MISTRA

Sustainable Mobility

A Mistra research initiative focusing on the transport sector

Call for pre-proposals

Mistra is issuing a call for pre-proposals for large-scale, interdisciplinary and internationally competitive academic research efforts addressing sustainable mobility. The programme should preferably be geographically concentrated to one or two academic centres in Sweden.

Applications for planning grants must be received by Mistra by September 15, 2004.

Historically, increasing mobility is closely linked with economic, social and cultural progress. People move more and more and ever-increasing amounts of goods move longer and longer distances. There are no signs that these trends will change. The negative environmental effects of an ever-increasing mobility are at the same time large and increasing.

Mistra's *vision* is that the social benefits today linked with mobility can continue, while at the same time the environmental impacts gradually are reduced.

The programme is planned to start in January 2006. The level of funding for a first three-four year phase could be in the order of SEK 20-40 millions. Further funding could follow after evaluations of both scientific and practical values.

The motive for the initiative

Mobility and the concept of progress go hand in hand. This was as evident thousands of years ago as it is today. Industrialisation and urbanisation accelerated the movements of people and goods, as technology made travelling easier and as travel costs decreased. This process continues unabated within and between all regions of the world, developed as well as developing.

These trends are as visible today in industrialised countries like Sweden, as they are in industrialising countries like China and India. One century ago the average Swede moved 500 m per day. Today his/her grandchildren and great-grandchildren travel 50 km per day. The average distance travelled increases with household income; to the daily commuting between work and home is added weekend trips for recreation and yearly trips to other countries.

Mobility has to be socially inclusive. The quality and the arrangement of the transport systems in relation to the organisation of society have implication from several social aspects. Different social groups tend to move in different ways with different means of transport. Gender, age, income level and, coupled to that, ethnical aspects are examples of perspectives that are relevant and have to be considered in planning and decision-making. Personal space is growing and becoming more specialised. The same holds for the spatial pattern of production. Flowers grown in Africa are flown to Amsterdam and trucked to Stockholm. The use of capital is becoming more efficient as production systems are based on just-in-time planning. Cities grow around their edges as retail marketing of goods and services in urban areas require ever more space. The deepening complexity in the use of time and space drives the movements of people and goods. A well functioning transport system is fundamental to the economic and social well-being of a modern society.

At the same time, the environmental impacts are growing, even if some progress has been made. More and more land is used and ecological and social barriers are created due to the trunk lines between urban centres. Traffic is the single most important source of noise pollution and a significant source of different emissions harmful for people and ecosystems. Traffic congestion in urban areas reduces the quality of life in cities – not least in cities built during other technological eras. And the carbon dioxide emissions from the transport sector keep growing.

Thus the existing transport system is not on a sustainable path. It may be efficient from an economic point of view, but it is not from the point of view of the environment and possibly not from the point of view of social inclusion.

The existing research context

The public and private money spent on research on mobility and transport is huge in the OECD countries. In Sweden alone, the publicly financed transport sector related research amounts to some SEK 700-800 millions. Much of it is directed towards road transport and vehicle technical development, partly as an effect of the importance of the vehicle industry to the Swedish economy.

The Swedish government has assigned VINNOVA to co-ordinate an action plane for the transport research among the Swedish state agencies. One conclusion was that the technical

development efforts were well covered. There is, however, a significant gap in the Swedish research landscape regarding analyses of critical long-term issues relevant for policy-making in industry and political affairs.

The strategic agenda for the Mistra research initiative

Mistra will, within the framework of this initiative, support academic research that is relevant for developing a paradigm for long-term sustainable mobility systems. The initiative has been designed to fit in the proposed publicly financed research action plan of VINNOVA.

Mistra's *vision* is that a sustainable mobility system in fact is feasible.

Mistra's *goal* with this initiative is to create an academic platform that will enable different actors within the Swedish mobility system to develop concepts and methods that can make a difference for long-term sustainable development of the transport system.

A Mistra research programme has to be trans-boundary in three senses:

- Between academic disciplines: all the relevant disciplines have to be included.
- Between theory and practice: the dialogue between academics and practitioners has to be constantly ongoing.
- Between Swedish and foreign researchers: foreign researchers should be invited to participate in Swedish research groups.

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Mistra believes that some environmental issues are particularly critical when developing a paradigm for sustainable mobility. These issues are:

- Climate change – ideas have to be developed on how to decouple the carbon-dioxide emissions from increasing mobility.
- Congestion – ideas have to be developed on how to reduce the congestion in urban areas and on critical interurban transport links without at the same time taking inordinate amounts of land into use.
- Land use both in urban and rural areas – ideas have to be developed on how to limit the ever increasing fragmentation of landscapes and ecosystems.

