



est!

environmentally sustainable transport

GUIDELINES

OECD
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Bundesministerium für Land- und Forstwirtschaft Umwelt und Wasserwirtschaft
das lebensministerium

GUIDELINES

est!

environmentally sustainable transport

futures, strategies and best practices

Guidelines for environmentally sustainable transport (EST) presented and endorsed at the international conference held from 4th to 6th October 2000 in Vienna, Austria.

The EST conference was organised by the OECD and hosted by the Austrian Ministry of Agriculture, Forestry, Environment and Water Management.

SCOPE AND PURPOSE

i. Ensuring progress towards sustainable development is a priority of the OECD's work. Transport is a particularly challenging sector. It is indispensable to modern life, but has many adverse effects on health and environment. Most transport trends are unsustainable.

ii. In 1998, Environment Ministers of OECD Member countries called on the OECD to develop guidelines for moving towards environmental sustainable transport (EST). The OECD's Working Group on Transport developed the EST guidelines based on the results and conclusions of the EST project. This OECD initiative involving many OECD and non-OECD countries provides a solution to making transport policy more sustainable and enhancing quality of life.

iii. The EST Guidelines have been developed to enable economic development and individual welfare without causing undue health and environmental impacts and depletion of finite resources. These guidelines represent a desirable and feasible approach for the transport sector that may also be of value in the sustainable development of other sectors.

iv. The Working Group on Transport has submitted the EST Guidelines for discussion and endorsement at the OECD Conference on Environmentally Sustainable Transport Futures, Strategies, and Best Practice held in Vienna in October 2000.

v. The OECD acknowledges the contributions by and assistance of participating countries, in particular those that provided case studies: Austria, Canada, France, Germany, Italy, Japan, The Netherlands, Norway, Sweden, Switzerland, and the CEI region.

I. TRANSPORT CHALLENGES SUSTAINABILITY: OECD TAKES ACTION

1. Numerous initiatives have been undertaken or proposed to reduce the negative environmental and health impacts of current transport systems. There have been significant gains with respect to specific pollutants, notably carbon monoxide and lead, from the application of regulations controlling vehicle emissions and fuel quality.

2. However, many measures lack effective implementation, in particular those targeting structural changes in transport activity and reductions in carbon dioxide emissions and noise. Continuing growth in transport activity offsets the gains achieved through technology. Overall, insufficient progress has been made towards achieving environmental sustainability for the transport sector (see Annex 1).

3. A new target-oriented approach is needed that places environment and health at the top of the policy agenda for transport and related sectors, at international, national, and local levels.

4. To this end, the Environment Ministers of OECD Member countries agreed on Shared Goals for Action (OECD Environmental Ministerial, April 1998). They requested the OECD to undertake further work on environmentally sustainable transport (EST), including the development of guidelines for implementing EST principles. In response to the Ministers' request, the OECD's Working Group on Transport elaborated the EST Guidelines based on the results and conclusions of its EST initiative

5. The EST Guidelines operationalise the Principles towards Sustainable Transportation and the Strategic Directions endorsed by the OECD Conference on Sustainable Transport held in Vancouver in 1996.

6. Furthermore, the EST Guidelines are part of the OECD's commitment to contribute to the implementation of major international conventions and other commitments, in particular:

- the UN Framework Convention on Climate Change, and its Protocols (1994/97)
- the Vienna Declaration of the UN ECE on Transport and Environment (1997)
- the WHO Charter on Transport, Environment and Health (1999)

The EST Guidelines recognise the global responsibility of each sector to contribute to the achievement of sustainable development, as stated in the 1992 Rio de Janeiro Declaration on Environment and Development and adopted in Agenda 21. They are fully in the spirit of sustainable development, formulated in 1987 by the World Commission on Environment and Development to stress the need for inter-generation equity and the integration of social, economic, and environmental objectives in all policy developments.

7. The EST project characterised EST by starting from the broad definition of sustainable development and constructing a qualitative definition for environmentally sustainable transport (see Annex 2). Health and environmental quality goals for a number of

criteria were set based on internationally agreed guidelines, standards, and goals. Six EST criteria were identified as the minimum number required to reflect the wide-ranging health and environmental impacts of transport. They concern noise levels, emissions of major air pollutants and greenhouse gases, and land use (see Annex 3).

8. The EST project used a new goal-oriented approach by constructing long-term visions of EST consistent with the EST criteria, and then proposing strategies for reaching the goals by applying a backcasting methodology. At the core of the strategies were well-phased packages of policy instruments considered capable of achieving EST.

9. Extreme solutions were rejected. Reaching EST entirely through technological advances would be costly, and also risky because necessary improvements may be beyond reach. Reaching EST entirely through changes in transport activity would entail unrealistic changes in mobility patterns, numerous restrictions, and the loss of too many of the economic and social benefits provided by transport.

10. The EST Guidelines are proposed as a basis for developing a feasible and viable strategy towards sustainable development and for future-oriented policymaking and practice in the transport sector.

