the time of the year and is easily

** Residents exposed to noise from road and street traffic*
affected. Spills from vehicles and accidents in connection with transportation of hazardous goods can render both surface and ground water unusable as drinking water for long periods.

There are currently no parameters and methods for assessing the degree of interim goal achievement as a whole. Instead, parts of the goal are monitored. Overall, the SRA believes parts of the interim goal have been achieved.

**Recycling of surfacing materials**

In 2005, almost 100 per cent of torn up surfacing materials were recycled. This is equivalent to about 1 130 000 tonnes. Of these, 54 per cent were recycled for new surfaces, and 46 per cent were used for other purposes or placed in intermediate storage for use in coming years. During the year, some 900 tonnes of removed surface material were used for landfill. The diagram below shows how much have been recycled during the last ten years.

**A system for handling chemicals**

The SRA is creating a system with routines and aids to support effective, uniform and environmentally friendly handling of chemicals. The system will be used to inspect and approve chemical products to be used in the SRA's activities. Consumption volumes will also be reported annually. The SRA has worked on the system in partial cooperation with the National Rail Administration, as the system will include a common database on chemicals and common usage requirements and criteria.

**Water**

The SRA has reported that 21 water catchments have been affected by road salt and chloride levels above 50 mg/l. During the winter 2004/2005, 293 000 tonnes of salt were used on state roads. In 2005, measures were taken to remedy eleven conflict points between roads and water catchments.

However, there is no clear picture of the overall development, as a comprehensive study of water catchment conditions is lacking. Further measures are thus needed to achieve good water conditions. During the year, the SRA introduced a long-term strategy for managing water issues, the aim of which is to decrease the negative environmental effects of the road transport system on surface and ground water. The strategy’s starting points are the national environmental quality goals that concern water issues “Living lakes and waterways” and “Good quality groundwater”. The strategy also includes measures in accordance with requirements in the EEC water directive. In 2005, an inventory was begun of water catchment areas that support more than 50 persons and are located next to the public road network. An evaluation was also done of the water protection measures carried out during the last ten years. The results of the evaluation will support further development of methods to protect surface and ground water and monitor ground water quality.

**Affected water catchments and remedied conflict points between roads and water catchment**

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<th>Number of water catchments affected by road salt</th>
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<td>Number of remedied conflict points between state roads and large water catchments</td>
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Natural and cultural environment – outcome and analysis

**INTERIM GOAL E**
New road transport facilities shall be placed in a way so they work in harmony with their surroundings, and be designed to take into consideration natural and cultural values.

Conservation work regarding valuable natural and cultural environments is being carried out successfully both in Sweden and in the rest of the EU. Despite this, 2005 did not witness the expected positive break in the trend regarding parameters such as the number of endangered species and the population development of the indicator groups, birds and butterflies. This view was shared by the international work group Millennium Ecosystem Assessment (MA), which concluded that an increasing number of ecosystems are becoming imbalanced and thus losing their ability to produce "ecosystem services", which in many cases are vital for man. As a result, the EU has added a new goal to its Sixth Environmental Action Programme: to protect and, where necessary, restore the structure and function of ecosystems and to stop the destruction of living environments by 2010. The main focus of the programme has been moved to ensuring the functioning of ecosystems and the processes that create "ecosystem services" necessary for man.

Cultural environment conservation is experiencing a similar change of course, as the orientation during the past few decades has moved from conservation of individual objects towards preserving entire cultural and historical environments and increasingly emphasising man’s relation to the landscape. By signing the European Landscape Convention, Sweden has committed itself to protecting, preserving and developing landscape values. Work to ratify the convention commenced during the year.

Also during the year, the Riksdag introduced a 16th environmental quality goal – “A rich plant and animal life". Of the current 16 environmental quality goals, 10 concern the natural and cultural environment area, where the transport sector is clearly responsible for most of the conflicts and negative impact.

**Degree of goal achievement**
The interim goal is monitored by determining the degree of risk posed by the road in adopted action plans to areas considered important for the natural and cultural environment. Of the 47 plans adopted during the year, 6 (about 13 per cent) were deemed to cause appreciable damage. The SRA considers the goal to have been partially achieved.

The interim goal concerns only a small part of the road transport sector’s entire impact on the natural and cultural environment. In connection with follow-ups on environmental requirements in road projects, the SRA has found that most of the studied projects have contained major deficiencies throughout the chain from planning to building.

A study by the SRA on the cultural environment units of county councils showed that also smaller measures along the existing road network, such as traffic safety and noise reduction measures, and the building of parallel roads and bus stops, can also cause unexpected and significant harm to the natural and cultural environments.

Some 30 per cent of all culverts are believed to form obstacles preventing the migration of fish and other aquatic animals. During 2005, measures continued to be taken to deal with these and other impediments to biological diversity and recreational opportunities along the existing road network. Work in this area has been in progress for several years, but the pace has been modest. An exception was the year 2004 when a large number of migration obstacles in waterways were removed. 2005 saw a return to a low level of action as the area has decreased in priority for the SRA and the Swedish Forest Agency, and as most county councils have not fulfilled their coordinating roles.

**Road and street architecture**
The Government’s architecture policy goal – An Action Programme for Architecture and Design (prop. 1997/98:117) emphasises the importance of the public environment and the great responsibility of the traffic administrations in setting good examples in the area. In a summary of its vision for a sustainable transport system 2030, the Government writes: “The road and rail networks shall be well adjusted to the natural and cultural environments and keep a high international standard with regard to aesthetic values.” For the SRA, this means development work in several of its activity areas.

Architecture and design is a part of our culture and society. What we build and the objects we surround ourselves with affect our way of living and our behaviour.

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In terms of traffic, a well-designed road environment contributes to clarity, accessibility and traffic safety. The road environment must meet high quality standards concerning functionality, technology, ecology and aesthetics. These are the starting points in the Swedish Government’s new architectural policy, which from the start has included public infrastructure. The goal establishes that quality and aesthetic aspects must not be overshadowed by short-term economic interest. As result of the new architectural policy, requirements regarding aesthetic design have been included into road legislation.

For the goal to be achieved in a coordinated way, road architecture work will need to receive central priority. The prerequisite for producing good road architecture is a respect for the values of the landscape and the needs to be met. Road architecture is about managing the encounter of man, technology and landscape. Formulating an overall vision is a way of managing and coordinating the various interests and needs attached to infrastructure projects. The European Landscape Convention (European Treaty Series - No. 176), which has been signed by the Government, is yet another reason to acknowledge the value of the landscape in various respects.

The SRA currently lacks the standards and criteria for measuring the degree to which the architecture policy goal is met. It is consequently difficult to assess development in the area and to decide where to direct efforts. However, that the SRA’s road architecture work is producing results is indicated by the growing interest in architecture and design, which has led to built-up areas and street environments receiving more and more attention. Several city and area development projects have commenced to support the development of the transport system. In connection with these, the importance of starting road architecture work at an early stage has become clear. At the same time, however, it has proved increasingly difficult to integrate design issues into discussions on technology, economy and traffic safety. During recent years, the focus in investment projects has been on keeping to planned costs.

The SRA published new advice and regulations for road and street design (VGU) in 2005. The guidelines in the publication will affect the organisation and dimensioning of road and street environments in several ways. Many of the included considerations concerning technology and safety aspects have a direct impact on road or street architecture. Aspects concerned range from general, structural planning such as drawing of road alignment to more detailed issues such as road directions and slope angles. To ensure architectonic qualities are considered at all levels of planning, great attention has been paid to descriptions, both in text and pictures.

For some years now, a model has been under development for assessing the design qualities of road projects. The parameters prepared so far have been based on road users’ experiences and evaluations of road environments and surroundings. The project has also compared laypersons’ and experts’ evaluations, and studied the ability of experts to judge the quality of a completed project from drawings. So far, the model has indicated positive results.
POSITIVE REGIONAL DEVELOPMENT

SUBSIDIARY GOAL
The road transport system should promote favourable regional development by helping to equalise the opportunities for development between the different parts of the country, and to counteract the disadvantages of long-distance transport.

Division of Sweden into regions (Glesbygdsverket/Swedish National Rural Development Agency)

1. Forest counties, inland
2. Forest counties, other
3. Metropolitan areas
4. Rest of the country

IMPORTANT CONCEPTS USED IN THIS REPORT
Central town: Built-up area with more than 3,000 inhabitants (Swedish National Rural Development Agency).
Urban areas: Swedish towns and cities.
Metropolitan areas and national centres: Stockholm, Göteborg and Malmö.
Regional Centres: 32 towns that offer major public services (county hospitals, universities, etc), commercial and cultural facilities and which the National Public Transport Agency has identified as important nodes for the different types of traffic.
Sparsely-populated areas: Equivalent to the inland area of the forest counties (Glesbygdsverket/Swedish National Rural Development Agency).

Intentions and purposes of this goal
There are no interim goals established for the subsidiary goal of regional development. Development work is required before a complete goal analysis can be performed. We will therefore limit ourselves here to describing our work regarding the analysis of the content of the concept of “positive regional development”, describe a few parameters for measuring the subsidiary goal and report the outcome we can show so far.

Positive regional development
The formulation of this subsidiary goal has clear redistribution policy aspects. To “equalise opportunities for development between different parts of the country,” and “counteract the disadvantages of long-distance transport” mean that those areas that have more difficulty developing should be helped.

These clear redistributive aspects mean that improvements in the road transport system should help to afford people in sparsely-populated areas of the country with at least the same degree of accessibility to work, public services and other important public functions as people in other parts of the country enjoy.

The Government Bill “Infrastructure for a long-term sustainable transport system” (Govt.Bill. 2001/02:20) formulates interim goals for the various subsidiary goals, and links the goal of regional development with that of accessibility. Under the heading, ”Development of interim goals for accessibility and positive regional development” the Government states that “creating good accessibility is the most important contribution of the transport sector to the achievement of positive regional development,” and continues that “the regional dimension is fundamental to the concept of accessibility,” and “the new common interim goals emphasise the regional dimension through the use of the concepts sparsely-populated areas, central towns, metropolitan areas and surroundings”.

In the autumn of 2001, the Government adopted a new regional development policy according to the Government Bill “En politik for tillväxt and livskraft i hela landet” (A policy for growth and vitality throughout the country) (Govt. Bill. 2001/2002:4). The goal for regional development policy is well-functioning and sustainable local labour market regions (i.e. geographical areas in which it is possible to commute to work) and a good service level for all parts of the country. The key concepts are growth, vitality and entire country. The Government Bill emphasises that growth originate on the local and regional level, and that the development of our society should concentrate on utilising and developing the resources of the entire country. The travel patterns of commuters to and from work define the geographical boundaries of well-functioning local labour market regions. The Government Bill thus highlights the central role of the transport system in growth and regional development.

According to the Government Bill, growth should be sustainable over the long term. This concept includes economic sustainability, ecological sustainability and social sustainability. Sustainable development is defined as development that meets today’s needs without limiting the possibilities of future generations. The three dimensions of sustainable development are all equally important, and mutually dependent.

The requirement of sustainability gives the concept of growth a content far beyond a merely economic one. An interpretation of the social dimension is that it relates to good living conditions for all individuals in the form of access to various social services and activities that are important to the maintenance of a good quality of life. Everyone needs access to social contacts, cultural activities, recreation, education, government services, health-
The most recent decision on regional development policy marks a transition from a redistributional emphasis to a policy that promotes growth.

Care and social assistance. The social dimension also includes important issues that we associate with human rights, such as freedom of speech and gender equality. The ecological dimension relates to issues such as the conservation of finite natural resources so that future generations can be offered good living conditions.

