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**Introductory Session:  
Sustainable and Healthy Urban Transport Patterns and Land-Use Planning**

**A Vision of Sustainable Urban Transport  
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### **Introduction**

This paper considers the role of urban transport and compares the present situation with the requirements for sustainable mobility. It examines the environmental, social and economic effects of transport, and describes how improved land-use planning, together with traffic management and greater use of improved public transport can improve the quality of life and help society to achieve sustainable mobility.

### **Transport and Society**

Cities are our major source of wealth creation, intellectual progress and cultural creativity. They are the engines of modern life and if they are affected by weaknesses or overtaken by failure the consequences reach into every corner of economic, social, community and personal existence.<sup>1</sup> The world's population is increasingly living in cities; indeed 80% of the population of the European Union now live in urban areas.

Transport is important because it broadens our horizons, enables travel and trade, and has allowed men and women to embrace new freedoms. It is not normally required for its own sake, but because it gives people access to the places and facilities they need in order to lead full and active lives. Good transport is vital for the life of our cities – but poor transport slowly strangles them.

### **The problem**

City populations are expanding, people are travelling more, and an increasing proportion of journeys are being made by car – even very short journeys. In the European Union, the daily distance travelled per person doubled between 1975 and 1995. Now, 80% of all personal journeys in the European Union are by car and 50% of all car trips are less than 5 km. A further doubling of traffic is expected in the next twenty years.<sup>2</sup> Globally, travel is expected to have doubled from 1990 to 2020, and then to redouble from 2020 to 2050. Car registrations across the world are growing more than twice as fast as the population -

50 million in 1954, 350 million in 1989 and 500 million in 1997.<sup>3</sup> This increase in traffic reflects economic growth and improvements in the standard of living.

## **Sustainable transport**

Sustainable development acknowledges that communities make demands on the earth's resources, but that society must develop within certain environmental constraints. The Brundtland Report<sup>4</sup> stated that "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Resources are limited, the environment can only absorb a certain level of pollution, and people now and in the future have a right to a certain level of environmental quality, for example clean air, clean and sufficient water, and silence. Development within these constraints is sustainable development.<sup>5 6</sup> Sustainability can only be achieved when the three interlinking elements – the environment, society and economy – are in balance.

A sustainable *policy* is one which can be continuously implemented. This means that we must have the resources to support it, and there must be the financial and administrative capacity to carry it out. So it would be wrong to adopt policies which are not acceptable to the community and so are difficult to implement, but it would also be wrong to follow unsustainable policies simply because these are all it is felt possible to implement.

For sustainable mobility, we need a transport system which is environmentally sound, socially just and economically feasible. So it must:

- Meet all peoples'<sup>7</sup> access needs (to goods, jobs, education, leisure, information), while
- Public health is not endangered,
- emissions do not exceed the assimilative capacity of the environment,
- the use of renewable resources remains below their rate of regeneration, and
- the use of non-renewable resources remains below the rate of development of renewable substitutes.<sup>8</sup>

UITP has proposed,<sup>9</sup> an operational definition for sustainable transport and development as that which allows decent living and working conditions in which:

- the majority of citizens should be able to conveniently meet most of their local needs by foot, cycle and public transport,
- public transport services sufficient to meet these needs are available and affordable,
- longer distance journeys between urban centres are adequately served by public transport,
- those journeys which go by private transport, pay their full economic and environmental costs, and
- the capacity and management of the road system is in balance with the demand for highway capacity with full social cost pricing.

Affordable and sustainable transport for all brings access to education, employment and markets encouraging solid economic development, whilst access to health, other essential services and leisure activities brings social cohesion and stability. This benefits both the developed and developing world.

We are not achieving sustainable mobility because present transport arrangements do not give mobility to all, because people do not make sustainable choices, and because increasing traffic has many damaging effects, including:

- accidents.
- noise.
- air pollution, leading to climate change and individual health problems.
- adverse social impacts.
- lack of physical exercise.
- congestion.
- consumption of space in cities.
- disruption to public transport and pedestrians.
- visual intrusion and degradation.
- damage to buildings and the fabric of historic cities.
- urban sprawl and the dispersal of development.
- pressure to spend increasing financial resources on roads and parking, and
- effects on employment.

Excessive traffic is affecting the health and the efficiency of our communities and both the global and local environments. Use of the private car has grown as standards of living have improved and as people demand ever more mobility. But the car cannot give mobility to everybody – many people have no access to one, there is not enough space to accommodate them, and as more people use them for ever more journeys so congestion increases, more urban space is taken up by roads, public transport is prevented from working efficiently and life becomes more difficult for those who do not have access to a car.