II. A NEW TRANSPORT VISION: EST!

11. EST is a new transport vision and approach. It provides an appealing and plausible alternative to unsustainable 'business-as-usual'. This new transport approach comprises: (i) a portrayal of a sustainable transport future, (ii) the development of environmental and health quality objectives and criteria, and derived quantified targets with dates and milestones, and (iii) the specification and implementation of packages of measures required to achieve a sustainable transport future.

12. The key conclusions drawn from the OECD's EST project are:

- EST offers an appealing and realistic vision of a long-term sustainable transport future that provides for enhanced quality of life for present and future generations while retaining the numerous benefits of today's transport.

- 'Business-as-usual' in transport policy and practice is no longer a viable option. Growth in transport would continue, with the highest rates in road freight and aviation; modal split will become more unbalanced; and fuel use would steadily increase, as would noise and the use of land for transport. Some air pollutants could be reduced due to tight emission controls. These transport trends call for a reorientation of transport policies and practices to ensure sustainability and to maintain the benefits of the transport sector.

- EST can be defined. This requires deriving targets based on environmental and health quality objectives and criteria using internationally agreed standards, goals, and guidelines. These must fulfil local, regional and global requirements.

- EST is attainable. It requires a consistent and balanced package of measures focussing on the technology of vehicles, fuels, and infrastructure, on the one hand, and changes in transport activity and management, on the other hand. The latter involves favouring a higher share and use of environmentally sound and health beneficial modes, increasing the loading and occupancy of vehicles, reducing the need for motorised transport, changing mobility patterns and driver behaviour, and providing information and education about the efficient use of transport. EST calls for a much greater emphasis on transport demand management policies than in the past.

- EST will induce structural changes and provide for new opportunities. EST induces significant changes in technology, transport activity and mobility, and land use patterns that will require adaptations by the transport sector. It will at the same time provide opportunities for transport industry, operators and new mobility services as well as better and more balanced access to people, places, goods, and services.

- EST must be co-ordinated across sectors. It requires prioritising and implementing appropriate actions within the transport sector and other key sectors. Investment policies and financing practices as well as pricing and fiscal policies need to contribute to not counteract sustainable development of transport.

- EST can be reached through several paths, varying according to national, regional, and local circumstances. Overall, the key to success will be a well designed, co-ordinated, and broadly supported implementation strategies.

- EST provides for numerous social advantages. There would be increased accessibility through a wider choice of transport modes and thus more individual and collective opportunities.

- EST provides the opportunity for economic enhancement through the establishment of viable long-term infrastructure, the expansion of sustainable transport modes, and the avoidance of the costs of ill health, accidents, environmental degradation, and resource depletion.

- EST policies are evolutionary rather than revolutionary. Many of the elements required for it are already known or even in place, however their implementation must be strengthened and more effective. With a few new and innovative measures, and the proper implementation of currently available instruments, EST can be achieved within the time frame of a generation (30-40 years).

13. Policies for EST should adopt a goal-oriented approach akin to modern business practice. Specific environmental and health, economic and social objectives are set and detailed; quantified targets, dates, and milestones are established. Policies are formulated precisely in terms of their ability to ensure that targets are met. This approach has been used with success in managing some of transport's environmental impacts. It should be extended to all transport activity.

14. EST should build on the active participation of citizens, businesses, governments, and non-government organisations. Special emphasis should be given to promoting sustainable mobility behaviour and sustainable production and consumption patterns through information dissemination and public awareness building, in particular through the education of younger generations.

III. TOWARDS SUSTAINABLE TRANSPORT: THE EST GUIDELINES

15. The EST Guidelines have been elaborated to assist governments at all levels in the development and implementation of strategies towards EST. Effective implementation of the EST Guidelines requires strategies that accommodate the particular geographic and socio-economic conditions of countries or regions. The EST Guidelines should be used in a dynamic fashion that takes into account the latest scientific results. When starting an EST implementation process, concerned parties transport, environment, health and other sectors, government, industry, academia, and NGOs, as well as the public-at-large, should be involved to ensure widespread awareness, understanding, commitment, and acceptance.

16. OECD Member countries are called upon to use and apply these EST Guidelines and to initiate an implementation process towards achieving environmentally sustainable transport at international, national, regional, and local levels. This approach is also recommended for other countries, as well as for other sectors of the economy.

THE EST GUIDELINES

Guideline 1. **Develop a long-term vision of a desirable transport future** that is sustainable for environment and health and provides the benefits of mobility and access.

Guideline 2. **Assess long-term transport trends, considering all aspects of transport,** their health and environmental impacts, and the economic and social implications of continuing with 'business as usual'.

Guideline 3. **Define health and environmental quality objectives** based on health and environmental criteria, standards, and sustainability requirements.

Guideline 4. **Set quantified, sector-specific targets** derived from the environmental and health quality objectives, and set target dates and milestones.

Guideline 5. **Identify strategies to achieve EST** and combinations of measures to ensure technological enhancement and changes in transport activity.

Guideline 6. **Assess the social and economic implications of the vision,** and ensure that they are consistent with social and economic sustainability.