The conditions required for positive regional development, both in terms of redistribution policy and growth policy, are affected by a great many policy areas and their co-ordination. These include economic, education, rural, as well as agricultural and forestry policy. Positive development is achieved most efficiently when the various policy areas cooperate to achieve common goals. For this reason, transport issues should be advanced in coordination with other sectors of society.

Conclusion

The most recent decision on regional development policy marks a transition from a redistributional emphasis to a policy that promotes growth. The growth aspect thus occupies a central role in regional development policy. The total economic growth of the country is completely dependent on development that occurs on the regional level in various parts of the country, and especially how the regions with the most business concentration (and thus, the most population density) develop in competition with other areas in Europe and the whole world. Long-term, the development of the country’s metropolitan areas will also be important for living conditions in sparsely-populated areas, as the development in the cites increases total resources, including those needed for significant measures in sparsely-populated areas.

Both the regional and transport policy decisions that pertain to the area of regional development are not in complete consensus, nor do they provide clear-cut guidance. There is no clear position regarding the balance between the efficiency and redistributive criteria (i.e. the relative importance of measures that benefit geographical areas with growth potential and those areas with impaired growth.

A reasonable approach with regard to the development of the road transport system, is to contribute to the overall growth of the country, while protecting the fundamental transport needs of every person.

Current parameters for measuring regional development

The parameters we use to measure the effect of the road transport system on regional development are currently limited to the social and economic aspects. Today’s parameters relate to changes in accessibility and how these changes affect employment opportunities. The parameters relating to changes in accessibility concern car trips and are based on changes in travel times. An empirical calculation model has been improved during the year to assess how employment and population are affected, by using accessibility change data.

Accessibility, expressed in terms of time or expenses, is also to some degree affected by the physical condition of roads. Uneven roads mean higher vehicle expenses and longer travel times. Roads with reduced bearing capacity can affect the costs of transporting goods, as longer bypass roads may have to be used instead. During winter, road maintenance and conditions play an important role. These technical parameters are analysed in the “High transport quality” chapter. They are also commented on in the same chapter, in the outcome for the redistribution policy aspects of the subsidiary goal.
The need for parameter development

Today, we are not able to measure all the relevant dimensions within the subsidiary goal, especially with regard to changes over a single year. We need more knowledge of how changes in the road transport system affect the conditions for economic growth in geographical areas with different demographic and economic conditions. We also need more knowledge on the relationship between how public transport and goods transport affect regional development.

In addition, we need to be better aware of what demands people have on the transport system in various stages of their lives and in various environments. This knowledge will be particularly useful when we aim to create attractive environments, which are important for demographic development and economic growth.

Outcome – regional development

The growth policy dimension of the subsidiary goal

This section deals with how changes in the road transport system affect the conditions for economic growth. The effects of changes in the road system on employment have been analysed using a recently developed model. The analysed period is 2001–2005, as it is not meaningful to apply the model to only a single year’s changes.

Four different accessibility parameters have been used as input data. These are accessibility to employment and labour, accessibility to the nearest regional centre and accessibility to the nearest national centre (i.e. Stockholm, Göteborg or Malmö). The first two parameters concern local accessibility (commuting possibilities) which is also important for the functioning of labour markets. Accessibility calculations have been made for about 8700 areas in the country.

The results from the model show that the net effects on employment of the changes in the road system that took place between 2001 and 2005 are about 3000 jobs, of which around 90 per cent will become available in the forest counties. These effects are expected to materialise within a period of 20 years counted from the changes in the road system.

Generally, the changes measured by the four accessibility parameters, whether positive or negative, are relatively small. Typically, they are decreases or increases in travel time from areas of residence to various public functions equivalent to a minute or two.

One explanation for the comparatively weak effect on employment in the more densely populated and economically vibrant parts of the country below the forest counties is that, relatively speaking, many more areas in Southern Sweden than in the forest counties have experienced a reduction regarding accessibility to labour markets.

The map shows the areas in which the number of workplaces within 45 minutes has changed by more than one per cent during the past five years.

The redistribution policy dimension

This section describes how the effects of changes in the road transport system have been distributed geographically during the past five years. This is done by comparing the outcome in the forest counties with that of the more densely populated southern parts of the country. The term forest counties here refer to both the inland and other areas of the forest counties. The inland area of the forest counties is equivalent to the sparsely-populated areas of Sweden. However, as its development also depends on the development in the other parts of the forest counties, it is more relevant to describe the development of the forest counties as a whole.

Distribution of effects on economic growth

The goal is “to equalise the opportunities for development between the different parts of the country”. An interesting question is thus whether changes in the road transport system affect the economy and employment in ways that are favourable for redistribution.

As became clear in the previous section, the outcome is favourable in terms of redistribution policy, as around 90 per cent of the positive net effects on employment accrue to the forest counties. Of this percentage, about 20 per cent will benefit the inland area of the forest counties.

Accessibility to workplaces within 45 minutes

Change from 2001 to 2005

The number of residents in areas with increases and decreases in the number of workplaces within 45 minutes is about 1.5 and 1.1 million people, respectively. This means a figure of about 400 000 people have gained increased accessibility to employment, according to this parameter.
Changes in accessibility
Good accessibility to the various functions in society is an important welfare factor. Estimates have been made of the number of people living in areas where accessibility to certain public functions has undergone changes, and of how this is distributed geographically within the country. The public functions or destinations that have been chosen are labour markets, regional centres and national centres.

Accessibility to a labour market is a parameter that concerns daily travel opportunities. Estimates have been made of the number of work places that can be reached within various time intervals. A computer based model has been used for weighting a parameter for accessibility to a labour market (an accessibility index). The number of people who have experienced increased and decreased accessibility to labour markets were then estimated.

The table below shows the numbers of people who have experienced changes of more than one per cent in accessibility to their work places. Municipalities have formed the smallest geographical units in the calculations.

As can be seen in the table, a significantly higher percentage of people in the forest counties now have improved accessibility to employment than in the rest of the country.

Accessibility changes to regional centre and national centre destinations have also been estimated.

In the compilation of persons who have experienced changes in accessibility to their nearest regional centres, we have only included persons whose travel time is at least 30 minutes and has changed by more than 30 seconds. For people who have experienced changes in accessibility to their nearest metropolitan areas (national centres), we have only included persons whose travel time is at least one hour and has changed by more than four minutes. The higher limit for trips to national centres is justified by the lower incidence of trips to these destinations, although in some parts of the country metropolitan areas may also be the nearest regional centres.

As the table indicates, a higher percentage of people have received better accessibility to regional centres or national centres in the forest counties than in the rest of the country.

### Overall outcome evaluation for the period 2001–2005
In general, changes in the road transport system contribute positively to the country’s economic growth by increasing employment. According to the analysis model used, the changes in the period 2001–2005 will create around 3,000 new job opportunities within the next two decades.

From the point of view of redistribution policy, the outcome is positive. The changes in the road transport system will benefit the forest counties the most.

### Degree of goal achievement
We can still not annually measure and analyse all relevant dimensions of this subsidiary goal. We are also lacking a clarification of the content of the subsidiary goals. Pending the development of annual analyses and a clarification of the intentions and purposes of this goal, the SRA chooses not to make an assessment of goal achievement for the year.

From the perspective of the most recent five-year period, the SRA is of the opinion that the goal, as formulated in the 1998 transport policy Government bill, was achieved.

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### Transport quality
The physical state of road surfaces affects accessibility, as it has consequences on both passenger car trips and the transport of goods.

The chapter “High transport quality” describes trends concerning the physical condition of state roads, including roughness, permitted loads and restrictions during the spring thaw.

Trends regarding roads with light traffic, mainly in sparsely-populated areas and other parts of the forest counties, are of special interest from a geographical redistribution perspective. Follow-ups carried out during the past five-year period show that the overall condition of roads in the country has generally improved.

This improvement has been slightly more noticeable in the forest counties than in the rest of the country. Longitudinal roughness of roads has decreased in the forest counties, as has the number of road kilometres with restricted spring thaw bearing capacity. However, the roads in the forest counties have become more rutted.

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### Accessibility to workplaces within 45 minutes

<table>
<thead>
<tr>
<th>Parts of the country</th>
<th>Thousands of people with changed accessibility to employment</th>
<th>Percentage of the population of that part of the country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest counties, inland</td>
<td>146 000</td>
<td>6 000</td>
</tr>
<tr>
<td>Forest counties, other</td>
<td>603 000</td>
<td>44 000</td>
</tr>
<tr>
<td>Rest of the country, including metropolitan areas</td>
<td>868 000</td>
<td>2 133 000</td>
</tr>
</tbody>
</table>

### Accessibility to regional and national centre

<table>
<thead>
<tr>
<th>Parts of the country</th>
<th>Thousands of people with changed accessibility to the closest regional or national centre</th>
<th>Percentage of the population of that part of the country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest counties, inland</td>
<td>Reduced travel time</td>
<td>Increased travel time</td>
</tr>
<tr>
<td>Forest counties, other</td>
<td>120 000</td>
<td>70 000</td>
</tr>
<tr>
<td>Rest of the country, including metropolitan areas</td>
<td>280 000</td>
<td>35 000</td>
</tr>
<tr>
<td>Forest counties, inland</td>
<td>445 000</td>
<td>300 000</td>
</tr>
</tbody>
</table>
REPORT OF RESULTS

GENDER-NEUTRAL TRANSPORT SYSTEM

SUBSIDIARY GOAL
A road transport system that is designed to cater equally to the transport needs of women and men. Men and women should have an equal opportunity to influence the formation of the transport system, its design and management, and their values shall be accorded equal importance.

Goal intentions
The sixth transport policy subsidiary goal is the most recent one. The goal was added in 2001 after a final report from the Gender Equality Council for Transports and Information Technology (Jämit) (SOU 2001:44).

The following account represents a first step in defining and describing comprehensive parameters for this subsidiary goal. The chapter starts with a description of the background to the interim goal and the intentions and expectations regarding future results the Government had when adopting this subsidiary goal. These intentions then form the basis of the proposals for parameters that will be presented. As there are not enough parameters yet for determining the outcome, it is not possible to make a comprehensive goal analysis of the subsidiary goal.

The Government’s general gender equality policy
The subsidiary goal of a gender-neutral transport system has to be viewed against the background of the policy decisions that have been made in the area, the theories that form the basis for the gender equality policy and the strategy used to achieve gender equality.

Policy decisions
The overall gender equality goal aims at ensuring that women and men have the same rights, obligations and opportunities within all relevant areas in life.

THE OVERALL GOALS FOR GENDER EQUALITY INCLUDES:
- Equal distribution of power and influence
- Equal opportunities for economic independence
- Equal conditions and opportunities regarding entrepreneurship, work, conditions of work and professional advancement
- Equal access to education and opportunities to develop personal ambitions, interests and talents
- Shared responsibility for household work and child care
- Freedom from gender-related violence

These goals were formulated for the first time in the Govt. Bill 1999/2000:24, the Government characterises gender equality as relating to fairness, sharing of economic and political power, democracy and assigning equal value to women and men.

Theory
The paradigm often used in Swedish gender equality policy is Yvonne Hirdman’s gender system theory, which was first presented in the government report “Demokrati och maktsättningar i Sverige” (Democracy and power in Sweden) (SOU 1990:44). The model describes the gender system, or gender order, that explains why there is gender inequality in so many areas of society. Gender order or gender system is a dynamic structure (system) that refers to the power structure maintaining the existing social order. It is a network of processes, conceptions and expectations which together form a pattern of regularities. That the term gender is used instead of sex, is because gender encompasses the social and cultural processes shaping the biological sexes, girls and boys, into what they are in various cultural contexts.

