# Mobility management in early planning processes and its impact on energy efficiency in the transport sector

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## Keywords

mobility, traffic management, public private partnerships, transport policies and measures, transportation

## Abstract

In Sweden the transport sector amounts to roughly ¼ of all energy use. In order to achieve the goals of the energy efficiency directive in this sector a holistic approach is required. The Swedish Energy Agency (SEA) along with other actors has identified the importance of promoting urban structures and planning processes that facilitate an increased use and attractiveness of energy-efficient means of transportation. The SEA is a government agency responsible for several Swedish politically established long-term goals regarding energy efficiency, environment, energy knowledge and production. In this paper the focus however lies with examining how mobility management can be used as a regulatory tool employed by the SEA in regard to striving towards the Swedish national energy-efficiency goals in the transport sector.

Mobility Management is usually understood as different informational measures used as a tool to reduce the amount of energy-inefficient transportation. There are however often problems with such approaches as current urban structures are separated by function and in themselves often promote car-bound transportation, and thereby higher energy use. Mobility management as seen in this paper is defined in a still broader context, as linking parking management to urban planning processes with the goals of reducing inducted car transportation between city functions.

From a national regulatory perspective a new approach in mobility management has been a bottom-up oriented networking programme where the SEA has worked together with 12 municipalities. The focus has been the incorporation of mobility management measures in the earliest stages of the municipal land use planning process. Via public/private partnerships between municipalities, contractors, investors and property owners it has been possible to combine informational measures with direct changes to the built physical environment. The initiative has resulted in an enormous increase in the municipal capacity to implement mobility management measures in their regular planning processes and controlling documents. From a regulatory perspective the programme is an interesting case as almost no economic incentives were linked to the programme.

The programme has yielded relevant results regarding mobility management in relation to national regulatory measures. The network form of the initiative has since January 2015 been continued by the participating municipalities without funding or involvement by the SEA. This indicated that carefully weighed and timed regulatory action via network facilitation can lead to lasting engagement and continued contribution of the participating actors.

The programme has also yielded several experiences and examples of how urban structures can be constructed where parking spaces are reduced in number and replaced by mobility management enabling features such as bike lanes, bike pools, car pools and walkable environments, and how the costs for this can be distributed. A key part in achieving good results are the public/private partnerships where municipal authorities can negotiate deviations from the parking norm in exchange for the above mentioned mobility enabling features.

## Introduction

One of the largest and most pervasive energy-efficiency challenges facing countries today lies in how to tackle rising energy use in the transport sector. Transportation of people and goods is an essential part of our societal structure, and the trend that can be seen for the last decades is that global and local distances travelled and goods transports have been steadily rising. Mobility projections done by the OECD indicate that global passenger transport volumes could be up to 2.5 times as large as today, and freight volumes could grow by a factor of four[1]. There is of course a wide global acknowledgement of the impact effects of transportation in all instances of governance and international and national programmes, and instruments and regulations often reflect this. These however are in many cases in conflict with other national or international objectives in areas such as trade regulations, regional development, economic growth or accessibility. The EU's white paper on transport for instance states that "curbing mobility is not an option"[2].

While such an analogy in this context is an oversimplification, it is used merely to illustrate an initial point that energy-efficiency measures in the transport sector often face the challenge of affecting and possibly conflicting with other sometimes more insistent national goals. A reflection of this challenge is perhaps that many regulatory instruments are easier to focus on technological development and research, whether this regards vehicle efficiency or takes the form of subsidies aimed at promoting certain kinds of customer decisions when purchasing vehicles. It cannot be said from an energy-efficiency standpoint that such an approach is correct or incorrect, but it must be considered in a wider context and alongside an analysis of what measures are necessary to reach internationally agreed upon energy-efficiency goals.