Guideline 7. **Construct packages of measures and instruments** for reaching the milestones and targets of EST. Highlight 'win-win' strategies incorporating, in particular, technology policy, infrastructure investment, pricing, transport demand and traffic management, improvement of public transport, and encouragement of walking and cycling; capture synergies (e.g., those contributing to improved road safety) and avoid counteracting effects among instruments.

Guideline 8. **Develop an implementation plan** that involves the well-phased application of packages of instruments capable of achieving EST taking into account local, regional, and national circumstances. Set a clear timetable and assign responsibilities for implementation. Assess whether proposed policies, plans, and programmes contribute to or counteract EST in transport and associated sectors using tools such as Strategic Environmental Assessment (SEA).

Guideline 9. **Set provisions for monitoring implementation and for public reporting on the EST strategy**; use consistent, well-defined sustainable transport indicators to communicate the results; ensure follow-up action to adapt the strategy according to inputs received and new scientific evidence.

Guideline 10. **Build broad support and co-operation for implementing EST**; involve concerned parties, ensure their active support and commitment, and enable broad public participation; raise public awareness and provide education programmes. Ensure that all actions are consistent with global responsibility for sustainable development.

ANNEXES 1-4

The purpose of these annexes is to describe and illustrate features of the guidelines in order to facilitate their use and application when developing and implementing EST strategies. They serve to share the lessons learned during the course of the OECD EST initiative. Care should be taken, therefore, to ensure that particular national, regional or local considerations are addressed when using these .

- Annex 1 highlights certain unsustainable trends in relation to local, regional and global scales.
- Annex 2 recalls the qualitative definition of Environmentally Sustainable Transport developed for the EST project that has been derived from the broad definition of sustainable development.
- Annex 3 presents the minimum number of criteria required to encompass the wide range of health and environmental impacts from transport, identifies health and environmental quality objectives and derives quantitative targets.
- Annex 4 provides hints and explanations as to the application of the guidelines.

ANNEX 1:
KEY SIGNS OF UNSUSTAINABLE TRANSPORT TRENDS

This brief assessment focuses on the EST criteria considered to be the minimum number to characterise the wide-ranging health and environmental impacts from transport.

Climate protection: the CO_2 criterion

Transport represents a growing source of climate-impacting emissions. Furthermore, as shares of these emissions are decreasing in other sectors, transport's share of climate-impacting emissions continues to grow. Under the assumption that no drastic interventions will occur, global CO_2 emissions from motor vehicles are projected to increase by more than 300 per cent by 2030 compared to 1990 levels. This increase is primarily due to growth in road and air traffic. In OECD countries the overall increase will be 'only' 56 per cent. Altogether, these emission increases will contribute to dangerously high concentrations of atmospheric CO_2 that are more than double the present levels.

Regional air quality: the NOx and VOC criteria

Transport's share of responsibility for causing acidification, eutrophication, and dangerous levels of tropospheric ozone continues to grow as emissions from stationary sources decline. Stringent emissions standards and targets for motor vehicle emissions have been established up to the year 2005 and beyond for all the three OECD regions in order to meet long-term air quality objectives. With the adopted standards, NO_x and VOC emissions are expected to decline by 40 to 70 percent between now and 2030, and possibly stabilise thereafter. However, air quality will not improve at the same rate due to complex transformation processes of emissions into ambient air levels, notably those concerning the production of ground-level ozone. Thus, air quality standards will be exceeded for many years to come, in terms of short-term episodic peaks as well as long-term ambient levels. Furthermore, a similar trend in emission reductions is not expected for other parts of the world, where high growth rates together with lenient controls will result in increased total emissions from transport, in particular from motor vehicles, resulting in further degradation of already-bad air quality.

Local air quality: the particulate matter (PM) criterion

The growing vehicle fleet and increasing distance travelled by road freight diesel vehicles will continue to contribute to exceedances of ambient air quality standards for PM. In the three OECD regions, stringent emission controls and use of filter technology will reduce emissions substantially over the long term. By 2030, emission levels will be much lower than today. However, air quality standards for fine particulate matter will still be exceeded for many years and a large proportion of the population will be exposed to harmful concentrations. New research on health effects suggests that exposure to ultrafine particulate matter (less than 2.5 μm) emitted from both gasoline and diesel vehicles will cause increasing public health concerns.

Quietness: the noise criterion

Transport noise, particularly from road vehicles, is the major source of external acoustic nuisance in urban areas. Engine noise has been reduced through stringent standards, but tyre and road noise levels have remained largely unchanged and have even increased. Aircraft noise is also increasing, affecting larger numbers of people. About 10 per cent of the European population is affected by aircraft noise above 55 dB(A), 30 per cent is exposed to road traffic noise above the nuisance level of 55 dB(A). The proportion of European region's population exposed to high noise levels (equivalent to 65dB(A)) increased from 15% to 26% between 1980 and 1990 (WHO Charter for Transport, Environment and Health, Annex 1, London 1999). Despite technological progress to reduce noise at the source, the prospects are less promising for the future; noise nuisances will increase near roads, airports, and railway lines due to projected increases in vehicle traffic and expansion of road infrastructure and airports.