Strategy
As early as 1994, the Government, in its gender equality bill (Govt. Bill 1993/1994:147), established gender equality integration as the strategy by which gender equality will be achieved. Gender equality integration means that the gender equality policy will permeate all policies and activities on all levels, from preparations and decisions to implementation. The Government has included this statement in its government declaration every year since 1994.

The following definition of gender equality integration was formulated by the Council of Europe, and is also used by the EU: “Gender equality integration entails (re)organisation, improvement, development and evaluation of decision making processes so that a gender equality perspective can be incorporated into all decision making, on all levels and at every step of the process, by those who normally take part in decision making.”

In its report ”Etappmål för ett jämställt transpotsystem” (Interim goals for a gender-neutral transport system) (Report 2002:5), the Swedish Institute for Transport and Communications Analysis (SIKA) underscores the importance of establishing rules and approaches that ensure gender equality aspects are always present in the planning, decision making and administration activities of the transport sector. The main strategy regarding integration thus also concerns the transport sector.

Why a gender equality goal for the transport sector?
Several years of preparatory work preceded the subsidiary goal. Among the bodies active in this work was the Communication Committee (KomKom), who first drew
attention to gender equality issues within the transport field. This led to the Government setting up a special council in 1999 – Jämit. The council’s task included monitoring of gender equality issues and proposing parameters for improving gender equality within the transportation sector.

Jämit found that women most likely do not have, or have not had, the same opportunities to exert influence as men do, and that they have been heavily underrepresented in planning and administration areas. Consequently, the council found it most likely that the transport system has mainly been built on the values, interests, norms and rules of men. Jämit considered it important to make gender-related structures and patterns visible so that they could be openly discussed.

In 2001, the Government proposed the adoption of a sixth subsidiary goal, concerning gender equality (Govt. Bill 2001/02:20). The goal was formulated in light of Swedish gender equality policy. According to the Government, there were pronounced differences between male and female working conditions and opportunities within the transport sector, with the management of state traffic authorities heavily dominated by men, and that the same was true for the traffic authorities, trade associations and interest groups. The female perspective was poorly represented in planning, decision-making and administration in the transport system.

The decision on gender equality integration requires that a gender equality perspective permeate transport policy. However, permeate does not mean merely adding a component. Instead, it means a complete overhaul of the transport policy goal from the gender equality perspective. In its report on the gender equality goal (Report 2002:5), SIKA writes that the transport sector is so closely connected to other areas of society that the goal – if it is to be interpreted literally – in fact requires a much broader starting point than merely a transport policy one. The gender order and informal structures prevailing outside the transport sector are at least as important as those within the transport sector.

The gender-neutral road transport system
In the foreword of the final report “Jämställdhet – Transporter och IT” (Gender Equality – Transports and IT) (SOU 2001:44), the chairperson of Jämit writes: “...describing a gender-neutral society is not easy, because we do not know what needs and wishes will manifest themselves, physically and mentally, in that society. But we can have visions and expectations for it. My expectation is that social development will result from both women’s and..."
men’s visions. Democratic processes will be well developed so that both women and men can, and want to, contribute to shaping society. Consequence analysis will be done for both groups, as a matter of course. Civil servants and public officials in all municipalities, as well as at regional and central levels, will continuously monitor gender equality issues."

Consequently, the parameter of a gender equal road transport system is not how the road transport system is built, but rather the degree of integration of women’s and men’s values and opinions in the creation, shaping and administration of the system. That the design and functioning of the road transport system is not the main target of the gender equality goal means that the goal requires a different approach than the other five subsidiary goals. For the sixth subsidiary goal, the parameters reflecting the degree of goal achievement should concern the degree of integration.

The main strategy regarding integration provides that this and the other five subsidiary goals should have specific gender equality parameters for determining and analysing the degree of goal achievement. After all, how can these goals be achieved if they do not take into account the influence of women and men? Unlike the results for the sixth subsidiary goal, the results of gender equality work in connection with the other five subsidiary goals can also be reflected in the design and functioning of the road transport system, in these cases it is the outcomes of gender equality work within the road transport system that are to be analysed.

However, what is most vital if the subsidiary goal on gender equality is to be achieved is being responsive to men’s and women’s values and needs. When these values and needs are dealt with fairly, continuously and self-evidently, without even having to specifically remember them, then the gender-neutral transport system has become reality.

**Parameters for determining the degree of goal achievement**

“What is measured will be done” is a common expression in connection with management by objectives and results. Developed measures have a powerful effect not only on the evaluation of goal achievement, but also on the planning of activities.

The difficulties in interpreting the content of the subsidiary goal have led to delays in the development of parameters for outcome evaluation. Several transport authorities have wished for a concretisation of the goal in the coming transport policy Govt. Bill (“Res Jämt”. SRA publication 2005:110).

**Current parameters**

The parameters most commonly used at present deal with travel patterns, the use of different transport modes, access to a car and participation in various working groups.

**New parameters**

Two types of parameters need to be developed and used at the same time:

1. Parameters that can describe the degree of integration (process parameters). These may include:
   - Percentages of women and men who state that they are able to influence the creation, shaping and administration of the transport system
   - Percentages of women and men who state that they can influence decision making
   - Proportion of control documents in which both female and male perspectives have been taken into account
   - Percentages of women and men who can influence the research that is being carried out
   - Percentages of women and men in decision-making groups
   - Percentages of women and men in groups that participate in the designing of traffic environments and development of traffic systems
   - Percentages of women and men who believe they have influence in areas such as traffic safety, environment, regional development, accessibility and quality assurance
   - The degree of gender knowledge amongst strategic personnel.

2. Parameters that can describe the current degree of gender equality regarding the design and functioning of the road transport system (status parameters). These may include:
   - Percentages of women and men who feel safe when using the road transport system
   - Percentages of women and men who feel the road transport system meets existing transport needs
   - Percentages of women and men who feel that the resources of the transport sector are distributed fairly between women and men
   - Percentages of women and men who feel the traffic system is meeting existing needs.

When developing parameters, undesired gender structures should not be preserved. In its report regarding interim goals for a gender-neutral transport system (Report 2002:5), SIKA deems it probable that due to the prevailing gender system, current travel patterns and transport needs do not reflect the “genuine” needs and transport patterns. Although shaping and adjusting the
transport system according to the male and female values expressed today makes current every-day life easier; there is a risk that these parameters, in a more long-range and broader perspective, strengthen traditional gender roles.

As the gender equality subsidiary goal is both multidimensional and should permeate other subsidiary goals, both SIKA and Jämit consider the developing of parameters for it problematic. Accordingly, more research and qualified knowledge is needed in the area.

Outcome
The currently used parameters show the following:

Women generally travel in smaller geographical areas than men. This difference is evident in how commuting patterns vary between men and women. Men travel farther to their work than do women (Nutek 2005). On average, men also have a larger geographic labour market than women do.

Women use public transport more than men do, and walk and bike to a greater extent (SIKA report 2003:5). Public transport accounts for 9 per cent of men’s trips to work, compared to 14 per cent for women (SIKA, Communications Study 2003).

In 2004, 79 per cent of all women between 16 and 84 had access to a car. The corresponding figure for men was 86 per cent. The greatest disparity between the sexes is found in the 65 to 84 year old group, where an average of 62 per cent of the women and 85 per cent of the men had access to a car. Geographically, the greatest difference between the sexes is found in the sparsely-populated areas of the North (Statistics Sweden, Living Conditions Survey [ULF]).

In 2005, the SRA did a follow-up study of the extent to which women are participating in working groups or other cooperation committees in the Administration’s external activities. At about 200 meetings that were followed up by SRA regions, women accounted for a total of 30 per cent of the participants. Among those who represented the SRA at the meetings, the distribution was 33 per cent women and 67 per cent men.

In 2005, women accounted for 19 per cent of the managers at the SRA, which was a decrease of 5 per cent compared to 2004. For the government authority function, the percentage increased from 33 per cent to 36 per cent. Within the business divisions, the percentage of women dropped from 7 per cent to 5 per cent in the same period. Of the 22 managers in charge of research, development and demonstration (RDD) at the SRA, five are currently women. Of the applications received for 2005 RDD activities, 22 have a woman as project manager or contact person.

Degree of goal achievement
The currently used parameters are not sufficient for a comprehensive assessment. Consequently, the degree of goal achievement cannot be measured.
This chapter is an historical survey of the development of goals and results in various aspects of the environmental area. It starts with an in-depth analysis of the subsidiary goals set for periods ending in 2005. Four of these goals concern air quality and one concerns noise (see the sentences in bold in the box below). The air quality goals concern the limiting of harmful emissions. The noise goals, on the other hand, directly concern those affected by noise.

**INTERIM GOALS**

Carbon dioxide missions from road traffic by 2010 shall not exceed 1990 levels. By 2005, there shall be a decrease of emissions from 1995 levels of nitrogen oxides by at least 40 per cent, of sulphur by at least 15 per cent and of volatile organic compounds by at least 60 per cent. Levels of carbon monoxide, nitrogen oxide, sulphur dioxide, soot and particulate matter in built-up areas shall be below the limit values and established environmental standards. Emissions of carcinogens in 2005 shall not exceed half of the 1998 values. By 2007, no one shall be exposed, in their residence, to traffic noise exceeding a level equivalent to 65 dB(A) outdoors. Along state roads, this shall be achieved by 2005. In cases where the outdoor level cannot be reduced, the goal should be that the equivalent indoor level shall not exceed 30 dB(A).

The goals were set to improve the conditions for those who use, or are in other ways affected by, the road transport system. Now, at the finish line, there are several interesting questions to consider:

- What has the improvement been like?
- Why have the results turned out as they have?
- What conclusions can be made and how can we apply these in our future work?

Before starting our retrospective analysis, we can conclude that achieving good results is possible if there are clear goals, sufficient resources and monitoring of the efforts. Moreover, it seems easier to achieve goals that can be reached mainly by applying technology, especially when industries have strong incentives to help provide solutions.

The air quality goals have been achieved through efficient development of engines, purification equipment and fuels. Noise reduction has also been successful in many ways, mainly due to measures involving windows and shielding, which have lowered indoor noise levels. However, much remains to be done before those goals are achieved.

There is good cause for satisfaction on the part of those who have participated in improvement measures, and especially for those whose surroundings have become more pleasant, but the work is not yet done. Even though emissions have decreased dramatically, air pollution levels in many areas are still unacceptably high. Even though 25 000 persons living along state roads are enjoying considerably quieter indoor environments, there are still 9 000 persons who are affected by high noise levels. The number of persons exposed to noise is also continuously rising due to the results of growing road traffic volume. The worst problems are experienced along the municipal road network, where fewer noise reduction measures have been implemented.

**CLEAN AIR**

What pollutes the air?

When the media deal with air pollution caused by traffic, expressions such as “harmful substances” or simply “emissions” occur frequently. But what do these emissions contain? Which are the harmful substances and how are they harmful?

**Nitrogen oxides** are created mainly through a reaction between the oxygen and nitrogen in air. This reaction requires high temperatures, which the combustion in engines provides. In simplified terms: the more efficient the combustion, the higher the temperatures are, and the more nitrogen oxides are produced. There are two kinds of nitrogen oxides (NOx) in exhaust fumes – nitrogen monoxide (NO) and nitrogen dioxide (NO2). They irritate mucous membranes and also damage vegetation. When nitrogen oxides react with water, they form acids which corrode buildings and lead to the acidification of soil. The nitrogen (nitrate ion) also has a fertilizing effect and thus contributes to the ongoing overfertilization problem.