This paper will primarily examine the results of a 2.5 year project initiated by the SEA as a means to examine the applicability of mobility management in urban planning processes in order to generate a lowered transport demand then the prevailing norm. As urban structures themselves in large part "generate" a need or demand for people to transport themselves and the goods they use, understanding the drivers and processes involved in shaping these needs is relevant. The paper will outline the work and outcomes of the project in relation to both direct energy savings and the knowledge gained from a regulatory standpoint. In regards to this it is of note that the SEA did not define mobility management as the topic of the project from the start. Instead this was done in conjunction with the intended participating municipalities.

In Sweden there is currently much debate regarding the energy and climate challenges facing the transport sector. A recently completed large governmental investigation with the task to examine what regulatory measures are necessary to reach the national ambition of having a fossil-fuel independent vehicle-fleet by 2030 has concluded that[3]:

- It is necessary to plan for and develop attractive and accessible cities that reduce transport demand.
- Infrastructural measures combined with changing to energy-efficient vehicles is necessary.
- More energy efficient vehicles in combination with a more energy efficient style of driving is necessary.
- Biofuels must comprise a much larger part of total fuels used.
- Electrified road transports are important in regard to goods- and personal transportation.

The investigation focuses on climate aspects but energy efficiency is a large part of a fossil driven sector and intimately intertwined with $CO_2$-emissions. While there is much discussion regarding the finer details of how regulatory measures can be constructed and implemented, and what the short and long term impacts on society arising from such measures can be, that is not the focus of this paper. One important conclusion, which is also mirrored by previous investigations by the Swedish Transport Administration, is that in order to reach both the national goals of emission-reduction and energy-efficiency, *it is not enough to focus on technological aspects alone*[4]. Technological aspects are here defined as the research, application and implementation of more efficient vehicles, tires, engines and fuels. Such conclusions of course raise the question of what additional measures are needed and how much that can be done from an energy-efficiency perspective and by what measures in relation to each other. It is of course difficult to give an accurate answer considering the transport sector from a national perspective, let alone an international one. There are however estimates done by the Swedish Environmental Protection agency and the Swedish Energy Agency, that give indications in regard to the order of magnitude of regulatory measures in different areas and their relative impact on reaching energy-efficiency goals.

Urban and regional planning measures that promote urban structures that *lessen the demand for transport* have been identified as a central part of Swedish national energy-efficiency potential in the transport sector[5]. Mobility management as presented in this paper clearly falls under the category of lessening transport demand. This indicates that regulatory measures and/or actions are also needed in the field of urban and regional planning which directly affects urban structures themselves. It is important to stress that these measures are seen by the SEA as a complement to, and are meant to work in conjunction with, existing and future regulatory measures in other relevant areas such as fuel efficiency research programmes, vehicle battery research, tire marking by energy class, car tolls, subsidies premiering lower emission cars and many other measures.

## Mobility management

In light of this discussion, the SEA has expanded their work in the area of urban and regional planning with the intent of promoting energy efficient planning practices. One area with significant promise in affecting transport demand is Mobility Management, an area also aptly known as transport demand management. This is usually understood as different informational measures used

1. 2012, OECD, Transport outlook – Seamless Transport for Greener Growth.

2. 2011, European Union, Roadmap to a single European transport area – towards a competitive and efficient transport system, p. 6.

3. 2013, Swedish Ministry of Enterprise, SOU 2013:84, Fossilfrihet på väg.

4. 2011, WSP, Underlag för klimatscenario.

5. 2015, Swedish Transport Administration, PM, Fortsatt minskning av klimatutsläppen men i för långsam takt för att nå klimatmålen.

as tools to reduce the amount of energy-inefficient transportation. A current European definition is: "Mobility Management (MM) is a concept to promote sustainable transport and manage the demand for car use by changing travellers' attitudes and behaviour. At the core of Mobility Management are 'soft' measures like information and communication, organising services and coordinating activities of different partners. 'Soft' measures most often enhance the effectiveness of 'hard' measures within urban transport (e.g., new tram lines, new roads and new bike lanes). Mobility Management measures (in comparison to 'hard' measures) do not necessarily require large financial investments and may have a high benefit-cost ratio."[6]