Land use/take criterion

Land use for transport is a key issue in that it is both a factor generating transport activity (infrastructure-induced mobility) and a contributor to environmental stress (e.g., increasing pressure on biodiversity due to habitat separation, fragmentation, and destruction). Transport infrastructure, mainly roads, occupies 25-30 percent of land in urban areas and less than 10 per cent in rural areas in the OECD. Land use for transport infrastructure (roads and parking, rail corridors, airports, and harbours) is likely to increase by 2030 due to the expected strong growth in transport activity. Furthermore the expansion of road infrastructure, in particular motorways, will add barriers to the migration of many species, reducing their viability and disrupting local ecosystems.

ANNEX 2: DEFINITION OF ENVIRONMENTALLY SUSTAINABLE TRANSPORT

In the spirit of the well-accepted broad definition of sustainable development, four broad ecological principles can be derived:

- public health and the environmental quality should be preserved;
- non-renewable and renewable resources should be used sustainably;
- critical limit values for health and ecosystems should be respected; and,
- global irreversible effects should be avoided.

A sustainable transport system should provide access to people, places, goods, and services in an environmentally responsible, socially acceptable, and economically viable manner. Mobility for communication and for enabling social contacts, as well as movement of people and goods, is to be considered as a means rather than as and end in itself.

Important prerequisites for realising an EST system in the long term are these: protect human health, ensure ecosystem integrity, respect health and ecological limits (critical levels and loads), prevent and minimise pollution, ensure sustainable use of non-renewable and renewable resources and avoid human-induced changes in global environmental systems such as the atmosphere and the oceans.

A sustainable transport system is therefore one that (i) provides for safe, economically viable, and socially acceptable access to people, places, goods and services; (ii) meets generally accepted objectives for health and environmental quality, e.g., those set forward by the World Health Organization for air pollutants and noise; (iii) protects ecosystems by avoiding exceedances of critical loads and levels for ecosystem integrity, e.g., those defined by the UN ECE for acidification, eutrophication, and ground-level ozone; and (iv) does not aggravate adverse global phenomena, including climate change, stratospheric ozone depletion, and the spread of persistent organic pollutants.

Accordingly, the EST project developed the following brief definition of an environmentally sustainable transport system as one where,

> *transportation does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources below their rates of regeneration, and (b) use of non-renewable resources below the rates of development of renewable substitutes.*

This qualitative definition has been elaborated by expanding some of the generic statements and developing quantified criteria and targets based on international environmental and health criteria and objectives.

ANNEX 3:
HEALTH AND ENVIRONMENTAL CRITERIA FOR EST

This annex describes how the broad EST definition (see Annex 2) can be operationalised by setting quantified targets based on health and environmental objectives for a minimum number of criteria that describe transport's wide-ranging impacts.

Health and environmental quality objectives have been adopted in almost all OECD countries (and in many non-OECD countries) based on national and internationally agreed goals and standards. Long-term targets -- typically for a time period of 30 to 40 years -- can be derived from these quality objectives. Intermediate targets for shorter periods of time (e.g. 10 years) could be set to supplement the long-term targets and focus policies and strategies. These specific targets should be set in accordance with economy-wide sustainable development goals and will have to take into account efforts made in other sectors towards these broader objectives. Reaching these broader objectives will imply that cost-effective and realistic solutions are applied in each sector. Also, targets should be set so as to be consistent with countries' commitments and obligations outlined in various international treaties (e.g. Long-Range Transboudary Air Pollutant Convention and its protocols, EU Directives, United Nations Framework Convention on Climate Change and its protocols, etc...). Criteria selected for the transport sector should reflect local, regional, and global environmental quality goals. The specific target levels chosen will depend on countries' specific environmental and health conditions. The environmental quality objectives, however, are valid for all countries since they represent the desired health and environmental outcome.

The targets developed in the context of the OECD's EST initiative (see box on following page) can be achieved within the time frame of a generation (30-40 years). However, in the course of the project, it became evident that some countries thought it necessary to extend the deadlines for meeting some targets (e.g. the CO_2 emission reduction target). In those cases, the level of the target remained the same while the time period was extended.

Six criteria for the transport sector have been developed for the EST initiative as being the minimum number required to encompass the wide range of health and environmental impacts from transport. These criteria have been selected so that local, regional, and global concerns are addressed, notably noise, air quality, acidification and eutrophication, tropospheric ozone, climate change, and land use. Specifically, the criteria concern emissions of carbon dioxide, nitrogen oxides, volatile organic compounds, carcinogenic particulate matter, noise, and land use. Criteria for other important impact vectors such as ultra-fine particulate emissions, waste generation, water and soil pollution, biodiversity and habitat fragmentation, and releases of persistent organic pollutants could not be quantified at present, therefore more analysis of these is required. Each criterion described on the following page is accompanied by a footnote providing the manner in which it was quantified.