The view on the health effects of nitrogen oxides has changed. A large number of epidemiological studies have linked high air pollution levels to health effects in populations. However, nowadays nitrogen dioxide is seen more as an indicator of pollution than an actual cause of health effects. Instead, the effects on health are usually attributed to other pollutants, especially ultrafine particles, which correlate strongly with nitrogen dioxide. For nitrogen dioxide alone to affect the health of sensitive persons, levels of 375-565 mg/m³ are needed. Levels this high no longer occur in outdoor air. However, even very modest levels of ultrafine particles appear capable of adversely affecting health.

**Sulphur dioxide** (SO2) is a gas produced by engines if these operate on fuels containing sulphur compounds.
Its effects on health and the environment are similar to those of nitrogen oxides, except that sulphur dioxide does not lead to overfertilization. Current fuels contain very little sulphur, and so sulphur dioxide emissions from road traffic can be deemed as solved.

Petrol and diesel oil consist of compounds of carbon and hydrogen, or hydrocarbons. The combustion in engines is never complete, and consequently small amounts of more or less degraded fuel, as well as engine oil residues, always come out with exhausts. In addition, fuel can evaporate from fuel tanks and leaking pump hoses. The volatile parts of hydrocarbons are collectively called volatile organic compounds (VOC). The group consists of many substances, many of which differ with regard to certain characteristics. Some of these substances are carcinogenic.

Particulate matter is another group of pollutants with varying characteristics. Unlike the previous substances, they are not gases but, as their common name suggests, particles, often consisting of a solid core on which various substances have condensed. However, there is no clear-cut distinction between particles and gases. Gas molecules constantly condense on the surface of particles and smaller particles can form larger ones, in a process know as coagulation. Thus, particles usually increase in size the further they travel from their source. But substances can also leave the particle surface, thus decreasing the size of the particle. The upper limit for how large particles can become is somewhere around one thousandth of a millimetre (one micrometer). Particles like this are created during combustion and from condensed gases originating from combustion.

Another type of particulate matter stems from various forms of wear, including wear of tyres and tyre studs, brakes, asphalt and road gravel. These particles are larger than those generated by combustion and are usually not smaller than one micrometer. Earlier, it was held that mainly the small particles created at combustion were harmful to health. However, research during the past few years has shown that wear particles can also cause considerable health effects, such as more readily causing respiratory problems for persons suffering from asthma than do combustion particles. Combustion particles, on the other hand, have stronger links to cardiovascular diseases. Both wear and combustion particles lead to increased mortality, although it is probable that the latter type does it more effectively. It is estimated that particles contribute to several thousand premature deaths annually in Sweden.

Carcinogen is a collective name for hydrocarbons and particles with carcinogenic properties. Emissions of these substances occur through fuel evaporation and vehicle exhausts. The carcinogens in exhausts can be both uncombusted and combusted fuel gases. Examples of carcinogens in exhausts are benzene, 1.3-buta-diene and benzopyrene. The potential of carcinogens to cause cancer varies considerably, as do their levels in exhausts, which makes it very difficult to assess the entire impact of vehicle emissions. Tyre wear can also produce carcinogens.

In 1998, the SRA assigned the Swedish Road and Traffic Research Institute to develop a model – the TCT model – to be able to monitor carcinogenic emissions, especially with regard to the goal of reducing these emissions by 50 per cent by 2005. The TCT model has been used since 1998 for annual follow-ups on road traffic emissions of carcinogens. The model uses an index which weights emissions of various carcinogenic substances according to their potential to cause cancer. The index is used to determine the degree of goal achievement.

In addition to the above substances, there are other substances whose levels are being monitored. For example, there are environmental quality standards for ozone. Together with nitrogen oxides, hydrocarbons contribute to the creation of ozone. Ozone irritates the airways of the lungs and, at higher concentrations, causes tissue damage. Ozone is less water soluble than sulphur dioxide and nitrogen dioxide and thus travels further down the airways. The health effects that may follow are reduced lung function, airway symptoms, increased airway sensitivity to irritating substances and inflammatory effects. Ozone is estimated to contribute to over a thousand premature deaths in Sweden annually. Ground-level ozone also damages cultural monuments through corrosion, and causes large annual crop losses. In Swedish
built-up areas, ozone levels are usually lower than in the surrounding countryside. The reason is that urban areas have higher emissions of nitrogen oxides, which partially break down ozone.

There are also environmental quality standards for carbon monoxide (CO), which is created during incomplete combustion due to insufficient oxygen. Carbon monoxide gas is not be confused with carbon dioxide, which is always produced during combustion. Carbon monoxide attaches more effectively to the haemoglobin in blood than oxygen and so interferes with oxygen transportation. High enough levels of carbon monoxide or long enough exposure to the gas can lead to unconsciousness, and eventually death if no measures are taken. Carbon monoxide emissions from both petrol and diesel driven vehicles have decreased significantly due to the use of catalytic converters to purify exhausts. With the exception of certain special occasions, such as veteran car runs, unhealthy levels no longer occur.

Carbon dioxide is produced at all combustion of carbon-containing fuels. Carbon and oil are contained within the earth crust and when they are burned in the form of diesel and petrol, the levels of carbon dioxide in the atmosphere increase. Fuels made from plants and other renewable sources contain carbon that is already part of the carbon cycle, and so the burning of these fuels does not affect the atmospheric levels.

Carbon dioxide affects the global heat balance. Without the carbon dioxide in the atmosphere and the greenhouse effect it produces, the earth would be too cold to live on. In other words, the greenhouse effect in itself is not a cause for concern. It is rather the fact that it is increasing that leads to climate change. Unlike other pollutants, carbon dioxide cannot be purified away. Thus, the only way of controlling its levels is to use less fossil fuel. There are two ways of doing this, which in practice must be combined: decreasing energy consumption and increasing the proportion of non-fossil fuels.

Emissions and levels
It is the level, or concentration, of a pollutant that is significant for how the pollutant affects the environment and health. There is naturally a connection between emission amounts and pollution levels, but that connection is not always a straightforward one. Emissions from traffic are often higher in population centres, and in densely built areas with high buildings, ventilation is slow. Emission amounts also depend heavily on driving conditions and on the proportion of vehicles that have just started up, as this means that their engines and exhaust purification systems have not yet reached their normal working temperature. Emissions from recently started up vehicles can be a hundred times higher than from vehicles with fully warmed-up engines and purification systems. There are also other sources of air pollution, which sometimes can dominate. Consequently, when traffic emissions decrease in densely populated areas, air pollution levels in these areas do not necessarily decrease at the same rate.

The goals that are discussed here concern the quantity of emissions, and have been set to achieve an overall reduction in the levels and deposition (acidification and overfertilization) of air pollution. For local air pollution levels, there are environmental quality standards. Currently, Swedish legislation includes environmental quality standards for sulphur dioxide, nitrogen dioxide, nitrogen oxides, particulate matter (PM 10), lead, benzene, carbon monoxide and ozone. The limit value for soot is still effective. Although overall pollution levels have decreased, problems still remain locally. There are several reasons for this. Firstly, vehicle exhausts are naturally not the only cause of pollution. Particulate matter, for example, is also created by road surface, tyre and brake wear and wood heating. This is also not always locally produced, but can be transported by winds from other areas. Nitrogen dioxide levels can likewise not be attributed to exhausts alone. The increased levels of ozone in cities during the last decade have also contributed to increased nitrogen dioxide levels, as ozone oxidises nitrogen monoxide to nitrogen dioxide. A reason for increased vehicle emissions of nitrogen dioxide is catalytic converters in diesel driven vehicles, which have dramatically increased the proportion of nitrogen dioxide in these vehicles’ nitrogen oxide emissions.

The interim goals on emissions and levels include the limiting of nitrogen oxides, not nitrogen dioxide specifically.

Developments
It has long been known that vehicle exhausts have negative effects on health and the environment, although this knowledge has gradually become more detailed. Amongst the early measures to limit emissions, mainly of carbon monoxide and hydrocarbons, were the prohibitions against vehicle idling introduced by many municipalities in the 1970s. The first exhaust requirements in Sweden were enacted at the end of the 1960’s and concerned petrol driven passenger cars manufactured in 1971 or later. It took a relatively long time before exhaust requirements were introduced for other types of vehicles. For diesel driven passenger cars they came for 1989 models and later, and for heavy lorries for 1993 models and later. However, simpler requirements regarding particle emissions (smoke) had already been introduced earlier.

An environmental classification system was introduced in Sweden for cars manufactured in 1993 or later. The system received its latest revision in 2002, and current Swedish environmental classifications for passenger cars, light and heavy lorries and buses are similar to...
those of the EU. Environmental Class 2000 largely corresponds to what is popularly known as Euro 3, Environmental Class 2005 to Euro 4, and so on.

Of the newly registered petrol driven passenger cars and light lorries in 2005, 93 per cent met the exhaust requirements for Environmental Class 2005. The requirements of Environmental Class 2005 became mandatory in January 2006. The corresponding percentage for diesel driven cars and light lorries was 57 per cent. Of these, 73 per cent emitted 5 milligrams or less of particulate matter per kilometre, which means they also met the requirements of the coming environmental class 2005 PM.

Of the diesel driven heavy buses and lorries registered in 2005, about 0.9 per cent met the Environmental Class 2005 standard, a handful of vehicles the Environmental Class 2008 and EVV standards, and the rest the Environmental Class 2000 standard.

Petrol driven passenger cars
The first emission requirements for petrol driven passenger cars were very modest by today’s standards. In 1976, the restrictions were tightened for carbon monoxide and hydrocarbon emissions and a limit value was introduced for nitrogen oxide emissions. The requirements corresponded to those that had been introduced in the United States a few years earlier. Lead-free petrol had also been introduced in the United States, which enabled exhaust purification with catalytic converters. However, in Sweden lead-free petrol was not available. Sweden was also largely alone in Europe regarding exhaust requirements, which led to unusual and less tried and tested methods for limiting exhaust emissions. The most common method was exhaust re-circulation, or EGR, which lowered the combustion temperature and thus decreased the emission of nitrogen oxides. Cars built between 1976 and 1988 are often characterised by high fuel consumption, starting problems and jerky operation. When function checks of exhaust purification systems were incorporated into vehicle inspections in 1989, it was found that in most cases, maintenance and repair of the systems had been neglected. Internationally, harmful emissions started to receive increasing attention. Not least in California, serious local pollution problems lead to forceful policy decisions. These clear signals to the vehicle industry helped technological development gain momentum, which in turn enabled gradually tougher emission requirements.

Starting from 1989 models, the exhaust requirements for new passenger cars in Sweden were raised to such a degree that to meet them, purification with catalytic converters became necessary. However, already in 1987, several new car models with catalytic converters had been available, and those who purchased them were entitled to a tax reduction. At the same time as the new exhaust requirements were introduced, limits were also set for evaporation from the fuel system, which led to the installation of carbon canisters (filters that contain active charcoal which absorbs the hydrocarbons in evaporative fuel, and are sucked clean when the car is driven). To pave the way for the new requirements and to reduce the emissions of lead, lead-free petrol became available on 1 January 1986. Almost ten years later, on 1 March 1995, leaded petrol was forbidden altogether in Sweden. These changes led to dramatic improvement in exhaust and fuel system emissions from petrol driven vehicles. Carbon monoxide emissions are now negligible and nitrogen oxide and hydrocarbon emissions have decreased to only a few per cent of what they were before these important developments.

Since 1989, Swedish emission requirements for passenger cars have been further tightened on three occasions – in 1997, in 2001 and in 2006. The successive new requirements since the introduction of the catalytic converter have been popularly called the Euro 1, 2, 3 and 4. The Swedish exhaust requirements during this period have also harmonized with the EU’s requirements. Before joining the EU, Sweden introduced an environmental classification system for vehicles. This system has since been harmonized with the corresponding EU system (see above). The environmental classification system
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has been used together with tax reductions to speed up the introduction of vehicles that meet future exhaust requirements.  