For example a classic mobility-management measure can be a municipal informational campaign intended to promote biking to work or the use of public transport by adherent car users. Usually such campaigns stretch over a limited time of 6–12 months and include some form of economic incentive, for example a prepaid bus pass. In addition to this the campaign is also often tied to some form of contest aspect at the work place – i.e. who can substitute their car use to the largest degree. The ultimate aim of such mobility management activities is to affect the way people think of the different transport options available to them and to enable them to step out of set routines and practices in regard their transport behaviour. Research indicated that such effects are also seen in a long-term perspective.[7]

## SWEDISH URBAN AND REGIONAL PLANNING

In order to better understand the possibilities of mobility management it is important for the reader to at least be aware of some of the preconditions regarding urban and regional planning in Sweden. The SEA has not historically had any greater part in this system as it has mostly been focused on energy research, production and distribution. In later years however much attention has been directed towards energy-efficiency and consumption. This combined with the previously mentioned areas in the transport sector has led to a greater involvement by the agency in urban and regional planning. The section will also outline how mobility management relates to the planning system, the SEAs role from a national perspective and a European outlook on the origins of mobility management.

Current urban structures are separated by function and in themselves often promote car-bound transportation. In particular it is not fully investigated by what degree soft measures as describe above can sustain their effect when they are ultimately working in an established hard system of infrastructure. There are of course also hindering factors in promoting biking and walking involved in that infrastructure investments often are aimed at supplementing mobility by car, and that urban sprawl is a threat in growth-regions.

In the Swedish urban and regional planning system the municipalities have a very large measure of control over the functions of land use planning. This is directly reflected by the fact that they possess a "planning monopoly" which gives the municipal authority full control over any and all measures involving urban planning. The planning system is of course connected to national goals and guidelines, but national authorities such as the SEA have no measure of direct influence over land use planning or the processes involved. There are important roles for such actors from a regulatory perspective when it comes to supervision of laws but they are not part of the planning processes themselves. National authorities can instead undertake different kinds of promotional activities, often combined with economic incentives, to affect local land-use planning practice and processes.

The regional planning level in Sweden is at the same time based on guidelines and voluntary agreements between involved municipalities and regional planning organs such as the county administrative board and/or regional municipal unions. Planning relevant documents and agreements at the regional level are not legally binding and the processes are instead focused on collaborative efforts of striving towards consensus regarding regional challenges. There are weak links between regional urban planning and national economic incentives. While there are generally different forms of agreed upon regional planning documents, goals and/or guidelines the enforcement of these falls upon the municipal authorities themselves. This can lead to challenges when regional and local strategic goals can interfere with one another, such as possibly conflicting goals concerning environmental and energy-aspects measured against mobility and economic growth. Such a system is not inherently negative in itself as there are positive aspects at the local level such as decentralised land use planning and democratic aspects of the decision making processes itself. The caveat is simply that it is harder for national agencies such as the SEA to implement regulations and to see to the enforcement of these.

## THE ROLE OF THE SEA

In light of the energy-efficiency challenges in the transport sector in Sweden, and the aforementioned acknowledged importance of urban and regional planning as a means to promote national energy-efficiency and climate goals, the challenge for the SEA has been how to effectively promote mobility management as a part of municipal planning processes.

Mobility management as it has been defined here has seen some success during the last years in different urban projects. These activities are however seldom employed in any broader strategic sense and there were until recently few national arenas available for the advancement and exchange of knowledge within the field. Many municipalities have done excellent campaigns in order to promote energy-efficient transports but in somewhat isolated and poorly evaluated projects. At a national level there have been initiatives spearheaded by the Swedish Transport Administration with the aim of promoting mobility management in municipalities and regions, often in cooperation with other national actors. With a change in their mission and responsibilities however, there was never a wide and continual implementation in the strategic work at the municipal level.