Long-term Environment and Health Quality Objectives, Criteria and Derived Targets for EST

These criteria and targets were developed in the context of the OECD's EST initiative as being the minimum number required to describe EST and were selected so that local, regional and global concerns are addressed. They provide an illustration of how criteria and targets can be linked to significant environmental and health quality objectives. These targets are long-term -- specific intermediate targets and milestones should be set to focus action. The quantitative target levels below are not prescriptive and could be adapted according to national, regional or local circumstances. What is essential for the EST approach, is that target levels are set to achieve environmental and health quality objectives.

CO_2 Climate change is prevented by reducing carbon dioxide emissions so that atmospheric concentrations of CO_2 are stabilised at or below their 1990 levels. Accordingly, total emissions of CO_2 from transport should not exceed 20% to 50% of such emissions in 1990 depending on specific national conditions.[1]	***NOx*** Damage from ambient NO_2 and ozone levels and nitrogen deposition is greatly reduced by meeting WHO Air Quality Guidelines for human health and eco-toxicity. This implies that total emissions of NO_x from transport should not exceed 10% of such emissions in 1990.[2]
VOCs Damage from carcinogenic VOCs and ozone is greatly reduced by meeting WHO Air Quality Guidelines for human health and ecosystem protection. Total emissions of transport-related VOCs should not exceed 10% of such emissions in 1990 (less for extremely toxic VOCs)[2].	***Particulates*** Harmful ambient air levels are avoided by reducing emissions of fine particulates (especially those less than 10 microns in diameter). Depending on local and regional conditions, this may entail a reduction of 55% to 99% of fine particulate (PM_{10}) emissions from transport, compared with 1990 levels.[3]
Noise Noise from transport no longer results in outdoor noise Depending on local and regional conditions, this may entail a reduction of transport noise to no more than a maximum of 55 dB(A) during the day and 45 dB(A) at night and outdoors.[4]	***Land use/Land take*** Land use and infrastructure for the movement, maintenance, and storage of transport vehicles is developed in such a way that local and regional objectives for air, water, eco-system and biodiversity protection are met. Compared to 1990 levels, this will likely entail the restoration and expansion of green spaces in built-up areas[5].

1 The Second Assessment Report of the Intergovernmental Panel on Climate Change (1996) maintains that, in order to stabilise atmospheric CO_2 concentrations at near current levels, world-wide CO_2 emissions would need to be reduced by 50% to 70% with further reductions thereafter (IPCC, Second Assessment Report, page xi, Intergovernmental Panel on Climate Change, 1996). In order to allow for increases in emissions in developing countries, OECD countries should reduce their emissions by 80% or more so that a global reduction of 50% may be attained (OECD, Environmental Criteria for Sustainable Transport, OECD Environment Directorate, Paris, France, 1996). A reduction target of 50% might be more appropriate for certain countries that benefit from a favourable situation (e.g. a more environmentally favourable modal split). This was suggested by the EST pilot study for the countries of the Central and Eastern European region.

2 These criteria are set in line with the WHO guidelines for human health regarding NOx, VOC's and Ozone (WHO, 1996) and the UNECE protocols under the Convention on Long-Range Transboundary Air Pollution for ecosystem protection regarding critical loads for nitrogen deposition and critical levels of ozone (UNECE, LRTAP Convention, 1999).

3 The WHO advises that no safe threshold level can be set for fine particulate matter (smaller than PM_{10}) and ultra-fine particles (smaller than $PM_{2.5}$) below which health effects (including cancer) do not occur. However, countries should set targets based on dose-effect considerations. The targets set here are preliminary due to the ongoing research on the health effects from ultrafine particulate matter (WHO, Air Quality Guidelines, World Health Organization Regional Office for Europe, Copenhagen, Denmark, 1998).

4 This criterion is based on the former WHO recommendation on noise that has been recently updated in the WHO Guidelines for Community Noise (WHO, Guidelines for Community Noise, World Health Organization, Geneva, 1999).

5 Quantification of the land-use criterion will require further research.

ANNEX 4:
THE EST GUIDELINES CHECKLIST

Guideline 1

Develop a long-term vision of a desirable transport future that is sustainable for environment and health and provides the benefits of mobility and access.

☑ **The vision should guide policy.** Policy-making can be framed by the negative ("avoid making things worse") or by the positive ("work towards a better situation"). On the assumption that the positive is better than the negative, society should look principally to where it wants to go, not to what it wishes to avoid. A vision for environmentally sustainable transport should answer this need.

☑ **The vision should be long-term.** Adapting any sector to the requirements of sustainable development will not occur overnight. The vision should sufficiently far removed from the present to allow for major changes yet set not so far into the future to make it unrealistic. A time horizon of 30 to 40 years seems appropriate.

☑ **The vision should inspire action.** It should present an alternative transport scenario that delivers real social, environmental, and economic benefits. These benefits need to be described in both a quantitative and qualitative manner.

☑ **The vision should be positive.** The negative rarely inspires people. A vision that repeats looming threats in crescendo will likely turn away many more people than it will attract. The vision should be couched in terms of what is to be gained from EST and what might be lost through inaction.