### **Sustainable transport and land use**

We have to make reference to land use if we are to adequately describe sustainable transport, because settlement patterns are fundamental to the scale and nature of mobility needs and to the effectiveness of our various means of meeting them. Land is one of the scarce resources we must conserve. We must also take account of the environment and of other objectives such as social equity.

#### Urban sprawl

In traditional communities, people could meet their basic daily needs within the immediate neighbourhood. Shops, schools, entertainment and health facilities, possibly even their work, was within walking or cycling distance, or a short journey by public transport. As cities have expanded, bringing urban sprawl and dispersal of development, motorists have travelled longer distances to meet their daily needs. Now private transport is needed to cope with these basic activities, which are not reached more quickly or more conveniently, but are simply further away.

The analysis by Kenworthy and Newman is well known and has been developed with UITP into the Millennium Cities Database<sup>10</sup>. This shows that the most critical factor in containing energy consumption is population density. In dispersed, car-based American cities, energy consumption may be 6 to 10 times greater than in the more compact European cities with well-developed public transport and better provision for cyclists.<sup>11</sup> The development of out-of-town shopping centres consumes more agricultural land, encourages more journeys to be made and takes up even more land for parking.

Increasing urban sprawl makes journeys longer and more expensive. It also means that public transport is more thinly spread over a wider area, becoming less economic - it may cease to exist as a result. Dispersed development also leads to increasing pressure to spend ever more financial and land resources on the construction of new roads, with the environmental and social costs these bring. In the United States, following the Intermodal Transportation Efficiency Act of 1991 (ISTEA), four times as much has been spent on highways as on public transport, often on new highways and on widening schemes which have extended urban sprawl and created even more inhospitable environments for pedestrians. This has increased the area to be served by city transit operators by 30% in most US urban areas, and by up to 50% in others.<sup>12</sup>

### Space in cities

In cities and urban areas, space is a scarce resource and needs to be shared fairly and productively between residential and commercial activities, public buildings, roads and open spaces. The allocation of space has a direct impact on the living conditions of citizens. But road building has pushed public transport aside, and required pedestrians to use subways and underpasses. Space is more effectively used by public transport per passenger km carried: metros can travel underground and create opportunities for buildings overhead, buses use half as much space as bicycles, and ten to 30 times less than the car when parking and road use are included.<sup>13</sup>

Increasingly, roads and traffic have come to dominate our cities. In some cases, roads have been squeezed into residential areas with a serious impact on the residential environment, and historic buildings are damaged by the pollution and constant vibration from heavy traffic. "Visual intrusion, noise, smells, dirt, fumes, the fear of accidents and severance caused by heavily-trafficked roads, all combine to give an overwhelming impression in the majority of cities of complete domination by vehicular traffic."<sup>14</sup> High traffic speeds, wide roads and widely spaced junctions restrict the places where pedestrians can safely cross the road. Parked vehicles at particularly significant places, such as shopping parades and schools, add to the danger.

Public transport can achieve equivalent, or better, mobility for citizens in far less space than private transport. A high capacity urban railway, for example, can carry around 40,000 passengers an hour along a track of similar width to a traffic lane that would have difficulty in carrying 2,000 passengers per hour, particularly taking into account the low occupancy of most commuter cars. In addition, those cars will require parking space in the city centre. In

total, space for transportation takes between 15 and 30% of the urban surface area in a typical city.

The Millennium Cities Database suggests that the most important factors in achieving lower car use, and so lower use of energy and emissions, are:

- increasing density of population and jobs in all parts of the city;
- increasing importance of the central area, especially in its residential concentration but also in the proportion of jobs it contains;
- reduced car ownership;
- lower amounts of road space per capita;
- increased congestion, and
- improved public transport services.

This list clearly shows the significance of land use. Urban form and the transport system which serves it are, of course, inextricably linked, and it is clear that a denser urban area well served by high quality public transport is more likely to encourage the use of the more sustainable modes of transport: walking, cycling and public transport. Transport is used as a means of access to the facilities people need. Where land use patterns are compact and properly structured, then the need for costly transport of all types can be contained. Where there are local facilities to meet peoples' daily needs, then regular access can be obtained by walking and cycling. Those facilities that attract larger numbers of people should have good quality access by public transport, in order to minimise the use of cars and other forms of motorised personal transport.

### Social Effects

As society has come to depend on the car, those without cars find themselves increasingly marginalised and prevented from leading full and active lives. They are excluded from activities which require access by car, such as out-of-town shopping centres, many employment opportunities, entertainments and other places not connected to the public transport system, which is itself less comprehensive due to the loss of passengers.