## COMBINING HARD URBAN PLANNING AND SOFT MOBILITY MANAGEMENT MEASURES

As a consequence of the prevalent premises the SEA launched a new initiative within one of its programmes called "Sustainable Municipality" in 2010. In the programme there were multiple initiatives aimed at different fields linked to energy-efficiency

6. 2014, EPOMM, http://www.epomm.eu/index.php?id=2590.

7. 2008, Cairns et al, Smarter Choices: Assessing the Potential to Achieve Traffic Reduction Using 'Soft Measures'. Transport Reviews, vol, no 5, 28 593–618.

measures and mobility management was early identified as a promising avenue of work. The premise of the programme was that participating municipalities would apply to be part of the programme free of charge, and receive coordination, knowledge transfers and inspiration from both the SEA and each other in coordinated networks. The focal point for each municipality was that they decided upon central projects relevant to the field and would aim at developing these with the aforementioned help into spearhead initiatives to be used as precursory examples for municipalities not participating in the programme.

In the case of mobility management it was deemed that there would be an attempt not only to produce isolated examples of success but also to translate the work being done so that it could be incorporated into the municipal planning processes. The main challenge in such an approach lies in how to combine the soft components of mobility management with the broader planning process and municipal strategic documents that involve the planning, layout and decisions of urban land use planning. Such an attempt had previously not been undertaken as mobility management was conceptually thought of as a promotional tool and not a tool for affecting urban structures themselves.

#### THE EUROPEAN MAX PROJECT AND ITS INFLUENCES

Much inspiration for the programme was initially taken from the European Platform on Mobility Management, EPOMM and its MAX project. The MAX project had been working on the integration of Mobility Management and land use planning both in the plan-making process and in the site-related building permission process. In these processes, it had developed a set of guidelines, as well as a whole range of other useful recommendations, summaries, tools, training materials and research reports. An adaptation of this information to suit Swedish planning conditions has been done by the STA and named MaxLupo SE. This document was at first an integral part in what the SEA wanted to achieve with the mobility management group in the Sustainable municipality programme. The primary goal was for each municipality to test out a Swedish adaptation of one or many of the planning principles as outlined in MAXLupo SE[8], namely:

- Locating and planning urban exploitations and their impacts on sustainability
- Clear criteria for environmental impact assessments
- Functional and organizational implementation.
- Mobility management counselling towards contractors.
- Mobility management plans as demands or a prerequisite for negotiations in the planning process.
- Promoting car-free residential areas or residential areas with low car-use.
- Flexible parking norms.
- Municipal purchases of parking spaces.
- A maximum number of parking spaces.
- A ceiling on visiting car-traffic in visit-intensive areas.

8. 2011, Swedish Transport Administration, MaxLupoSE – råd om hur mobility management kan användas i den kommunala planeringen.

The main goal was to form an understanding of how such principles could be integrated in the municipal planning process and the plans and actual built environment that it eventually leads to.

## The sustainable municipality programme

In order to facilitate a development where the municipalities could work with the principles within a contextual situation the work was based on the concept of developing projects selected by themselves into spearhead initiatives. For the SEA the government's guidelines were clear in this regard, that the programme was to produce local initiatives within the different fields of "spearhead quality". In the instance of the work with mobility management this entailed developing local planning projects that combined the soft aspects of mobility management and incorporated them into the build physical environment of the chosen developments. An example of this would for instance be implementing a car pool and providing the required premium space for its construction and operation and at the same time launching an informational campaign about it. Normally such an approach is not seen in planning processes but implemented by private actors in already constructed urban spaces.

In these early stages of the programme the involved municipalities had little experience of exactly how such measures could be prepared for in the early stages of planning, and what actors had to be involved.