☑ **The vision should be ambitious, sound and realistic.** It should be supported by detailed scientific and quantitative analysis supplemented by more qualitative descriptions. A realistic vision can be ambitious, but not all ambitious visions are realistic.

☑ **The vision should be built from the ground up**. Like a house, the vision should have a strong foundation. Such a foundation builds on the collected aspirations of different key stakeholders in society. A vision that does not address and incorporate these aspirations will not compel and will ultimately fail.

☑ **The vision should be tailored to a broad range of actors.** Concrete descriptions of daily life and of the operating environments of different types of households, firms, and industries should be portrayed in order to translate the vision into practical terms.

Guideline 2

Assess long-term transport trends, considering all aspects of transport, their health and environmental impacts, and the economic and social implications of continuing with 'business as usual'.

☑ **An essential step in moving towards EST is determining whether society is on the right path**. Developing an understanding of where 'business-as-usual' will lead provides policy-makers with insight as to the scope and scale of the changes needed to achieve EST.

☑ **The BAU forecast should be realistic.** Determining 'business-as-usual' involves some uncertainty as changes will occur that cannot be accurately foreseen. At a minimum, a BAU forecast should account for all present, planned, and reasonable foreseeable policies and technological, economic, and social changes.

☑ **The BAU forecast should reflect a number of viewpoints.** Depending on your viewpoint, BAU can look good or bad. In developing the BAU forecast, great care should be taken to involve a wide range of parties and interests so that they can not only provide their own view on the future but also have their views balance the optimism and pessimism of others.

☑ **The BAU forecast should cover the same time frame as the EST vision.** Too short a time period could favour BAU on account of predictable short-term improvements (e.g., in air quality); while too long a period could render the forecast useless because of the inherent uncertainty associated with long-term projections.

Guideline 3

Define health and environmental quality objectives based on health and environmental criteria, standards, and sustainability requirements.

Environment & health objectives		Derived targets
Noise WHO Guidelines attained	⇨	Noise sources: **- 50% - 70%**
Air quality WHO Guidelines (NO_2, PM) Critical levels for Ozone attained	⇨	Air emissions: **- 50% NOx; >-99% PM** **- 80% NOx & VOC**
Acidification / Eutrophication Critical Loads attained	⇨	SO_x- / NO_x- Emissions: **- 75% - 80% (- 50% NH_3)**
Climate protection Stabilisation of CO_2 conc.	⇨	GHG / CO_2 Emissions **OECD -80% , Global -50%**

☑ **Basic health and environment quality objectives should form an integral part of all policies related to transport activity**. Commonly, transport policy is couched in economic and social terms. These concerns are integrated 'upstream' in order to formulate specific policy responses within and outside the transport sector. Health and environmental impacts are typically assessed ex-post and this understanding is used 'downstream' to develop mitigation strategies. EST calls for health and environmental quality objectives (e.g., clean air, avoiding morbidity and mortality, ecosystem protection, avoiding anthropogenic climate change, etc.) to be integrated from the outset.

☑ **EST health and environmental objectives should reflect the best available understanding of impacts on human health and the environment.** A wide range of recognised and agreed-upon criteria, standards, guidelines, and other sustainability requirements exist. These should form the basis for characterising EST (see the Figure above).

☑ **Health and environmental quality objectives are valid for all countries** -- the criteria and targets that are derived from these depend on specific national, regional and/or local conditions.

☑ **The characterisation of EST should be dynamic**. Our understanding of the health and environmental impacts from transport is continually evolving. As this understanding evolves, so should the health and environmental objectives.

☑ **The objectives should reflect the broadest views on the health and environment impacts of transport.** Existing international criteria, standards, guidelines, and other sustainability requirements should be taken into consideration when no corresponding national guidance exists. Where international criteria, standards and guidelines are more stringent than national; requirements, care should be taken to demonstrate the necessity for weaker standards in light of health and environmental objectives. Regional exceptions should be fully justified.

☑ **Criteria, standards, guidelines, and other sustainability requirements that can be quantified, should be quantified.** Those that cannot be quantified should be developed in such a way as to include a broad range of viewpoints (e.g. industry, trade unions, governments, academia, NGOs, as well as groups of population at higher risk such as children, handicapped people, the elderly, etc.).

Guideline 4

Set quantified, sector-specific targets derived from the environmental and health quality objectives, and set target dates and milestones.

☑ **EST targets for pollutants, greenhouse gas emissions, noise, land-take, etc. should be based on the health and environmental quality objectives outlined in Guideline #3**. Targets for the reduction of environmental health impacts from transport can be relative (e.g., incremental improvements from the present state) or absolute (measured against a defined end-state). Moving towards EST should be based on absolute rather than relative targets to ensure fulfilment of health and environmental objectives.

☑ **Targets should be set taking into account the specific conditions at the national, regional or local level.** Target levels will be dependent on actual baseline levels for different criteria.