Some communities become cut off by road infrastructure, or by high levels of traffic which can isolate people, especially the elderly and disabled, who feel unable to walk or cross the street. This limits their interpersonal networks of support, which has been found to be associated with higher mortality and morbidity in the elderly.<sup>15</sup>

The effect on children can also be severe. Those who can play unhindered by street traffic and without the presence of adults have been found to have twice as many social contacts in the immediate neighbourhood as those who could not leave their home alone due to heavy traffic. The fear of accidents is reported by parents as being the main reason for taking children to school by car. This hinders the development of children's independence and reduces their opportunities for social contact. It adds to traffic at school times, which discourages others from walking, and it influences children's attitudes towards car use and personal mobility in adulthood.<sup>16</sup> In the UK, trips to school now account for 20% of morning peak congestion in urban areas.

While private cars drive people apart, public transport brings them together. It creates places where populations mix, encourages people to use public places, and gives mobility to all. It plays a crucial role in local development and maintains the social and urban fabric. 7 out of 10 people in densely populated areas of Paris quoted public transport as one of the major components of quality in city life.

There is therefore the need to promote healthy transport such as walking and cycling, and also public transport as this can result in walking and cycling for part of the journey. A high proportion of car trips are very short: in Paris, 30% are less than 2 km and 20% are under 1 km.<sup>17</sup> The average walking trip in Europe is about 1.5 km and the average cycling trip about 3.5 km, each taking about 15 minutes to make: two such trips each day would be enough to provide the recommended “daily dose” of physical activity, whilst significantly reducing car traffic.<sup>18</sup>

### Congestion

Traffic congestion affects businesses and individuals. It lengthens journey times leading to inefficiency, anger and frustration. For businesses, it results in a loss of productivity and increased costs of transporting goods. It makes public transport unreliable and inefficient, and further reduces the demand whilst increasing costs. It is not new – ancient Rome suffered from chariot congestion and had to limit their use.<sup>19</sup> The EU quotes a figure of 210 billion Euro per annum as the overall cost of congestion, considerably more than the total amount invested in passenger transport! Congested roads are eroding the benefits of individual freedom that increased car ownership had brought.

Congestion arises when the volume of traffic exceeds the capacity of the road, so each additional vehicle slows down all vehicles. However, it is now widely accepted that building roads only gives a temporary respite to congestion since it tends to encourage additional road use. It is not therefore a sustainable long-term policy. On the other hand, greater use of public transport will reduce the road space taken up, as long as it is used effectively. If the space saved is taken from the road, the total vehicle flow should fall and the amount of congestion will be reduced. If the flow reduces enough to allow road speeds to increase, then everyone will benefit.

### Employment

Public transport gives access to employment even for those without cars – it improves the efficiency of the labour market by increasing the availability of labour, increases the pool of candidates from whom employers can recruit, and increases the range of opportunities for which job seekers can apply.

If those without a car cannot reach jobs then the availability of labour is reduced, which is inefficient for business and society. By contrast, public transport aids social inclusion and can link excluded communities to the economic and social mainstream. Of course, the car

enables workers to travel longer distances to work, but this is not sustainable. Indeed, new road construction encourages people to move home and travel further to their work.

If greater use of public transport reduces the need for car parking, then more land is released for productive use, and less expenditure will be needed on roads and associated infrastructure.

### **The Need for Action**

These problems are not being solved, they are getting worse, and traffic is now preventing our cities from fulfilling their purpose as generators of human activity and enterprise.

The European Commission in its 2002 White Paper stressed the need for action, but this was already clear. In its follow-up to the Citizens' Network<sup>20</sup>, the Commission had suggested that there is a high degree of consensus among authorities and transport operators on how to achieve a shift from dependence on private cars and to make transport systems more sustainable. These included:

- reducing the demand for travel, for example by reversing the trend for housing, jobs, schools, shops, medical facilities and leisure activities to disperse to places which are far apart and hard to reach except by private cars,
- making transport an essential component of strategies for spatial planning, economic development and social cohesion,
- raising the quality and accessibility of public transport services, and increasing their capacity to respond flexibly to changes in transport needs,
- making walking and cycling more attractive,
- recognising the continuing role of the car in local transport systems, while making it possible to have a good quality of life without depending on them,
- removing psychological barriers to the use of alternatives to cars and winning public support for policies to encourage more use of these alternatives,
- actively managing car use in congested areas - for example through parking restrictions, access controls or road pricing schemes,
- fostering new, flexible working time arrangements, and
- pulling all this together to create a door-to-door transport system.