There were also some trepidation amongst the participating municipalities regarding what was to be considered a successful spearhead initiative and how success could be measured against the goals of the programme that specifically focused on the creation of such planning projects. The SEA had at this time, and has not even today after the programme has finished chosen to define this term by setting any criteria. It was deemed that this was a very difficult task, especially in the field of urban and regional planning, as it is very difficult to measure projects against one another at a national level. This was found to be the case no matter what criteria were tried as the different municipalities had vastly different existing preconditions. There were simply too many varying geographical, economic and political variables involved. From a programme point of view this had little impact on the final results but proved to lend some uncertainty to many projects. The SEA could thus only give indications off if the projects were headed in the right direction. Some considered indicators were if the projects used innovative approaches to internal or external processes or if they yielded relevant and innovative policy documents. These were ultimately deemed too hard or inexact to measure in a significant capacity.

The network of municipalities involved was coordinated by the SEA with the help of consultants with experience from the European scene and the MAX framework. Trivector Traffic AB provided the daily support for the municipal work and had frequent interactions with the SEA about the content support provided to the network. Assessment regarding the projects development was done jointly each quarter by Trivector and the SEA via "professional assessment". This involved a simple hands-on evaluation where each projects was graded 1–3, with 1 showing the most promise. This simple method although lacking in solid indicators provided a useful situation update and the projects that were struggling could clearly be identified and singled out for more attention in the coming period.

### FIRST RESULTS

In the latter months of 2012 the work had picked up speed and all involved municipalities were confident that the projects they had chosen were suitable and in early enough stages of planning as to be good matches for mobility management features. The SEA and Trivector Traffic were following the work closely and continually adapting the content and information provided within the network to be as relevant as possible for the municipal work. Due to the dynamic form of planning processes it was much less straight forward going than the SEA had anticipated. The goals and timelines within the programme sometimes collided with local municipal delays caused by different arising priorities, different political directions or democratic involvement in the projects by local citizens. It is important to note that the mobility management aspects in many projects were not the most argued or disputed. Instead issues arising in all urban development affected the projects such as land-use discussions, environmental concerns and other issues. The projects were not always primarily defined by mobility management itself, but instead seen by many as a part of the greater municipal land-use planning development.

This lead to the SEA learning valuable insights about the time involved in planning processes and that land-use planning is complex and cannot be rushed by national actors. It was not desirable to rush the projects from the SEAs viewpoint as the whole point of a successful implementation could be lost.

Nevertheless by early 2013, 6 of the 12 projects were deemed as very promising. The rest were stalled in different manners, but not stopped altogether and still showing potential. The network meetings held were still involving all participants and the outlook for good results was positive.

### THE ROLE OF PARKING MANAGEMENT

At this stage it was becoming apparent that there was an additional complexity involved, namely that almost all the principles mentioned in the MAX project required a deviation from the standardised way of parking space construction by norms. Parking space provision in Sweden is regulated by the Planning and building act (PBL). The responsibility for parking provision is here clearly stated to lie with the municipal authority. The regulating paragraph is open to interpretations as all laws. However it has historically, and in many places still is, interpreted as if the municipality's responsibility is to provide one parking space per apartment. This parking norm of 1 has been used in Sweden since the 1960's.[9] At the time it was still interpreted thusly in many participating municipalities. At the same time a need to adapt these numbers was quickly arising. Several projects for instance wanted to incorporate more bike lanes and changing rooms for cyclists instead of the large amount of space used by parking spaces. These approaches were often hindered by conflicting municipal strategic- and/or parking policies. The mobility experts and traffic planners were encountering internal resistance from other departments such as building permits, due to different views regarding the regulatory responsibilities placed on the municipal authority by PBL. There were several internal discussions held regarding this regulatory obligation influenced by both the experiences continually derived from the network in the SEA programme as well as broader discussions held in Sweden at the time. A result of this was that flexible parking norms and ownership of a municipal parking company were identified as very important aspects if mobility management features were to be built in to the physical environment. Several municipalities in the programme eventually implemented flexible parking norms as a part of policy- and strategic documents. As of this date several municipalities outside of the programme have implemented flexible parking norms, where location, density and expected clientele of urban development areas has a direct impact on the amount of parking spaces that have to be built.