Diesel driven passenger cars
The requirements introduced for diesel driven passenger cars have likewise led to these cars now using catalytic converters (oxidation catalytic converters) that effectively remove hydrocarbons and carbon monoxide from exhausts. However, as diesel engines operate with an excess of oxygen, the nitrogen oxides cannot be purified away using the same technique as in petrol cars. Another disadvantage with diesel engines is a higher level of particle emissions. During recent years, an increasing number of diesel car owners have agreed to have particle filters installed in their vehicles, which have effectively reduced emissions, sometimes to even lower levels than those from petrol cars. The SRA has studied the possibility of introducing tax reductions for vehicles emitting low amounts of particulate matter. This would radically increase the amount of cars with particle filters.

Light lorries
Emission requirements have also been introduced for light lorries. However, these have come later than those for passenger cars. In addition, the required emission levels for larger light lorries have been higher than those for passenger cars.

Heavy vehicles
In the case of heavy lorries and buses, there have been no similar rapid improvements. However, several smaller steps have nevertheless led to significant improvements. The first requirements for new heavy vehicles in Sweden came into force at the beginning of 1993. Unlike passenger cars, there is often considerable variation between different types of heavy vehicles, which makes it difficult to develop requirements for whole vehicles. Consequently, the requirements have concerned the engines and exhaust purification systems of heavy vehicles. From the start, requirements have been more or less uniform with those in the rest of the EU, which have been introduced simultaneously with the Swedish requirements. Emission requirements have been tightened two more times – in 1996, 2001. There are also already decided requirements that will apply beginning in 2006 and 2009. The toughening of emission rules for heavy vehicles in the course of the next eight years will lead to dramatic reductions in the emissions of both particulate matter and nitrogen oxides. As with passenger cars, the chain of new requirements since 1993 are popularly called Euro 1, 2, 3, 4 and 5.

Work machinery
Improvements in the case of work machinery have followed those of heavy vehicles, although a few years later.
The engines in work machinery and heavy vehicles are often similar, which means technological improvements in heavy vehicle engines can usually be applied to work machinery.

Fuels
Increasingly sophisticated engine and purification technology requires petrol with increasingly low sulphur content. This has led to a toughening of the petrol requirements within the EU. A positive effect of this has been decreased sulphur emissions. Like vehicles, fuels have environmental classes. However, petrol fuels of different environmental classes have seldom been available at the same time. Instead, through common industry agreements, one type of petrol has been sold at a time, before being replaced with a new type with a higher environmental class. Low-sulphur diesel oil has also been introduced. In addition, other improvements to diesel have led to dramatically decreased carcinogen content in exhausts. By 1991, Sweden had already introduced environmental classes for diesel fuels, and through tax relief for the best environmental classes, fuels from lower classes have been successively phased out.

Other measures
In 1996, the three large city municipalities, Stockholm, Göteborg and Malmö, introduced strict exhaust requirements for vehicles allowed into “environmental zones”, and in 1999, the city of Lund followed their example. To speed up the overall introduction of vehicles and machines meeting these requirements, the SRA introduced a bonus system that provided higher compensation for contractors using them.

Technological development has not only led to significantly lowered exhaust emissions; it has also led to other emission sources now coming into focus. With the exception of carbon dioxide, traffic volume is no longer the factor that affects emission amounts the most. Other factors have now become dominant. The most important ones are cold starts (when the catalytic converter has not yet started working), older cars and cars with defective purification systems, fuel system leaks, aggressive accelerations and high speeds not included in the driving cycle test used at type approval, as well as emissions from motorcycles, lawn mowers and hand held tools with two-stroke engines.

Sweden has been at the forefront
As mentioned, emissions have decreased largely thanks to technological developments and to requirements that have made sure new solutions have been applied and used. In Sweden, the National Environmental Protection Agency has been the major proponent of stricter regulation, and provided the Ministry of the Environment with bases for national requirements on exhausts and fuels. This long-term policy has led to Sweden being viewed as an exemplary country is this area, and as one of the most active proponents for exhaust and fuel requirements within the EU. An example of a successful Swedish proposal, which is also important for Nordic conditions, is exhaust requirements for passenger cars at temperatures of -7°C or lower. Sweden’s active policies have also enabled the Swedish car industry to quickly develop new technological solutions for reducing emissions.

Measures to reduce climate impact
Considerable technological efforts are also taking place to reduce carbon dioxide emissions. More efficient engines are being developed, as well as fuels from non-fossil sources. Modern engines have become more efficient, but this development has been counterbalanced by the increasing weight of passenger cars, increased engine output, more energy intensive equipment and an increased traffic volume. As a result, carbon dioxide emissions are not decreasing. In its climate strategy for the road transport sector, the SRA emphasises three areas of effort to decrease carbon dioxide emissions: learning how to use energy more efficiently both in the short and long term, influencing transport demand and the proportions of various traffic modes, and making long-term investments in renewable fuels.

Results

INTERIM GOALS
By 2005, there shall be a decrease of emissions from 1995 levels of nitrogen oxides by at least 40 per cent, of sulphur by at least 15 per cent and of volatile organic compounds by at least 60 per cent. Emissions of carcinogens in 2005 shall not exceed half of the 1998 levels.
The emission of nitrogen oxides during the goal period decreased by 45 per cent, which means the goal of 40 per cent was met. Sulphur emissions decreased by 95 per cent, which means the goal was achieved by a large margin. Emissions of volatile organic compounds decreased by about 60 per cent. However, as the margin of error for the calculations is considerable, it is not certain whether this interim goal was achieved. For carcinogenic substances, the goal of a 50 per cent reduction was achieved, as the decrease was about 60 per cent. Overall then, almost all of the goals were achieved, which shows that goal-oriented work pays off.

Unfortunately, however, these reductions in emissions have not in all cases led to corresponding reductions in pollution levels. Overall levels of nitrogen dioxide have decreased by about 40 per cent since 1987, yet a fifth of the municipalities in Sweden are estimated to have built-up areas where levels exceed the environmental quality standard. The levels of the regulated hydrocarbon benzene have decreased by about 80 per cent since 1992/1993. However, according to estimates, 5–10 per cent of the municipalities in Sweden have built-up areas where the environmental quality standard for this gas, which will be effective from 2010, is at risk of being exceeded. That further efforts are necessary to improve urban air is therefore self-evident.

The contributions of road traffic to air pollution are significant, and in many areas dominant. Of the total emissions in Sweden in 2004 (including burning and international refuelling of ships and aircraft), road traffic was responsible for 32 per cent of carbon dioxide emissions, for 23 per cent of nitrogen oxide emissions, for 20 per cent of hydrocarbon emissions and for 4 per mille of sulphur dioxide emissions. The requirements for the road transport sector have been higher than for other sectors, which has also led to more ambitious measures. Consequently, the road transport sector’s proportional share of emissions has gradually decreased. An important exception is carbon dioxide. Here, the percentage represented by the road transport sector has increased. In 1995, this percentage was 30 per cent.

The lesson that should be learned from the improvements and results so far is that a combination of clear policy signals and incentives for technological development can lead to excellent results. However, in the future other types of measures will be needed as well. Implementing these measures in good time can also provide the opportunity of influencing the development within the EU.

Future developments
The achieved results are connected to interim goals, which in turn are connected to the transport policy subsidiary goal regarding a healthy environment. A lot remains to be done before the Swedish environmental quality goals have been achieved. The work with new exhaust requirements must continue. The EU has not yet decided on introducing Euro 5 requirements for passenger cars and light lorries. A considerable reduction in particle emissions is needed in this area. In the long run, decisions will also be needed on requirements for nitrogen oxide emissions from diesel driven vehicles. In addition, low particle emissions need a more precise measuring method which will include the measuring of particle numbers. Emissions from petrol driven vehicles will also need to be reduced. Of special importance is decreasing cold start emissions and improving fuel systems to prevent evaporation. Particle emissions from petrol driven vehicles also need regulation.

For heavy vehicles, it will be important to ensure that the advanced exhaust purification systems that are currently being introduced – SCR and EGR – actually work well in practice. The introduction of sustainability testing with on-board measuring equipment in heavy vehicles is a challenge. In addition, one additional tightening of requirements will probably be needed for heavy vehicles after the introduction of the Euro 5 requirements in 2009. There is also an increasing trend of global standardisation regarding testing methods. In some areas, standardisation of limit values may become reality.

Today’s requirements for exhaust emissions are probably final. However, for emissions currently unregulated, requirements will most likely be introduced. It is also likely that future requirements will concern a larger part of engines’ real operation areas than they do today. This means that tests will include more realistic driving patterns, lower temperatures and increased sustainability requirements.

However, the real challenge will be to decrease emissions of climate-affecting gases – particularly carbon dioxide – through efficiency increasing measures and alternative fuels. Here, applying technology will not be enough. We must also become better at economizing journeys and transports, both in order to decrease emissions and to secure sufficient fuel for the transport sector.

GOOD SOUND QUALITY

Sound or noise?
There is usually sound everywhere. Unwanted sound that is experienced as disturbing is called noise. In other words, whether sound is experienced as noise does not depend on sound volume alone, but also on who hears it and where and when. For most people road traffic noise is more or less disturbing. Road traffic noise can make a patio unusable, a house less worth and a park unsuitable for relaxation. Today, quiet natural and cultural milieus are increasingly hard to find. Even open-air recreation areas may not be safe from noise pollution from road traffic, snowmobiles or pleasure boats.

Noise is an extensive environmental problem and the form of disturbance that affects most people in Sweden.
Some 1.5 million persons are affected by road traffic noise. In many areas, road traffic is the dominant source of noise. The socio-economic cost for the disturbances caused by noise is somewhere between SEK five and ten billion, according to the SRA’s estimates.

Noise affects health and well-being and ranks high on the list of the more serious disturbances in modern society. Noise can cause immediate effects, such as disturbed sleep or concentration difficulties, but also long-term effects. Very loud noise levels lead to hearing damage, but considerably lower noise levels can also affect the body in subtle ways. For example, sustained exposure to road traffic noise increases stress, which raises the risk of cardiovascular diseases. This means a large number of persons may die prematurely every year because of road traffic noise. Night-time noise causes sleep disturbances whereas day-time noise can disturb conversation and other desired sounds. Undisturbed sleep is necessary for both the physical and mental functioning of people. Direct consequences of disturbed sleep include fatigue, low-spiritedness and decreased efficiency.

Measuring noise is fairly complicated. Obtaining exact measurements of sound energy or volume in itself is not difficult. However, measuring the level of disturbance of noise is problematic, as it also depends on factors such as sound frequency (pitch), how the sound volume varies and at what time of the day the sound occurs. An often used measure for traffic noise is the equivalent level, which is the average sound level over a typical 24-hour period. If the noise source is a heavily used road with a reasonably steady traffic flow, the equivalent level is a fairly accurate measure of the level of disturbance. However, if the noise source is a smaller road, or the measurements are done in a densely built-up area, the equivalent level can be highly misleading. Single passing vehicles have little effect on the equivalent level but can still cause considerable disturbance, especially at night time. In conditions such as these, the maximum level is a more accurate measure. A sound level of 50 dB(A) is normally not experienced as disturbing in urban outdoor conditions, but is completely unacceptable in indoor conditions, and clearly disturbing in recreation areas.

Emissions and immissions
The level and type of road traffic noise depend on many different factors. The most important of these factors are the number of vehicles, speed, driving style, tyres and road surfacing. The noise from a vehicle comes from its engine, driving system and tyres. In general, heavy vehicles cause more noise than lighter ones, but there is also variation in noise levels within vehicle categories. At low speeds, noise from the engine and exhaust system dominate, whereas at higher speeds, noise from tyres and the road surface take over. For passenger cars, the dividing line is at about 30-50 km/h, whereas for heavy vehicles it is at about 50–70 km/h.

