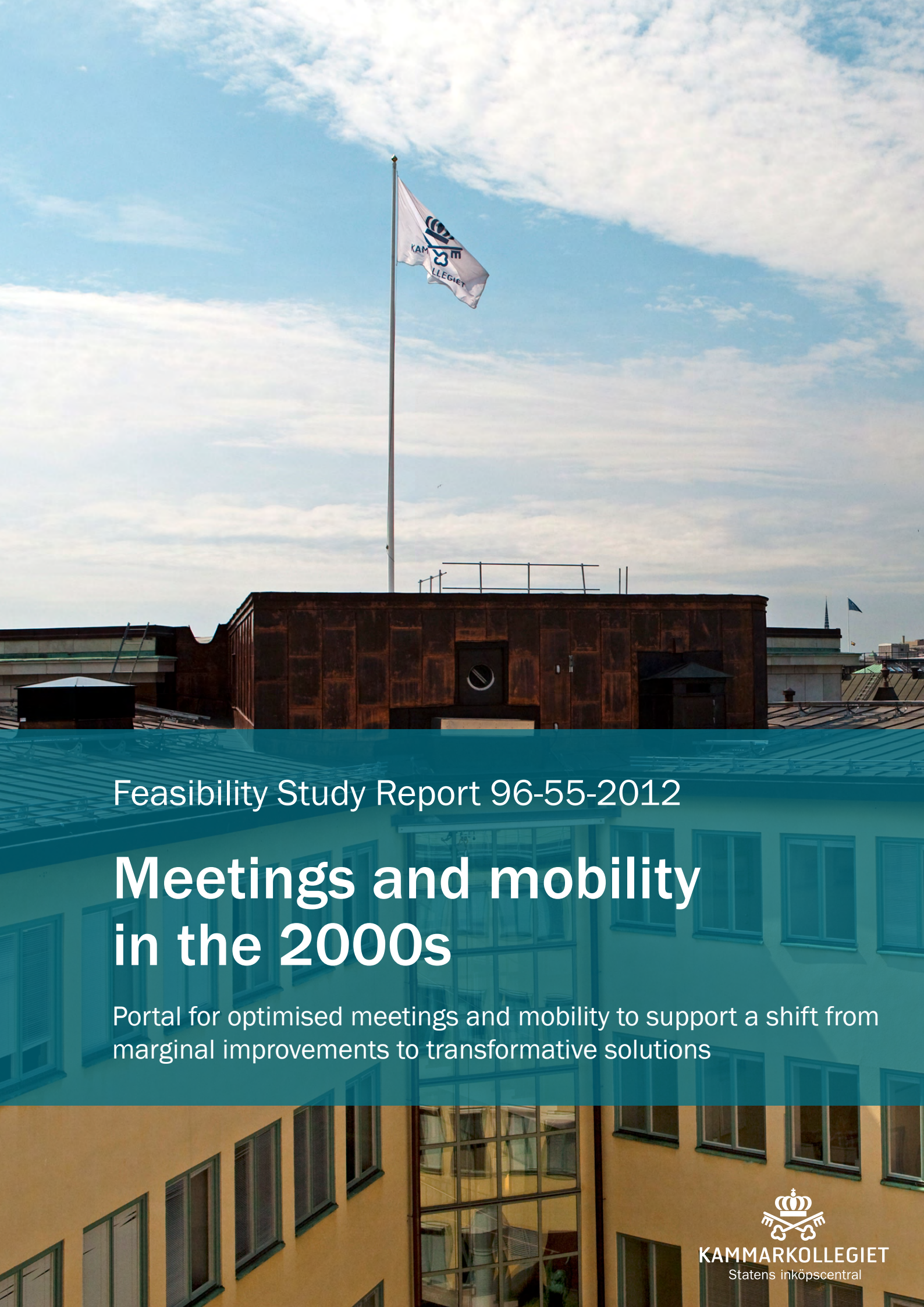

Feasibility Study Report 96-55-2012

Meetings and mobility in the 2000s

Portal for optimised meetings and mobility to support a shift from marginal improvements to transformative solutions

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Summary

This feasibility study proposes the creation of a web-portal for optimised meetings and mobility. By using new information technology in an easy to understand way that helps government agencies to make strategic choices based on scientific fact, a portal of this kind will contribute to significantly more efficient and less expensive meetings. The portal could also contribute to achieving the environmental objectives formulated by the Government and the EU.