In addition another important aspect was the involvement of investors. Traditionally these actors are not interested in promoting mobility management measures or reducing parking spaces since it is not their responsibility. For the projects however it was important that the costs involved in implementing car-pools, bike lanes and changing rooms did not fall on the municipality alone. It was envisioned that investors, or landlords in the case of existing urban areas, were to be involved and prepared to enter public private partnerships to carry some of the costs involved. Since this is a deviation from usual practices different companies reacted differently to municipal proposals. There is a clear economic incentive in constructing fewer parking spaces since this is costly. From a municipal standpoint it was important in many projects to address that by agreeing to provide mobility management measures in the projects involved investors could restrict the amount of parking spaces built. Many municipalities had to address fears that lowering parking would reduce the attractiveness of the constructed areas. This is still a widely debated aspect and probably will be for a time. Many municipalities were however successful in attributing other values to attractiveness then parking. In mobility management and urban planning research there are indications that parking space and car-accessibility in urban areas isn't valued as highly as it was a decade ago.[10, 11]

## Collective lessons learned

As shown above there were several areas identified by the municipalities in the programme as key in order to incorporate mobility management measures in early land use planning processes. Flexible parking norms and a political acceptance for their involvement was a key area. As described in the paragraph above several municipalities started to adopt the new norms over time. This was the fruit of much internal debate between different branches of the municipal administration with different viewpoints on the matter. In many cases several large internal workshops were held as a starting point to both adopt flexible parking norms, but also to communicate internally what mobility management measures were. The SEA was not involved in these discussions as they concerned municipal strategic matters, where the state does not have any direct influence. In the SEA network these discussions were encouraged

9. 2014, Per Lundin, Bilsamhället: Ideologi expertis och regelskapande i efterkrigstidens Sverige.

10. 2013, WSP Sweden & KTH, Parkering i täta attraktiva städer: dags att förändra synsätt.

11. Table 1, note: 2014, Eskilstuna Kommun, Parkeringsnormer för ett Eskilstuna i förändring.

**Table 1. Costs of parking construction.**

| Type of parking | Construction cost per space | Cost for 15 spaces |
|---|---|---|
| Ground level parking | 15,000 SEK | 225,000 SEK |
| Parking structure | 120,000 SEK | 1,800,000 SEK |
| Parking garage | 250,000 SEK | 4,500,000 SEK |

*Examples of the costs involved in parking construction. Note that the figures involved are approximations from Eskilstuna municipality. 1 Euro ~ 10 SEK.*

and recognized as necessary but no specific actions other than discussion were taken by the SEA. These internal processes proved to be instrumental in enabling the combination of mobility management in the build physical environment. From a national perspective it is sometimes easy to forget that a municipal authority cannot always be seen as singular unified entity. It is an amalgamation of many different administrative departments with different goals and viewpoints, and in the case of mobility management as seen from a national regulatory perspective this was an important lesson. It takes time and effort to establish new processes and/or methods of action at the local level, and this was a process that required patience. The SEA limited its influence in these matters to providing information in the established network and in extension a reliance on the municipal representatives to further their own projects in adaptation to municipal timetables and debates. This approach was well received by the participants and they themselves were bound to the timetable of certain political decision dates or the dates when broader strategic documents such as traffic- or parking policies were being reviewed.

Another important aspect was how regulation of mobility management measures could be both enforced and initiated when it comes to matters of responsibility. Most investors and some landlords see the benefit of parking space reduction as it significantly cheapens their construction costs. What is not always clear however is why they should either shuffle over surplus savings from lessened parking construction costs into mobility management features or how customers that will be buying apartments react to any real or perceived parking restrictions. There were certain worries amongst some companies that by restricting parking the attractiveness of the urban area itself would fall, and thereby profits. In the case of land lords reducing parking spaces in existing facilities much headway was also done in the programme, and an acceptance from the actor involved was eventually gained.