☑ **EST targets should be set in reference to a baseline date.** The choice of a baseline date is important as it can mask or accentuate the changes necessary to reach the EST targets. To avoid confusion, all targets should share the same baseline date (given data availability). The selection of the date should be made openly and should involve descriptions of the relevant underlying trends in transport-related phenomena.

☑ **EST targets should be set in reference to a deadline.** Setting an end-date for achieving EST targets ensures that the process of moving towards EST is verifiable. Intermediate targets and milestones should be established to allow progress to be tracked and policies to be adjusted.

☑ **As for the criteria, standards, guidelines, and other sustainability requirements outlined in Guideline #3, targets that can be quantified, should be quantified**. Those that cannot be quantified should be developed in a qualitative way and as concretely as possible taking into account best available scientific knowledge.

☑ **Targets and deadlines for EST should evolve as new information becomes available**. As scientific understanding of the environmental and health impacts progresses, so should the EST targets and deadlines. However, changes to these targets and deadlines should be made openly and with the involvement of a wide range of societal interests.

Guideline 5

Identify strategies to achieve EST and combinations of measures to ensure technological enhancement and changes in transport activity.

☑ **The initial direction for the EST strategies should be set by the already-developed long-term vision of a desirable transport future**. This will imply a 'balance of effort' for attainment of EST in terms of technological improvements, on the one hand, and changes in transport activity such as mode shifts, more efficient occupancy or loading of vehicles, and overall reductions in travel and freight movement, on the other hand. All EST strategies will likely comprise a mix of the two types of approach, perhaps in more-or-less equal amounts.

☑ **A quantified 'balance-of-effort' analysis should be performed** in order to determine the contribution of technology (unit emission improvements, efficiency improvements, vehicle downsizing) for the various passenger and freight modes and the contribution from activity changes (traffic avoidance), modal shifts, and increasing load/occupancy factors.

Guideline 6

Assess the social and economic implications of the vision, and ensure that they are consistent with social and economic sustainability.

☑ **The economic and social implications of EST should be contrasted to the social and economic assessment of the BAU case**, not only in reference to the base case.

☑ **External costs -- those costs not currently incorporated into the price structure for transport related-activities and services (e.g., environmental and health costs stemming from accidents, air pollution, noise levels, and climate change) must be accounted for when assessing the economic viability and implications of EST**. Past economic assessments of transport policy have mostly confined themselves to what is readily measurable at the micro, meso, and macro scales. Recent assessments, however have sought to account for costs that are not reflected in the price structure of transport markets. This trend should be continued and strengthened in the assessment of EST visions and strategies by openly incorporating the best current assessment of the scope and scale of such costs.

☑ **The validity and durability of external benefits -- those benefits not currently incorporated into the price structure for transport-related activities and services (e.g., 'time savings' leading to economic efficiency gains, 'congestion reduction', etc.) -- should be carefully examined when assessing the economic viability and implications of EST.** Many past transport policy decisions have been underpinned by the expectation that general welfare benefits can accrue to the public through new infrastructure construction. These expectations have rarely been met in the long term. Assessments of BAU and EST should carefully and openly check the validity of these benefits.

☑ **When examining the social acceptability and implications of EST, care should be taken to incorporate a wide range of societal needs** (e.g. industry, trade unions, governments, academia, NGOs, as well as groups of population at higher risk such as children, handicapped people, the elderly, etc.). Social benefits and disbenefits accrue in varying proportions to different sectors of society. Assessments of the social outcomes of BAU and EST should identify potential winners and losers in order to better inform policy-making.

Guideline 7

Construct packages of measures and instruments for reaching the milestones and targets of EST. Highlight 'win-win' strategies incorporating, in particular, technology policy, infrastructure investment, pricing, transport demand and traffic management, improvement of public transport, and encouragement of walking and cycling; capture synergies (e.g., those contributing to improved road safety) and avoid counteracting effects among instruments.

☑ **The first step is to identify potential instruments (measures) that could contribute towards the improvements in technology and changes in transport activity needed to meet the EST targets.** Some or all of these instruments will comprise the critical elements of the EST implementation strategy.

☑ **Then, instruments should be selected for inclusion in the strategy that are together capable of ensuring that the EST targets are met**, in a manner that is consistent with the long-term EST vision and provides for positive rather than negative social and economic effects.

☑ **The selected instruments will likely address numerous aspects of transportation.** On the one hand, they will include instruments that can secure the improvements in technology and changes in infrastructure needed for the attainment of EST. On the other hand, they will include instruments that secure the needed changes in transport activity through demand management, which could include incentives to reduce the need for travel and provide alternatives to individual ownership and use of vehicles. These instruments should also help facilitate a shift towards more environmentally friendly modes such as public transport, walking and bicycling. Finally, these instruments should address improved driver training, education and awareness-raising for sustainable mobility, land-use, production and consumption.

☑ **The selected instruments will likely include fiscal measures, regulatory measures, and measures to educate and change attitudes about transport.** Incentives should be considered as much as price increases and penalties. Incentives to reduce specific forms of transport activity should be considered only in conjunction with the provision of more environmentally benign alternatives.