Many other environmental impacts are of importance, but it is Mistra's view that the three mentioned above are of particular importance and also of particular complexity.

Decoupling

A sustainable mobility system should meet several goals simultaneously: it should be economically efficient in its own right as well as contributing to the overall economic efficiency of the society; it should be socially inclusive and not leave large groups of the population without access to mobility; and it should meet stringent environmental criteria. This could be studied on two different systemic levels:

- Decoupling between economic development and social inclusion on the one hand and ever increasing mobility on the other.
- Decoupling between increasing mobility and the impact on the environment.

Mistra recognises that this separation may well be somewhat arbitrary but nevertheless believes that both levels could be addressed. Three fields of research will be derived from these two levels.

Spatial specialisation and its governance

The rate of growth of mobility is the net result of economic and social processes that operate on many different geographical levels and over many different societal sectors. It is far from obvious if, and if so how, the transportation growth can be influenced at all (apart from through so steep increases in the price of transport fuels that the economic and social dislocations would prove unacceptable). It is conceivable that the underlying pressures for ever-increasing mobility are so strong that conscious policies to reduce the rate of growth of mobility are by and large impossible to implement in democratic societies. Nevertheless, the issue is so fundamental that it should be looked into. Potential research topics might be:

- Can spatial specialisation and thus the need for increasing mobility be decoupled from economic development? Are there societal or technological trends that could indicate such a possibility? Are there developments somewhere in the world that could be duplicated? Can a credible scenario be constructed and what might the consequences for the three environmental issues mentioned above be?
- If such a scenario could be developed, what decision-making processes might make a difference? Who would have the power to influence the development? What would be the role of politics and business on different levels of decision-making (EU, national, regional, local levels)?

Mobility management

Congestion and scarcity of land are already constraining mobility in many parts of the world and in particular in developed countries. Large cities invariably find themselves overwhelmed with congestion – there never seems to be enough land available that can be allocated without other negative impacts. The same is true in certain corridors between major urban regions (e.g. through the Alps). The costs of congestion are high both in economic, environmental and social terms. Greenhouse gas emissions are increasing all over the world. Thus the existing systems for moving goods and people are unsustainable. Actions to increase the efficiency in a sector by spatial specialisation are regularly made without taking the consequences for the transport sector, and thus the environment, into account.

Many solutions have been proposed but few have been implemented. Potential research topics could be:

- Are there any solutions or approaches (technological, organisational, institutional or otherwise) to mobility management, including logistic systems for goods and people transports, on different geographical levels that might make a difference with respect to the need for land use, congestion and carbon dioxide emissions? Where are the

main impediments for implementation? Are they technical, institutional or political? Is there hope?
- What would the decision-making processes look like that would take into account the mobility effects of increased sector efficiency in different sectors of the economy? Are there other management tools than prices, taxes and establishment of infrastructure?
- Specifically, what is the role of urban and regional governance? If there are practical solutions, what would the impact on social inclusion and the environment be? And on transport costs?

Sustainable fuel strategies

The transport system has been a huge source of air pollution for the better part of a century. Different pollutants have been addressed over the years, starting with carbon-monoxide during the early 1970's and then followed by lead in gasoline, nitrogen oxides, particles and VOC's. Industrial resistance, not the least from the transport fuel industry was initially strong, but lately there has been a convergence of views between governments, the oil industry and the vehicle industry that these problems are to be solved (even if there are still arguments over the rate of change). In the OECD countries, the end of the struggle against the traditional pollutants from the transport sector is in sight. And in the developing world, at least the end of the beginning of the struggle is similarly in sight. Developing countries are gradually implementing US or EU standards.

Not so with respect to carbon dioxide emissions (and other potential greenhouse gases). Emissions continue to increase and no obvious technical fix has been proposed. The trends are so strong that merely increasing the efficiencies of engine technologies will be insufficient. Fundamental changes in the fuel supply chain will be necessary in order to reverse the present trends. Such changes cannot be seen in isolation from other changes within the energy supply system.

The two dominant factors will be the respective role of carbon sequestration and the role of bio-fuels in stationary energy use such as power plants. If large-scale carbon sequestration proves to be technically and economically viable, opportunities open up. One such opportunity might be to continue to use oil and natural gas in the transport sector and then gradually separate the hydrogen in the hydrocarbons into a hydrogen fuel also for transport. Bio-fuels could possibly also be used as intermediary fuels, even if uncertainties are extremely large when it comes to the global or even European capacity for volumes of a size that would make a contribution large enough to reverse the trends.