In short it was found that a discussion about attractiveness and its link to parking provision was necessary in the planning process. In order for all parties involved to truly understand the reasons and benefits of mobility management, it was required that municipal authorities were very clear about their plans and provided a logic behind them that explained why the solutions were attractive for all parties.

#### PUBLIC PRIVATE PARTNERSHIPS AND PARKING MANAGEMENT

A need quickly arose from a municipal viewpoint of formalising the intensions of mobility management measures and clarifying the specific possibilities and responsibilities of public/private partnerships between the municipal authority and construction companies or land lords. In this area there were initially no Swedish examples of how such contracts could be formed and in turn enforced. The network had access to several European examples from the MAX project, but these were adapted to European laws and planning practices. It wasn't deemed as feasible by the participating municipalities to apply them directly into their respective spearhead projects but they did serve as an inspiration to possible implementation in Sweden. With the help of each other and the consultants involved in the project some municipalities began to develop their own guiding documents. Again internal coordination was a central aspect. The idea that investors companies should finance car pools, bike lanes or other mobility features in urban developments was still a foreign thought for many actors, both internal and external. By the end of the project time in December 2014 the network had resulted in several examples of how guidelines involving parking space reduction and what measures in a public/private partnership were required in order for public actors to qualify for a reduction of parking spaces.

Regarding the initial programme goals of producing 12 spearhead projects involving mobility management, 7 of the projects were deemed by the SEA to have achieved such status. A brief summary of the most prominent ones is given below. The most important aspect is however that even in the municipalities with "unsuccessful" spearhead projects there have been policy and strategic changes that enable future implementation of mobility management at a strategic level.

#### THE "NÄTET" NEIGHBOURHOOD IN ESKILSTUNA MUNICIPALITY

This project involved the development of a new neighbourhood 1km from the city centre on old industrial grounds. The project was evaluated by the municipality as having good preconditions for low car-usage because of the location. When the municipality joined the SEA network programme of Sustainable Municipality there had been discussion on promoting cycling aspects in favour of parking spaces in the project. Due to the informational exchanges facilitated by the network and the close ties to the MAX-project the municipality was able to regulate parking within the project. There were many meetings and workshops held, and the eventual number of parking spaces was reduced by about 50 %, the rest being replaced by cycling lanes and dressing rooms. This has today lead to a modern city project with public/private partnerships and mobility management measures such as external changing rooms for bicyclists, better walkways and a comprehensive public-transport plan for traffic provision to a new arena included early in the planning process. The most important aspects of the work are that the project inspired and affected strategic municipal documents

**Table 2. Example of flexible different measures effects on the parking norm.**

| Measure | Possible influence on parking norm |
|---|---|
| Contract regarding car pool for tenants | Up to -20 % |
| Distance to car parking from entrance >400 meters | Up to -25 % |
| Distance to car parking from entrance >200 meters | Up to -10 % |
| Distance to important public transport node <200 meters | Up to -15 % |
| Improved bicycle facilities | Up to -15 % |
| A Green travel plan as part of building permitt | Up to -15 % |
| Communal parking structure | Up to -10 % |
| Parking open to public a part of the day | -5 % |
| Distance to car parking no longer than to bicycle parking | x% dependant on location |

*The information above is intended as initiating information aimed at public/private partnerships in the municipality of Eskilstuna in the land use planning process. The specific agreements are signed on an individual project basis.*

to a degree where mobility management and public/private partnerships are included. The work has also resulted in other ongoing planning projects being influenced by the work done, and a general lowering of the amount of parking spaces built, replaced with mobility management measures.