Noise travels and causes disturbance both outdoors and indoors. Emissions refer to the noise emitted by a source whereas immissions refer to the noise that causes disturbance. There are limit values for noise emissions, such as the noise caused by vehicles and tyres, and guidance values for noise immissions, such as the noise levels deemed acceptable inside an apartment. The Swedish Riksdag has decided on the following guidance values for traffic noise:

- 30 dB(A) equivalent level indoors
- 45 dB(A) maximum level indoors at night time
- 55 dB(A) equivalent level outdoors at the building front
- 70 dB(A) maximum level at a patio connected to a dwelling.

How sound travels depends heavily on the terrain and the buildings around the sound source. Consequently, it is not enough to measure noise at its source, but it is also necessary to study the surrounding area to determine how the noise spreads. Houses, earth banks and rock cuts obstruct noise, but also distances and differences in elevation play
a role. The sound from a road that is elevated in relation to its surroundings can travel considerable distances.

Exposed or disturbed?
Different persons experience noise in different ways. Consequently, the sound level guidance values for new construction or major renovation is no unambiguous measure of how much noise causes disturbance. The guidance values have been determined on the basis of statistical material. For example, according to statistics, about 20 per cent of the population experience an outdoor equivalent level of 55 dB(A) as disturbing or very disturbing. Thus, in calculating how many persons or households are exposed to a noise level, the number or persons actually disturbed can only be estimated. The noise goals concern the number of exposed persons.

Unnoticed noise can also disturb
Besides audible sound, traffic also causes other types of wave motions, such as infrasound and vibrations. Infrasound is wave motions that cannot be sensed by the human ear, but which can nevertheless affect our well-being. Exposure to infrasound typically occurs inside cars and may cause concentration problems, headache and general tiredness. In situations where infrasound, noise and ground vibration coincide, complex symptoms may follow. Vibrations can be experienced as unpleasant, but they seldom cause damage to buildings.

History
Noise was the first environmental problem that caused concern when the use of motor vehicles increased after the Second World War. Noise levels in urban areas rose and quiet areas became fewer. Noise was still a topic of concern in the 1970s, but received less attention in the 1980s. Interest in the problem was reawakened in the 1990s and has continued since, due in part to the increasing number of people affected.

The development of traffic noise and noise disturbances has also reflected the development of society in general. The most important factors have been where dwellings, work places, services and commerce are located and how they are built, how vehicles have developed and the results of traffic volume caused by the social structure.

Social structure
The development of society can be seen as a spiral in which traffic and activities interact. Improved transportation has led to dwellings, workplaces, industries, services and commerce being located further away from each other. Proximity has increasingly become less significant than accessibility via various means of transport. This has led to increased traffic, which in turn has led to the need for better transport systems, which in turn has enabled new relocations, and so on. Consequently, more and more areas have become exposed to traffic noise, making this problem more extensive.

The number of people living in cities and built-up areas has also increased continuously. Currently, about 85 per cent of Sweden’s population lives in an urban environment. This means a large part of the population has moved from quieter rural areas to noisier urban ones. Some 85 per cent of the population exposed to noise lives in built-up areas.
Vehicles and traffic

The noise emission properties of new vehicles are regulated with limit values and checked using a specific test. The limit values have been successively lowered. Despite these measures, the noise emissions from vehicles have not decreased.

The limit value for passenger cars has been decreased by about 6 dB(A) since 1970. However, in effect, passenger cars have not become quieter. Noise from engines and driving systems has decreased somewhat during the past few decades but noise from tyres and road surfaces has increased as much. In 1970, many passenger cars were also quieter than the limit value at the time. Today, a larger proportion of vehicles emit noise levels close to the limit value. Moreover, most new passenger cars are optimized for the noise emission test, but the test does not fully correspond to how the cars are used in reality. This development has also to some degree been shared by heavy vehicles.

The limit value for heavy vehicles has been decreased by about 13 dB(A) since 1970. In effect, heavy vehicles have only become quieter than the limit value at the time. Now, most heavy vehicles emit noise levels close to the limit value.

The limit value for motorcycles larger than 500 cc has been lowered by 5–6 dB(A) since 1980. A motorcycle in the EU is allowed to emit as much noise as five motorcycles in Japan. In reality, motorcycles often exceed their limit values as many of them have modified or illegal exhaust systems (silencers).

The total noise emissions from road traffic equal the sum of all individual vehicles’ noise emissions. A doubled traffic volume means doubled total noise emissions. Light vehicles (under 3.5 tonnes) are responsible for around 93 per cent of the traffic volume and for 60 per cent of total noise emissions. Correspondingly, heavy vehicles (over 3.5 tonnes) are responsible for 7 per cent of the traffic volume and for 40 per cent of total noise emissions.

Heavy vehicles are mainly responsible for the peaks in road noise. The total noise emissions from road traffic are estimated to have increased by about 25 per cent since 1990.

Noise-obstructing covering

Where and how dwellings and other buildings are built affects how noise travels and to what degree people are exposed to it. Flat layout and frontage design also affect the level of noise exposure. Specific immission limiting measures, such as frontage measures and noise screens became common in the 1990s.

Decreasing indoor noise levels is generally the most cost-effective alternative, as it is much easier and cheaper than tackling outdoor environments, and utilise resources to benefit for more people. Additional window screens or new windows are usually the most effective measures. Glazing of balconies can also decrease disturbance. Glazing of balconies also improves heat insulation, which decreases both carbon dioxide emissions and heating costs.

Outdoor noise limiting measures also lead to decreased indoor noise levels. Naturally, this means better overall living conditions for residents. However, limiting outdoor noise is costly, as the available measures are noise barriers, noise screens, low-noise road surfacing and rebuilding of roads. Noise barriers and noise screens usually work poorly in densely built areas as they do not provide any significant improvement for residents living on higher floors. In addition, noise screens do not absorb noise, they only redirect it.

Improvement regarding road surfacing has so far mainly concerned durability. Swedish road conditions are problematic due to extensive use of studded tyres, long frost periods and heavy traffic during periods of lower bearing capacity. The low-noise surfacing that has been tried so far has not been durable enough to survive these strains. Swedish road surfacing are among the noisiest in Europe and produce 5–10 dB(A) higher noise levels than the European average. For comparison, low-noise surfacing has been used successfully for the last 10–20 years in the Netherlands.

Results

INTERIM GOALS

By 2007, no one shall be exposed, in their residence, to traffic noise exceeding a level equivalent to 65 dB (A) outdoors. Along state roads, this shall be achieved by 2005. In cases where the outdoor level cannot be reduced, the goal should be that the equivalent indoor level shall not exceed 30 dB (A).

An estimated 39 000 people along the state road network are exposed to road traffic noise above 65 dB(A) outdoors. It is often not practical or cost-effective to carry out outdoor noise reduction measures, and so, the SRA has focused on achieving the goal regarding indoor noise levels. At the end of the year, there were about 9 000 persons along state roads who were exposed to traffic noise above 65 dB(A) for whom no measures had been taken to bring the indoor noise level below 30 dB (A). Thus, the goal of reducing noise levels for all residents along state roads with outdoor noise levels exceeding 65 dB(A) by 2005 was not achieved. Most of the dwellings in need of measures are located in metropolitan areas. However, as long as many property owners either fail to reply to or refuse to accept measures offered, the goal cannot be fully achieved.

Since 1998, some 25 000 persons along the state road network have received significantly quieter indoor environments. Almost 4 500 persons who were previously exposed to very high outdoor noise levels have received quieter outdoor environments. Over SEK 580 million has been spent on improving indoor and outdoor environments, mainly by changing windows and building noise.
barriers and fences. When new roads have been built or old ones rebuilt, the goal has generally been to ensure that the number of people exposed to noise above the guidance values does not increase. However, the continuously growing traffic volume has made this goal difficult to achieve.

The next annual target for the interim goal (2007) concerns the whole road network. The worst noise problems are found along the municipal road network, but here measures have been much fewer. The SRA does not have any continuous monitoring of the number of people exposed to noise on municipal roads. According to an earlier study, there are some 200 000 people in need of noise reduction measures. So far, some 11 000 persons along municipal roads have received lower indoor noise levels, thanks to state subsidies during the period 2000–2005. The SRA does not believe that the goal for 2007 regarding municipal roads will be achieved.

Although many residents have received a quieter living environment, social and traffic development has led to nearly as many new residents being exposed to indoor noise levels above the guidance values for dwellings. However, the number of households suffering from disturbing indoor noise levels is estimated to have decreased somewhat between 1990 and 2005 despite the fact that the number of households exposed to noise levels above the guidance values has not. This is because noise reducing measures have been directed at those most exposed to high indoor levels, whereas the newly exposed residents have noise levels only slightly above the guidance values.

**Future developments**

In addition to the transport policy interim goal, there is also the third subsidiary goal of the national environmental quality goal regarding a sound developed environment:

> The number of persons exposed to disturbing traffic noise exceeding the guidance values set by the Government for indoor levels shall have decreased by 5 per cent by 2010 compared to 1998.

This goal, too, concerns noise exposure rather than noise production, and large efforts will be needed to achieve it.

That the development so far has not led to satisfactory results despite considerable efforts is largely a result of the fact that measures have been directed at those exposed to noise (the immission side) whereas the noise sources – vehicles, tyres and road surfacing (the emission side) – have changed very little. Future development will depend on how society, vehicles, construction and road surfaces develop.

There are tendencies both towards more compact cities with dwelling areas and other activities existing by side and an opposite development with spread-out centres. Urbanisation and denser settlements often lead to people moving to noisy areas, and changing to public transportation does not reduce noise emissions (the vehicle mileage being the same). This means that traffic noise will continue to grow at more or less the same rate as so far. The total noise emissions from road traffic are estimated to increase by about 20 per cent by 2020. If the current trend remains unchanged, the noise emission properties of new vehicles will probably not improve during the next 15–20 years. Today, there is no incentive within the car industry to develop vehicles that are quieter for the environment.

The estimated number of persons exposed to indoor noise above the guidance values was largely the same in 1998 as in 1990 (the data is based on study from 1998, which was the starting year for the noise subsidiary goal 2010). The number was the same also in 2005. In other words, we are now equally far from the subsidiary goal 2010 as we were when the goal was set. Unless any special noise reduction measures are taken, the number of people exposed to noise will start increasing, and will have, according to estimates, increased by 15 per cent by 2020.

Although noise emissions increase, noise immissions need not increase accordingly. There are many measures that can help to ensure this. For example, quieter road surfacing can decrease tyre-road surface noise in sensitive areas. A prerequisite for this is that the noise emitting properties of surfacing materials improve, and that noise issues are taken into account when deciding what type of surfacing to use. Trials are currently in progress regarding low-noise surfacing materials that are expected to be close to today’s materials in terms of durability. These new surfacing materials are 5–7 dB(A) quieter outdoors than the ones currently in use. Improvements to the sound obstructing properties of building frontages and to the room layout of flats will also are important measures in the future. An example of how room layout can affect noise disturbance is placing bedrooms to the quietest side of a flat. Noise screens can also be made more effective. Other important measures are planning and directing of traffic, and encouraging the development of quieter vehicles. In the long term, community planning can have a large impact if more attention is paid to noise producing and noise sensitive activities.

Although the development so far has moved towards a society increasingly exposed to traffic noise, overall, there are still good opportunities for turning the tide and achieving a society without significant noise problems. Many more pleasant living environments can be re-created. But what is needed is a combining of measures and the establishing of cooperation amongst the bodies responsible for them. Through joint efforts, the noise situation can be improved considerably.
Other Feedback Requirements

What follows are the SRA’s replies to the Government’s other feedback requirements in the SRA’s appropriation letter.