The procurement investigation (Swedish Government Official Reports 2013:12) has identified meetings and mobility as an area where there are many new opportunities and where the goals require transformative changes.[1] The starting point for the procurement investigation was that the coming years will involve major changes for government agencies. Technological development, for example, provides entirely new opportunities in a range of areas, from virtual meetings to tools that make it easier to analyse the consequences of different choices. At the same time, the government and the EU's ambitious goals when it comes to reducing greenhouse gas emissions require transformative solutions.[2]

The National Procurement Services at Kammarkollegiet (NPS) and the procurement investigation have studied the potential to support solutions with transformative effects through procurement. Part of this work saw the investigation of a specific interest concerning the ability to create a portal for optimised meetings and mobility.

The feasibility study for meetings and mobility is based on an earlier feasibility study by NPS, which included transformative services in the agreement area for profiling and gift items. The previous feasibility study was followed for the first time by a procurement that included a transformative section.

NPS has now completed a feasibility study to investigate the conditions for a system to support the changes to government agencies when it comes to meetings and travel by establishing a meeting and mobility portal. The feasibility study has been included as a pilot in the state-run procurement investigation's projects for transformative services.

The aim of a portal for optimised meetings and mobility is to make it easier to move from traditional ways of meeting and communicating to new, more efficient

[1] http://www.regeringen.se/sb/d/16941/a/210399

[2] Transformative solutions mean: Solutions that contribute to at least 80 per cent (factor 5) less resource consumption and CO_2 emissions in relation to how a function/service is provided in a conventional way. These solutions often mean new mindsets and initiatives, and an analysis of the needs that purchasing must satisfy that are not restricted to improvements to current technologies and systems.

and less environmental impacting solutions that are necessary for achieving climate targets etc.

The feasibility study demonstrates the potential of using the existing data from life cycle assessments to create a portal optimised to suit meetings and mobility. The portal should enable government agencies to effectively compare and choose different ways of meeting and thereby contribute to achieving the government's existing goals including innovation, the reduction of greenhouse gases and transparency.

By collecting scientifically verified data from various sources on the impacts and consequences from different types of meeting, you guarantee high-quality results along with the option of continuous updating. The portal can also take advantage of the opportunities that now exist to present different choices in a graphical and easily understood manner. This will make it easy to use the portal as a basis for making decisions, for both individual journeys and long-term strategic decisions.

The feasibility study indicates that the portal could contribute to more transformative solutions that can help government agencies to optimise their meetings and mobility. This could allow the government agencies to achieve their goals and reduce their costs by, among other things;

1. That government agencies receive scientifically verified data when it comes to various environmental and economic consequences of the meetings.
2. That government agencies can obtain customised information when they need it in the format they require.
3. That the platform can connect to existing initiatives at the government agencies and build on existing systems for the collection of data enabling the platform to reduce the workload of the agencies.
4. The platform makes it easier to develop strategies for an increased share of virtual meetings.
5. Creating a better understanding of all the elements of an agency by allowing customised information to be generated can clarify the consequences of individual choices.

Within the framework of the feasibility study, a questionnaire was conducted, aimed at 334 agencies. The questionnaire was answered by 207 of the agencies.

The questionnaire revealed substantial support for the mobility portal. Of the respondents, 85 per cent considered that “there is a reason to build a portal that allows the acquisition of˚information on how different travel classes impact on the ability to achieve your own and state goals in areas such as the climate.” As a complement to the questionnaire, a number of meetings have been held. A reference group with representatives from various agencies participated in the feasibility study and contributed with valuable information and useful feedback.