If carbon sequestration turns out not to be feasible, the pressures to use bio-fuels in stationary energy plants will be very large. The role of bio-fuels in the transport sector will then probably be more uncertain. Oil and gas will then probably be the preferred transport fuel for decades to come. Then again, much will depend on whether alternative methods to generate e.g. electricity will emerge.

Mistra believes that the time has come to look into the implications for the transport fuel sector of a scenario where carbon sequestration turns out to be feasible on a technical and economic level. Such a scenario would open up a huge number of issues, of which some might be topics for academic research. Examples might be:

- What might the time scale of large-scale carbon sequestration look like? Could, and if so should, bio-fuels play an intermediary role in the transport sector on a global or even European scale, compared to using bio-fuels in stationary applications?
- Is it possible to say anything about where along the distribution chain between oil/gas production and the fuel station the separation of carbon and hydrogen should take place? What are the potential economies of scale of the different technologies for distribution, separation and storage technologies?
- What might an institutional regime for carbon sequestration look like? Is it likely that a country like Sweden would have to develop its own re-injection? Or might there be a European market for re-injection services? Where are the most promising locations for re-injection?

Programme design and application details

Mistra invites proposals for integrated research programmes. The proposals should cover one or several of the strategic issues identified above, although not necessarily outlined in the same way. The programme should preferably be geographically concentrated to one or two academic centres in Sweden. The proposals must meet the following criteria:

- The proposal should clarify how the suggested programme will contribute to the gradual reduction of key environmental issues related to the transport system (such as emissions of greenhouse gases, changing landscapes and congestion).
- The research should be solution-oriented. There should be a clear idea of how the research could make a concrete and significant contribution to future sustainable mobility. Potential users of the research results (business and industry, local and national policy makers, NGOs and others) should be involved already in the planning phase of the programme as well as continue to interact with the researchers thought the entire programme period.
- The proposed research should be interdisciplinary. A strategic mission for Mistra is to contribute to the building of environmentally oriented interdisciplinary research milieus in Sweden with strong presence of socio-economic sciences.
- The proposed research should be based in Sweden and internationally competitive. The applicant research groups should have well-established contacts with international first-class research environments. Mistra encourages and attaches great importance to participation of senior researchers from countries other than Sweden as active members of the applicant group.

Programme design

A programme board and a programme manager, who are responsible for research coordination and dialogue with practitioners, are always appointed for Mistra's programmes. Activities could be divided into sub-programmes that have to be incorporated into the programme management structure. Normally, Mistra allow funds for an initial programme phase lasting 3-4 years, with the possibility of funding for a further phase if the programme is considered successful, following evaluations.

The programme could consider strengthening the scientific capacity in strategic fields by announcing two to three three-year-posts for young researcher (PhD degree not older than six

years) within the programme. These posts must offer the possibility of a one-year stay at a university abroad. The posts are to be advertised at the commencement of the programme and the programme board, in consultation with Mistra, will elect the successful candidates.

The programme is expected to commence on January 1, 2006. For the first 3-4 years the level of funding will be about SEK 20-40 million. The planning schedule for the process up to the launching of the programme is as follows:

September 15, 2004	Deadline for applications for planning grants
Early October, 2005	Decision on planning grants
April 1, 2005	Deadline for submission of complete programme applications
April and May 2005	Evaluation of scientific value and practitioner's value
June 2005	Mistras's board decides on which application(s) to fund
Autumn 2005	Concluding arrangement (legal and economical agreements, etc.) and staff setup
January 2006	Start of the research programme

Planning grants will thus be provided for the period from October 2004 to March 2005.

Application details

The applications for planning grants must not exceed ten pages, it shall be written in English, and Mistra must receive it by September 15, 2004. In addition the CVs of the main applicants should be added. The application should contain descriptions of:

- The research field(s) relating to sustainable mobility to be addressed by the programme.
- How the research is expected to make a concrete and significant contribution to the solving of important environmental problems.
- The practitioners with whom the research group is conducting/plans to conduct a dialogue.
- The methods to be used.
- The composition of the planned research group and its international contacts (but the group must not necessarily be formed yet).
- The likely programme host (i.e. an university department, research institute or similar).

Mistra will select a small group of applications that will receive planning grant and an invitation for submitting complete programme applications. Each planning grant will be in the order of SEK 150 000 – 250 000, including over-heads. The complete programme proposals will be subject to two evaluations during April and May 2005, prior to the decision by the board of Mistra in June 2005. One will be carried out to examine the usefulness of the programme in the perspective of practitioners. The other will address the scientific quality and be carried out by an international peer review group of scientists.

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