AGREEMENTS WITH OTHER PARTIES

The SRA must account for the number of agreements it has signed with parties that are expected to contribute significantly to the meeting of the transport policy goals, as well as for the general content of these agreements.

Introduction

The SRA signs agreements with a large number of both public and private bodies. These agreements are connected to all of the six transport policy goals and are signed by the SRA’s units and regions. They range from service procurements to cooperation agreements. Generally speaking, all the activities that involve an external party are regulated by an agreement of some kind. It is not clear what type of agreements the government refers to. However, the SRA assumes the government means agreements that the SRA has signed with other parties and that entail using sector appropriation funds.

Most of the measures reported in the goal analysis for interim and subsidiary goals, as well as the measures reported in this section have been preceded by agreements between the SRA and other parties. Additional examples of agreements and the measures included in these agreements are described below. These represent the variety both in terms of the nature of the agreements and their content.

Routines have not yet been developed for collecting and analysing all agreements and the measures they entail to ascertain which agreements have contributed significantly to achieving the six transport policy goals.

Examples of agreements

Speed control

The SRA has made agreements with the police on both central and regional levels. The activities entailed by these agreements include enforcement of traffic rules, continuous monitoring of road speeds, prioritising and evaluating supervision measures, and automatic road safety supervision through a new system of speed surveillance cameras (ATK).

The SRA also has agreements with the National Road Safety Organisation (NTF) that during 2005 resulted in several activities that showed the effect of speed on crash damage.

The SRA has paid special attention to the speed control of bus traffic by signing a national agreement with the Swedish Bus & Coach Federation and the Swedish Public Transport Association.

In addition, the SRA has made agreements with several municipalities and taxi companies regarding trials with an intelligent speed adaptation (ISA) system. The ISA-system notifies drivers when speed limits are about to be exceeded.

Sobriety

Several parties joined in the three year effort to produce the multimedia production “Länge leve livet” (“Long Live Life”) within the Don’t Drink and Drive project. In 2005, the production was shown to a large number of young people at upper secondary schools, folk high schools, universities, colleges and larger sports clubs. The shows were followed by discussion. The SRA has also disseminated information via mass communication channels following agreements with TV4, SF Bio, and the RIX FM radio station.

Municipalities and traffic operators have agreed with the SRA to install alcohol ignition interlocks in official cars, school transport vehicles and buses.

There are also agreements with the police on manual supervision of road temperance as well as cooperation regarding the Skellefteå Model. The Skellefteå Model is a joint project amongst the police, public health care, and the social services to offer drunk drivers a meeting with expert personnel within 24 hours of being caught. The SRA has also made agreements with county councils and municipalities concerning the model.

A nation-wide agreement with Statoil has resulted in the installation of alcohol ignition interlocks in the company’s vehicles.

Seat belt use

The SRA has agreements with the police and the NTF regarding measurements of seat belt use as well as campaigns and general influencing of attitudes to increase the observance of seat belt regulations. Agreements with the Swedish Vehicle Inspection Company have enabled joint use of the company’s facilities and joint information efforts regarding seat belt use.

Children

Several municipalities have agreed with the SRA to contribute to road safety efforts for children via the Traffic-Conscious School project.

Commercial transports

The SRA has made agreements with the Swedish Work Environment Authority and the traffic police regarding joint activities directed to the haulage industry. Information material has been prepared that presents good
examples from hauliers, bus and taxi companies and municipalities. The SRA has agreed to support companies dependent on heavy transports in their development of environmental, road safety and working environmental requirements for procurement. This support has lead to several of these companies receiving positive feedback from Q III, which is an independent body that evaluates and grades organisations purchasing heavy transports, in the same way as EuroNCAP grades cars and Euro RAP roads.

**Sustainable travel**
The SRA has made agreements with several municipalities, county councils, companies and sports associations within the framework of the Sustainable Travel project. The aim of the project is to contribute to making collective transports safer and more effective and environmentally friendly than individual transports by car.

**Transport quality assurance**
Within the Transport Quality Assurance project (TQ), the SRA has signed agreements with a large number of municipalities, county councils and companies. The agreements may concern environmental certification, development of traffic safety policies and trials with alcohol ignition interlocks. TQ is a nation-wide project that aims to create a market for safer and more environmentally friendly transports.

**Agreements in the area of OLA projects**
The SRA’s agreements with the police include cooperation in various OLA projects. OLA is a cooperative method for investigating fatal accidents and preventing similar accidents from happening again. An OLA project is concluded by the participating parties presenting a declaration of intent, or what they intend to do to prevent similar accidents in the future. The SRA then follows up on the implementation of the intended measures.

**THE EU’S SIXTH FRAMEWORK PROGRAMME FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT**
Within its sphere of activity, the SRA is responsible for encouraging Swedish participation in the EU’s sixth framework programme for research and technological development. The SRA should also contribute to making sure issues particularly relevant for Sweden receive high priority within the programme. The SRA must report for its activities.

Sweden participates in the European Road Transport Research Advisory Council (ERTRAC). ERTRAC is comprised of high level representatives from the EU Commission, national government offices, industries, universities and colleges and various trade organisations. The purpose of ERTRAC is cooperation and sharing of knowledge. All aspects and components of the road transport system are encompassed by the forum. Sweden has a ‘triple helix’ representation in ERTRAC, consisting of the SRA, the Royal Institute of Technology (KTH) and Volvo Technology AB. ERTRAC has formulated a vision for the future European road transport system. This vision has led to a technology platform for various RDD needs (RDD – Research, Development and Demonstration) for the road transportation system, and this platform will be included in the EU’s upcoming seventh framework programme.

European cooperation between road authorities is coordinated through the Conference of European Directors of Roads (CEDR). The activities of CEDR aim at influencing the development of road traffic and infrastructure. The goals are:

- to establish networks amongst the personnel of European road authorities
- to provide a platform for discussion of common problems
- to encourage commitment to the EU and interaction with its institutions
- to enable the sharing of knowledge amongst representatives within international bodies
- to ensure new solutions become known and are applied in the member countries

Within the framework of CEDR, ten European road authorities have started a joint project called Coordination and Implementation of Road Research in Europe (ERA-NET Road). The aim of the project is to achieve coordination amongst various national RDD programmes so that all these programmes will be open to all involved in RDD in the ten countries, by May 2008. The implementation of the ERA-NET Road project is divided into seven sub-projects of which the SRA manages two.

Since last year, a considerable effort has been in progress to plan the conference Transport Research Arena
Europe 2006 that will take place in Göteborg on 12–15 June. This conference is arranged by the SRA and Vinnova, and supported by ERTRAC, CEDR and the EU Commission, and has as its theme “Greener, safer and smarter road transport for Europe.” Its aim is to establish a platform for coordinating the needs for and implementation of research and development within the area of road transport, and is expected to contribute to a sustainable, effective and safe road transport system by strengthening the networks within and amongst the European research communities, authorities and industries.

To create strong and coordinated research environments able to compete within the EU, the SRA has created virtual RDD centres. These virtual centres will facilitate the obtaining of RDD assignments within the various EU framework programmes. A virtual RDD centre is a cooperative effort amongst national parties active within a specialised area of competence, and is managed by a coordinating body.

In total, there are 37 different parties active within four virtual RDD centres. The following RDD centres were established in 2005:

- The Virtual RDD Centre for Bridges and Tunnels (FUD-BT)
- The Centre for a Sustainable Road Transport System (CELEST)
- Transport Telematics R&D group Sweden (VFUDC-TTS)
- Swedish intermodal transport research centre (Sir-C).

The Swedish Construction Sector Innovation Centre coordinates FUD-BT, the Swedish National Road and Transport Research Institute (VTI) coordinates CELEST, the Teknikdalen Foundation in Borlänge coordinates VFUDC-TTS and the transport and logistics research institute TFK coordinates the Sir-C.

During 2005, the SRA participated in 15 different RDD projects connected to the EU’s sixth framework programme. The SRA has also provided financial support for the preparing of six applications to EU framework programmes. The recipients of this support were universities, research institutes and companies.

**FUTURE COMMERCE INVOLVING EVERYDAY PRODUCTS**

This project was initiated by the Environmental Conservation Delegation, and is a cooperative effort amongst companies, municipalities, regions and the government to promote the development of sustainable commerce involving everyday products in Sweden. The parties have formulated goals to work towards and signed an agreement on a number of concrete measures for a sustainable development. The aim is to decrease environmental impact throughout the chain from production to consumption, including transports. Among the general objectives for the project is halving the road transports of the food industry and trade as well as household shopping trips by 2025.

During 2005, the SRA participated in the Evening Distribution project. The purpose of this project is to ascertain whether moving distribution to evenings in
OTHER FEEDBACK REQUIREMENTS

Stockholm can decrease environmental impact, even out the flow of goods during the day and increase utilisation of capital.

THE CHILDREN’S PERSPECTIVE

The SRA must report how children have been taken into consideration in the various activities during the year.

The SRA is continuously working to incorporate a children’s perspective into its work. The objective is to adhere to the UN Convention on the Rights of the Child. Children and young people are also one of the customer groups the SRA has identified.

Cooperation with municipalities on community planning issues

It is important to include the children’s perspective into community planning. Accessibility for children is closely associated with children’s traffic safety. Consequently, efforts to decrease the number of child fatalities or serious injuries in traffic also positively affect accessibility work.

The SRA has cooperated with municipalities on issues concerning children and community planning in an urban area project and a traffic network analysis. Agreements have been signed regarding the preparing of status descriptions and action plans regarding children’s school journeys.

In its comments on municipal plans, the SRA’s community planners have criticised issues relating to how children can safely travel to school. The SRA has also carried out discussions with municipalities on the determination of preschool and school locations with regard to traffic safety.

Safer boarding and alighting points for school transports

The SRA is actively working to improve safety at school transport boarding and alighting points. New stops have been built along the state road network, and the safety of old stops has been improved. Some stops have been moved and specific turning areas have been built for school transport vehicles. Opportunities to safely cross the road at stops have been improved through speed limiting measures. Pedestrian and cycle paths have also been connected to stops to increase the safety of children who travel to and from the stops.

There have been mappings and inspections of school transport stops, and together with the SRA, some municipalities have prepared action plans and checklists for school transport safety. In 2005, the SRA presented a proposal to the government on trials with a 30 km/h speed limit for vehicles passing buses that have stopped at bus stops.

Information and education

Information and education for parent groups regarding protective equipment for children have been arranged at health centres and preschools. The SRA has also carried information efforts at various strategic locations, such as in hypermarkets, at traffic control points near kindergartens and schools, on traffic days and at exhibitions.
On 1 January 2005, a new law came into effect requiring children and young people under 15 to use a helmet while cycling or given a lift on a bicycle. The SRA has provided information about the new law through advertising and information and education efforts at schools, sports clubs, specifically arranged cycling and traffic days and public places.

During the 2005, the SRA also arranged a design competition for professional designers to produce new helmet models that are both comfortable and designed in a way that attracts new target groups. The winners were announced on 10 November.

Another competition, for school children in the sixth grade, aimed at educating children about the importance of exercise and wearing a helmet. The competition task was to produce an advertising campaign for cycle helmet use. A number of cooperative projects with municipalities have included the objective of improving children’s health and increasing their opportunities to cycle to school.

Information efforts have been carried out by municipalities and schools to increase that awareness of young people and their parents of the risks associated with driving a moped. The focus has been particularly on eighth and ninth graders.