### **How public transport helps**

Public transport has a strong role to play in achieving sustainable mobility. It has always been crucial to the development and success of towns and cities. It was public transport which gave mobility to the whole community, and allowed cities to grow. Now it is necessary once again to develop public transport to achieve mobility for all, which is sustainable to health and the environment.

Measures to promote public transport and reduce car use will have multiple benefits. For example:

- Greater use of public transport will help in reducing motor traffic and so reduce emissions, improve air quality and reduce accidents.

- Greater use of public transport will reduce energy consumed and greenhouse gas emissions per journey, enhance the service public transport can offer and reduce social deprivation.
- Buses take up less space, pollute the atmosphere 25 times less, consume 3 times less energy per passenger transported and help to reduce traffic speeds.
- Enforcement of speed limits will reduce emissions and accidents, and create a safer environment for pedestrians.
- Public transport encourages people to walk and cycle for part of their journeys, which will promote health by providing physical activity, decreasing noise and air pollution.
- Electrically powered public transport causes less noise than petrol or diesel vehicles, and can easily adapt to alternative sources of energy that are renewable and less polluting.
- Public transport uses less land than private transport, and so will help to avoid urban sprawl and enable further savings in energy consumption.
- Public transport can also be cheaper overall in terms of total annual expenditure on travel.

### **Government actions**

It is clear that action is needed at all levels of government to achieve change. It should be possible to develop sustainable mobility without increasing taxation and public sector spending, because the cash flows already spent inefficiently on travel can be recycled in a way that reduces traffic and simultaneously improves the quality of streets, public transport and access to activities.<sup>21</sup> In many cities there is insufficient public transport of adequate quality, while the cost of driving perceived by the motorist is lower than the cost to the community. A system of road pricing could ensure that users of all transport modes pay the full cost of their travel choices. This is not to increase taxation, but to use carefully selected tolls or taxes to influence the behaviour of motorists towards economic efficiency and the well being of the community.

To achieve these benefits, UITP has called for a series of actions by governments, in particular:

- Encouraging integrated planning of land use and transport in order to reduce overall travel demand whilst encouraging walking, cycling and public transport, and reducing the need to travel by car.
- Making balanced decisions, which take full account of all environmental and social effects, including noise and accidents, as well as effects on the economy such as land costs and access to employment.
- Ensuring that these effects are reflected as far as possible in the charges to the user for different modes.
- Promoting traffic management and parking policies that will encourage public transport use and provide road conditions in which buses and trams can operate efficiently.
- Facilitating investment in high quality, energy-efficient public transport, and
- Agreeing funding measures to assist developing countries in public transport improvements.

There are good examples of successful public transport initiatives around the world which show what can be achieved. For example, there is:

- Congestion Charging in London which has led to a 38% decrease in private car traffic during the working day.
- High public transport usage despite high car ownership in Stuttgart.
- A commitment to public transport and controlled car use in Zurich, where the entire city is a “blue zone” with a 90 minute parking limit except for residents in their own area.
- The high share of public transport in personal travel in Austria.
- The high share of cycling in the Netherlands (27%), and Denmark (18%).
- Effective inter-modal transport in Switzerland and the Netherlands.
- Optimal use of existing roads and investment in public transport in Singapore, with a restraint on the growth in the number of cars.
- Significant transfer to public transport through a new high quality tramway in Strasbourg.

There are examples of appropriate action that has been taken at international, national and local levels of government. The United Nations Kyoto Treaty requires the industrialised countries to commit themselves to reducing CO<sub>2</sub> emissions. However, in many countries it is emissions from the growing transport sector which are preventing achievement of the reduction targets. The Kyoto Protocol also calls for the ‘progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all greenhouse gas emitting sectors that run counter to the objective of the Convention and the application of market instruments’<sup>22</sup>. This provides valuable support for the principle that transport users should pay the full external costs of their mode of travel.

The WHO (European Region) Charter on Transport, Environment and Health was adopted by 51 countries in 1999<sup>23</sup>. It sets international targets for measures to reduce environmental pollution, accidents and noise associated with transport, as well as seeking action to reduce the social exclusion which results from dependence on private, rather than public, modes of transport. The signatories have committed themselves to promote modes of transport, such as public transport, walking and cycling, that have the best public health impact. Whilst Ministers of Environment and Transport have supported similar declarations in the past, Ministers of Health have now added their commitment, as have governments from eastern Europe.