#### GREEN PARKING PURCHASES IN UMEÅ MUNICIPALITY

The Umeå project differed from the others involved in the programme due to it dealing with lowering parking space and promoting mobility management in an existing central area office building together with the land lord. The project was initiated as a means of lowering particle emissions in central Umeå which have troubled the inner city for some time. The concept introduced was a contract between the municipality and the landlord where the municipal parking company would buy existing parking spaces intended for job commuters, and in exchange the land lord would implement mobility campaigns promoting other means of transportation to and from work. The measures are funded by a public transportation fund financed by the parking space purchases. The activities include free provision for employees of public transport tickets and an information campaign. The overall goal is to decrease work commute by car by 40 %. The project is currently experiencing difficulties with Swedish tax-laws but the municipality is positive that a solution can be reached.

#### A MOBILITY MANAGEMENT PLAN IN HUDDINGE MUNICIPALITY

Huddinge municipality initially tried to work with the MAX principle of implementing a ceiling on traffic in visit-intensive areas. The work was done in conjunction with several local companies but it was quickly apparent that more underlying strategic work was needed. There were no municipal guidelines in the area and it was proven difficult to implement guidelines strictly for mobility management. Instead the spearhead project became the implementation of a municipally wide mobility management plan as an underlying addition to the municipal transport strategy. The vision is that the mobility management plan is to be an underlying document that the new traffic strategy can be built upon. As of January of this year this decision is still 3–4 months in the future.

## The legacy of the programme and energy efficiency in the transport sector

When evaluating the programme the SEA was surprised to find that the spearhead projects themselves didn't turn out to be the most important result. While they indeed contribute to the national understanding of integration of mobility management in planning processes, the most significant results were the strategic effects. I all involved municipalities their participation in the programme primarily lead to strategic processes and strategies coming to involve new thought patterns. Mobility management integration was found to offer a useful and tangible tool in municipal planning towards sustainable urban environments. From a SEA perspective the evaluation showed preliminary energy savings in all municipalities combined up to the order of 18 GWh. The figure is of course uncertain as it involves estimating impacts on transports if all the spearhead projects are realised. Such calculations are uncertain since they involve assumptions about parking demand and geographical and societal factors. There is however evidence in research that parking availability in itself affects the demands on parking which was an integral part in calculations[12].

Another important effect of the programme was the national impact the work had on municipalities outside of the programme. The participants themselves became experts in the field after the programmes conclusion and have been invited to numerous national conferences dealing with either mobility management or sustainable transports. While the SEA has spread the experiences and results of the programme, the municipalities own experiences have often been perceived as more relevant to other municipalities. The SEA has been established as an important actor in the field of mobility management but knowledge transfers have proven to be more effective when the local players are involved. Thus the most important legacy of the programme has been the lasting national impacts from the knowledge gained in the network. Results and experiences from the programme are not always spread with energy efficiency in mind, but other benefits such as health, pollution and

12. 2013, WSP & KTH, Parkering i täta attraktiva städer: dags att förändra synsätt.

environmental impact instead often serve as the primary drivers. This is an important lesson in itself regarding the multiple-benefits of energy efficiency, a lesson the International energy agency has recently done research on and promoted as an efficient way of reinforcing messages about energy-efficiency[13].

The next step for the SEA or other national agencies should be to build on the experiences of the mobility management network. It is still unclear exactly what potential the area has when it comes to energy- and environmental impacts of urban and regional planning on a national and long term impact level. The results are very promising, and give a unique insight into how national regulatory instruments can be initiated in order to affect the energy use in transportation by promoting a less transport intensive society without curbing mobility. In local solutions as shown in the programme, accessibility and mobility are not hindered but instead encourage the use of energy efficient transports in the urban structures themselves. As shown in the introduction of this paper this is a requirement if the Swedish energy-efficiency and environmental goals are to be reached. In a country where the municipalities have strong control over local planning these kinds of cooperation based regulatory measures are needed.

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## Acknowledgements

A big acknowledgement goes to the participating municipalities in the programme Sustainable municipality. Through great will and curiosity you have all become leading experts in the field of mobility management.

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