Support to schools’ traffic, environmental and community planning

The SRA has supported schools and the child care system in their work with traffic, environmental and community planning. This support has included training for teachers to increase their interest in integrating traffic, environmental and community planning in teaching. Parent-teacher meetings regarding traffic safety for children have also been arranged.

Special training and information has been provided for school children and teachers regarding traffic safety in connection with school transports. Several cooperative projects with municipalities are in progress to enable more children to independently walk or cycle to school. Dialogue projects dealing with operation and maintenance of pedestrian and cycle paths have been carried out with parent-teacher associations.

The SRA has also carried out projects in cooperation with upper secondary schools to involve students in traffic safety issues. The aim has been to make young people aware of the importance of sober driving, seat belt use and keeping to speed limits.

Discussion with children

In connection with urban area projects, the SRA has consulted with children to obtain their views and to involve them in safety efforts. School children have participated by studying and analysing their school routes from traffic safety and environmental perspectives. Their points of view will be taken into account in subsequent work.

Some consultations with children have also involved the participation of their schools in the mappings necessary for child safety analyses in the road planning process. During mappings of school routes, children travelling the routes have joined in and influenced the work. The SRA has conducted dialogues with school children about the traffic environment at their schools and along their school routes.

Other measures

Among the other measures carried out during the year were child safety analyses for 16 road projects, including footpaths and cycle paths, crossings at major thoroughfares, urban area projects and rural roads separated by median barriers. Opportunities for consulting with children were also provided in connection with construction projects. The children who participated by expressing their viewpoints during preliminary studies have received information in the course of the projects and taken part in the official opening of projects.

The SRA has revised its handbook Vägutredning (‘Road Investigation’) (publ. 2005:64) to include more of the children’s perspective. A few other publications dealing specifically with child safety analyses also provide guidance, present knowledge and describe experiences that can be helpful in the development of child perspectives in road planning.

The SRA has made information on children and traffic available on the Internet. The website Hitodit (‘To and fro’) addresses children directly. Its main objective is to provide children aged 6–12 with a quick and easy way to express their opinions and ask the SRA traffic related questions. The website will work as a communication and information channel between children and the SRA. The website Barn och närsamhälle (‘Children and the neighbourhood’) mainly addresses adults.
Milestones 2005

This section provides a chronological overview of some events in the road transport sector in 2005.

**JANUARY**

Winter Storm Gudrun
2005 started dramatically with Winter Storm Gudrun in Southern Sweden. On the state road network, the costs for clearance, maintenance and the increased transport volume were estimated at SEK 600 million, of which about half was taken from the 2005 appropriation.

Increased cooperation between the Swedish Work Environment Authority and the SRA
The Swedish Work Environment Authority enhanced its cooperation with the SRA. Both authorities are entrusted by society to prevent losses and damage. Traffic safety became one of the items that the Work Environment Authority considers when evaluating the systematic work environment measures of companies and organisations.

Transport Forum
The Swedish National Road and Transport Research Institute’s, or VTI’s, annual conference, Transport Forum, was arranged in Linköping on 17–18 January.

Buses to reduce speed during heavy winds
Together with the public transportation authorities in Norrbotten and Västerbotten and the Swedish Bus & Coach Federation, the SRA carried out a trial project to help bus companies and drivers increase safety. New advice and recommendations were a part of the project. One recommendation was to decrease speed during strong winds.

**FEBRUARY**

The letter X is introduced on number plates
The number or registered vehicles is steadily increasing in Sweden, and as a consequence, the need for new registration numbers is increasing, as well. To meet this need, new letter combinations were introduced with X as the initial letter.

The government proposes stiffer measures against illegal taxis
The Government decided to refer a proposal on measures against unregistered taxis to the Council on Legislation for consideration. Among the measures proposed was a new penalty regulation to the commercial traffic legislation (1998:490) according to which even persons who provide occasional illegal taxi service could be punished by a fine. The government also proposed a special driving test for those applying for taxi licenses.

Six new road signs
The government decided that six new road signs would be introduced – one indicating automatic camera surveillance and five to be used mainly in long tunnels.

**MARCH**

The SRA proposes a lower tax for diesel cars
The SRA proposed that new diesel cars taken into use on 1 January 2006 or later would have their annual motor vehicle tax reduced by up to SEK 6 000 for up to three years.

**APRIL**

The last stage of the Södra länken opens for traffic
In the morning on 22 April, the eastern entrance at the Åbyvägen interchange opened for traffic, thereby completing the Södra länken project.

Proposal for 30 km/h speed limit at bus stops
The SRA proposed that vehicles passing buses loading or unloading passengers should reduce their speed to 30 km/h. The new regulation will be tested in several municipalities during 2006 and, if successful, introduced in the whole country in 2007.

Seminar on alternative financing
A whole-day seminar was arranged dealing with the future financing of the road transport system. The seminar was meant as a starting point for a broad national discussion aimed at finding new alternative forms of financing.

Anti-skid systems reduce the risk for serious accidents
The Folksam insurance company presented a new study on anti-skid systems. Anti-skid systems, often abbreviated as ESP, ESC or DSTC, automatically brake one or several wheels when the car starts to skid and thus helps to prevent serious accidents.

Another SEK 100 million to Rikstrafiken
The National Public Transportation Agency, or Rikstrafiken, received an additional SEK 100 million for the period 2005–2007. The addition meant that Rikstrafiken...
MILESTONES

now receives over SEK 900 million annually to support or purchase unprofitable long distance coach routes.

MAY

Proposal on obligatory registration for all mopeds
The SRA and the National Police Board proposed that all mopeds should be registered. According to the proposal, the Swedish Vehicle Inspection Company (Svensk Bilprovning AB) and the Swedish Machinery Testing Institute (SMP) would carry out the registration inspections.

JUNE

The Svinesund bridge opens
On 10 June 2005, the Svinesund line – a motorway between Nordby in Sweden and Svingenskogen in Norway – opened for traffic. The line is about 6 kilometres long and includes the new 700 metre long Svinesund bridge – the world’s longest single overhead arch bridge.

New, higher speed limits introduced
The speed limit was increased to 120 km/h along the E 6/E 20 in southern Halland. A variable speed limit was introduced at the same time, which means speed limits are lowered automatically in the event of rain or snow.

New chairman at the SRA
The government appointed Kenneth Kvist as the new chairman of the board for the SRA. Kenneth Kvist has many years of experience as a public official in the Swedish Left Party, including as general secretary in 1985-1993 and a member of the Riksdag in 1994-2002.

New research centres for telematics and intelligent transport systems
Four new virtual RDD centres were set up for the areas of bridges and tunnels, sustainable road transport systems, transport telematics, and intermodal transports. The aim is to coordinate existing research and increase the chances of participation in the EU’s framework programmes for research technological and development.

AUGUST

Evaluation of heavy transport purchasers (QIII)
QIII presented its first evaluations of purchasers of heavy transports. QIII is an independent non-profit association owned by the Swedish Trade Union Confederation and the Swedish Road Safety Organisation. The association evaluates purchasers of heavy transports according to the demands they make on working environment, traffic safety and the environmental friendliness of transports. QIII also provides purchasing support.

The old Svinesund bridge
On 31 August, the old Svinesund bridge was ceremoniously declared a common Norwegian-Swedish cultural monument. Both the Swedish and Norwegian governments have declared the bridge as a national historic bridge, which makes the bridge the first object jointly protected by Norwegian and Swedish law.

The Tylösand seminar
On 17–18 August, the Swedish Abstaining Motorists’ Association (MHF) arranged their annual Tylösand seminar for the 48th time. The theme this time was communication – learning how to better reach people’s hearts and minds in order to achieve the high goals set for road safety.

Investments in vehicle research
The government and the vehicle industry decided to make a joint investment in vehicle R&D. The state will contribute with SEK 400 million and the vehicle industry with at least as much.

Breakdown at the Traffic Registry
The Traffic Registry was out of function for a few days due to a systems breakdown. Besides causing inconvenience for the general public, the breakdown also affected the police, insurance companies and vehicle inspection.

Green light for environmental control grants to Volvo
The EU Commission gave the green light to the government’s proposed environmental control grants to Volvo Trucks in Umeå. Volvo Trucks plans to invest another SEK 650 million in its cab plant in Umeå. The aim is to introduce a new mechanical method for the top coating of lorry cabs.
The Traneberg bridge

The expanded and renovated Traneberg bridge was reopened. The bridge had been in such a bad condition that both the driving deck and the concrete supports under it, all the way down to the concrete arch, had to be replaced.

SEPTEMBER

Proposal on new speed limit system

The SRA proposed a new system of speed limits that would include the limits 40, 60, 80, 100 and 120 km/h in addition to the existing ones.

Proposed new rules and regulations on converting cars to use alternative fuels

Assigned by the government, the SRA investigated the possibilities of converting passenger cars to utilize ethanol and gas as fuel. The study showed that it would be possible to introduce rules regarding this type of conversion.

Swedish proposal on alcohol ignition interlocks

Sweden’s Minister of Infrastructure, Ulrica Messing, met with the EU Commissioner for Transport and Tourism, Jacques Barrot. In connection with the meeting, Ulrica Messing handed over a letter proposing that the EU Commission and Sweden would cooperate on introducing rules that would make it possible to require new cars to be equipped with alcohol ignition interlocks.

OCTOBER

The Essinge bridge is damaged by a crane boat

A crane barge hit the Essinge bridge and caused traffic jams lasting several hours. The traffic situation in Stockholm was affected within 15 minutes of the accident and continued to be affected for a number of weeks.

Road Temperance Day

A nation-wide demonstration against drunk driving took place on Road Temperance Day. The main slogan was “Life is beautiful – Don’t Drink and Drive”. The police contributed by carrying out a large number of DWI checks along roads and at other selected points.

700 road safety cameras to be placed along roads

In consultation with the National Police Board, the SRA decided on the locations of 700 roadside traffic safety cameras. The cameras will be erected along 102 hazardous road stretches all over the country.

NOVEMBER

Serious tank lorry accident

A serious accident involving a tank lorry occurred on the E 6 in Falkenberg. The accident took place on a flyover bridge over the old E 6 and a railway track. The SRA inspected the bridge and concluded that both carriageways had been seriously damaged. Traffic was initially directed to smaller roads and later to the old E 6.

Consequences of the Trolhätte Package

The Trolhätte Package, presented by the government in October 2004, changed the orientation of road planning in the whole country. As a consequence, the government assigned the SRA to revise the National Plan for the Road Transport System 2004-2015, which in turn meant a number of planned projects had to be postponed.

DECEMBER

Eight out of ten in the SRA’s traffic survey in Stockholm want ‘alcolocks’ in cars

On Lucia Day, drunken driving increased ten times. New figures showed that young people want alcohol ignition interlocks in cars. The figures were based on the SRA’s traffic survey in Stockholm in which 818 road users and passengers aged 16–24 answered questions relating to alcohol in traffic.

Trials with speed limits when passing school buses

The government decided on a new regulation that entailed a speed limit trial concerning vehicles driving past buses and school transports while these are stopping for loading or unloading.

New rules for authorities’ purchasing and leasing of environmentally friendly cars

The government decided on changes in the regulation regarding authorities’ purchasing and leasing of environmentally friendly cars. According to the new regulation, effective from 1 January 2006, at least 75 percent of the passenger cars bought or leased annually by a public authority are to be ‘green’ – a rise from the previous 50 percent.

2005 sees a break in the trend for the sales of green cars

Registration of passenger cars able to utilize Ethanol E85 increased from 5200 in 2004 to 9 500 in 2005. The corresponding increase for methane gas (natural or biogas) was from 1000 to 1800 and for hybrid fuel from 700 to 1 900.
Increased use of renewable fuels is required if we are to achieve the interim goal for carbon dioxide emissions from road traffic.
2005
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