The European Commission has developed transport policies which recognise the importance of public transport to the economic development of the Community, to the environment and to sustainable urban development. The 2002 Transport White Paper developed these proposals, relating them to the need for sustainable transport. The Commission had already published a White Paper on Fair Payment for Infrastructure Use in transport<sup>24</sup>, and its work to develop sustainable transport led to the founding of the Car Free Cities Network in 1994. It is also promoting research into alternative propulsion systems and fuels, projects to research sustainable mobility and to promote sustainable transport, and to record and publicise examples of best practice. These policies have been given added weight by the Transport Council.<sup>25</sup> However, the Commission points out that they also require action by Member States and Local Authorities. They can only be successful if they are actively supported at all levels, including operators, authorities, transport workers and users.

## **The Public Transport Industry**

The public transport industry must accept the challenge presented by the need for sustainable mobility, and demonstrate its efficiency and the contribution it can make to the community. Public transport operators have been in the forefront of developing environmentally responsible business strategies. As a public service, very much in the public eye, and often publicly owned or funded, the industry has a major presence in the city centres that are most in need of environmental protection.

As public transport is a part of the solution to the environmental crisis in our cities, it is essential that the industry adopts the best possible practices in its own activities. It is for this reason that UITP launched its Charter for Sustainable Development at its World Congress in Madrid in 2003. 38 UITP Members signed up to the Charter at its launch, and more are committing themselves to achieving its objectives before the 2005 Congress. In this way, UITP is leading its members in adopting sustainable development and exchanging their knowledge and experience with other members.

There has been significant research on the environmental impacts of different bus fuels, with the result that 95% of buses in London now run on ultra low sulphur diesel, 20% have catalysts and all new buses have engines to current Euro standards.<sup>26</sup> Paris has completed an assessment of the potential for reducing bus exhaust pollutants and instituted a programme to modify, upgrade and replace the bus fleet. It has also conducted experiments with new technologies such as LPG and electric buses.<sup>27</sup> In Germany, VDV has similarly developed a strategy for reducing emissions on new and existing vehicles.<sup>28</sup>

A number of cities have developed new light rail schemes which achieve many of the benefits of underground railways, including zero emissions at point of use, but are less costly to construct. The newest trains use up to 35% less energy than those they have replaced by generating current when they are braking, which can be used by other trains. In London, lineside areas have been planted with shrubs which absorb large amounts of carbon dioxide, and a biodiversity study of land alongside the tracks is being carried out to establish what wildlife lives in these undisturbed areas, in order to carefully manage them.

## **Developing Countries**

Lastly, it is appropriate to consider the case of developing countries. These at present account for only about 10% of the world's cars, but about one third of global road traffic emissions, due to the age and lower efficiency of their vehicle stock. Some cities like Mexico City and Bangkok face congestion and air pollution at least as bad as that encountered in industrialised countries. As the process of urbanisation continues, so an increasing number of cities in developing countries will face similar conditions if car-based transport policies continue to be pursued. Car use in developing countries can be expected to increase much faster than in the industrialised world.

The case for acting now to develop and promote public transport, rather than the car, is particularly strong in developing countries. This will help avoid congestion and bring the social and environmental benefits which have been described, and will avoid the need to build an extensive urban road at heavy financial and environmental cost. Funding public transport systems, perhaps as part of a trade-off arrangement, could be one of the most effective ways for industrialised countries to assist developing countries in reducing CO<sub>2</sub> emissions.

There are also excellent examples of good quality public transport investment in the developing world. For example, the busway systems in Curitiba and Bogota provide service comparable to a metro at significantly lower cost.

## **Conclusions**

Present transport arrangements are not sustainable and are causing major problems in our towns and cities. The effects are far-reaching and can no longer be tolerated. The challenge we face is to find more effective ways of providing mobility, so that all the community can lead full and active lives.

To achieve sustainable mobility, we need to achieve modal shift from the car to public transport, walking and cycling; to reinvent safe, attractive streets in which it is normal for children to walk or cycle to school; to use land-use planning to reduce the length of journeys; and to look for ways of participating in social activities that generate less traffic. This requires action which must include enhancements to public transport. The benefits would accrue to the whole community, even those who remain in their cars and find their journeys easier to make, and so will help public opinion to accept a reduction in car use.

Encouraging examples of good practice exist throughout the world and we can move decisively towards sustainable mobility by adopting these practices more widely. However, this requires strong action at international, national and local levels of government.

Our long-term vision is to achieve transport which is sustainable for health and the environment, which meets the needs of the present without endangering the ability of future generations to meet theirs – this will give us sustainable mobility.

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