☑ **As far as possible, the selected instruments should be synergistic or complementary rather than antagonistic or perverse in their effects.** For example, fuel efficiency measures applied in isolation can initially reduce fuel use and emissions, but if transport costs are thereby reduced such measures can increase transport activity, thus offsetting much of the reductions in fuel use. Therefore fuel efficiency measures should be used in conjunction with measures to manage transport demand. Some EST instruments can bring benefits beyond those of attaining EST, for example improvements in safety and in access by elderly persons and children. Use of such instruments should be emphasized in the development of an implementation strategy.

☑ **Thus, the implementation strategy should be thought of in terms of well-coordinated packages of instruments,** rather than as an assemblage of individual instruments operating in isolation.

Guideline 8

Develop an implementation plan that involves the well-phased application of packages of instruments capable of achieving EST taking into account local, regional and national circumstances. Set a clear timetable and assign responsibilities for implementation. Assess whether proposed policies, plans, and programmes contribute to or counteract EST in transport and associated sectors using tools such as Strategic Environmental Assessment (SEA).

☑ **The implementation strategy should comprise a schedule of deployment of numerous packages of instruments over the whole of the target period, carefully phased in relation to the milestones.** Development of the strategy may well require several iterations.

☑ **The instrument packages should be carefully orchestrated into a gradual progression that initially focuses on securing acceptance of the use of the more effective instruments and subsequently deploys these instruments.** Thus, initial instruments should include much in the way of education, building on the outreach processes employed during the development of the plan. They might also include instruments that 'pave the way' for unfamiliar or unpopular instruments to be applied in a later phase.

☑ **The implementation strategy should include a clear timetable for the deployment of instruments and their assessment.** The timetable should be organised according the milestones that have been determined. It should be flexible and amenable to adjustment in the light of circumstances and assessed progress towards sustainable transportation.

☑ **Responsibilities for implementation should be assigned.** The complexity of modern societies requires that many governments and agencies play a role in securing EST, at many levels of organisation from neighbourhood to international. Assignment of responsibilities for action and their coordination are critical components of any implementation strategy.

☑ **Strategic Environmental Assessment** has been defined as "The formalised systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or program and its alternatives, the preparation of a written report on the findings, and the use of the findings in publicly-accountable decision-making." The implementation strategy and its significant components should be subjected to this kind of assessment.

☑ **Ensure that the environmental and health impacts of transport are included within the scope of performance assessments** such as ISO 14001 and Eco-Management and Audit Schemes (EMAS)

☑ **An important feature of an implementation plan should be provision of the means to sustain the changes that have been achieved.** When EST is attained, attainment will continue only to the extent that appropriate instruments continue to be applied. Evidence to date suggests that without constraints transport activity and emissions will increase.

Guideline 9

Set provisions for monitoring implementation, and for public reporting on the EST strategy; use consistent, well-defined sustainable transport indicators to communicate the results; ensure follow-up action to adapt the strategy according to inputs received and new scientific evidence.

☑ **The monitoring system should not be an afterthought but rather an integral part of the strategy that is provided for at an early stage of its development.**

☑ **Several kinds of monitoring will be required.** The most important monitoring will be in relation to the targets that are used to characterise EST. This may require good data collection with respect to emissions and atmospheric concentrations of nitrogen oxides or noise exposure and land take, for example. Transport activity of all kinds will need to be carefully monitored as well as the key drivers of transport activity such as levels of vehicle ownership. This monitoring should also look at key parameters such as changes in modal split. Good indicators of transport's impacts, therefore, will be needed. Monitoring of public attitudes towards the deployed instruments and the changes in transport activity would also be useful.

☑ **Monitoring and assessment have value only to the extent that they can result in meaningful changes as to which instruments are used and how they are used.** Effective reporting is required. The implementation strategy must thus be of a kind that permits appropriate changes to be made in order to secure more certain attainment of EST.

Guideline 10

Build broad support and co-operation for implementing EST; involve concerned parties, ensure their active support and commitment, and enable broad public participation; raise public awareness and provide education programmes. Ensure that all actions are consistent with global responsibility for sustainable development.

☑ **People that will benefit or suffer from transport policy decisions should have a voice in shaping the transport system**. This requirement calls for the early integration and balancing of many viewpoints in society, including those that have usually been under-represented in transport policy-making like women, handicapped people, children and the elderly.

☑ **The role of education in the implementation of EST is paramount.** Consideration of EST itself is an educational tool. Much of the resistance to change in transport results from the lack of appealing, properly formulated alternatives.

☑ **Education and information about EST should be integrated with general concerns about the fate of future generations.** Transport should not be considered in isolation from other sectors of human activity. Current concerns should be considered in the light of their likely effects on grandchildren and their grandchildren. Individual and family concerns need to be balanced with those of society and humanity as a whole.

☑ **Implementing EST will require a structured plan of action and close co-operation among a broad range of stakeholders** from many sectors including transport, environment, health, finance, industry academia and civil society including NGO's.