The feasibility study also shows that the portal can be constructed in a modular format. This makes it possible to provide different functions depending on the needs there will be going forward. Suppliers who have constructed portals that contain the kind of functionality that the mobility portal should include are available in the market, and this makes it possible to ask different groups of companies to develop proposals for a mobility portal.

Based on the responses to the questionnaire, reference groups, expert statements and information from ongoing work at other agencies, the feasibility study's recommendation is that a portal for optimised meetings and mobility should be created. The feasibility study recommends that NPS should procure a portal for meetings and mobility.

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1 INTRODUCTION

The National Procurement Services at Kammarkollegiet (NPS) has conducted a feasibility study to investigate the preconditions for a system for supporting changes in government agencies in terms of meetings and mobility by establishing a portal for optimised meetings and mobility. The purpose of this portal is to make it easier to move from traditional ways of meeting and communicating to new more resource efficient and less environmentally impacting solutions. The portal is designed to provide information on how environmental impacts, prices and productivity differ depending on the choices the user makes. This is to give agencies supporting data on which to base both short-term and long-term strategic decisions in order to achieve the various environmental objectives.

1.1 Context of feasibility study

The context to the feasibility study is the same as for the procurement investigation's work on transformative solutions. The chapter below is therefore based on the content that described the context for the procurement investigation.[3]

The world, including Sweden, faces huge challenges where fossil fuels in principle need to be phased out by 2040. The exploitation of natural resources to provide solutions to the needs of society must be dramatically reduced to make it possible for nine billion people to live a good life in 2050.

The need for a radically more resource efficient economy is probably the greatest social transformation that humanity has to face since we started farming the land. Moreover, it is a change that must be implemented over just a few decades, requiring major changes today.

Despite the need for change, we continue to consume natural resources way too excessively and emit large amounts of greenhouse gases. Through a programme of investment in existing infrastructure we are locking ourselves into using resource-intensive and innovation-inhibiting production and consumption systems. We have a situation where the distance between what international conferences come up with is growing compared to what overall policy objectives say, what research findings indicate and what is actually genuinely happening.

[3]"Transformative solutions and public procurement" was included as Appendix 8 "Good business – a strategy for sustainable procurement" SOU 2013:12. http://www.regeringen.se/sb/d/16941/a/210399

The gap between what needs to be done and what is actually being done is resulting in a situation where it is sometimes difficult to determine if something important is actually happening, or if everything is merely empty talk. Climate change is probably one of the areas where the gap is greatest, something that forced the British magazine "The Economist" to call the climate meeting in Doha 2012 "Theatre of the Absurd".[4] Through an unwavering focus on the emissions that occur within national borders, a situation has been created where the national climate strategies of many countries make no difference to sustainable climate solutions aimed at solving the world's climate problems, and short-term "solutions" that all too often either shift the problem to other countries or only result in marginal improvements that lock us ever more firmly into the old structures.

In Sweden, the Swedish Environmental Protection Agency has estimated that Sweden's actual emissions, i.e. the emissions through our consumption that we contribute to globally, has risen by 15 per cent between 1993 and 2010. Emissions in Sweden have decreased by 11 million tonnes, but emissions abroad due to Swedish consumption has risen by 26 million tonnes over the same period.[5]

The longer we wait to implement the changes necessary to reduce greenhouse gas emissions, the more dramatic the changes need to be once they have been implemented, because we then have less time to make them. Delaying changes can therefore be seen as a risky strategy, as it might turn out to be very expensive.[6] The question is not about the necessity of transformative solutions, but when, where and how they should be implemented.

In this situation, it is worth noting that there is a great interest in transformative solutions and the ability to support them through public procurement:[7]

- There are massive opportunities to use public procurement to drive transformative solutions in Sweden and in cooperation with other countries.
- Various companies and clusters of companies are already working with various transformative initiatives and are ready to develop them, but lack clear positive signals, especially from government agencies.

One of the key areas where major changes are needed and where new, innovative, resource efficient solutions are in place is meetings and mobility. New

[4] http://www.economist.com/news/21567342-after-three-failures-years-un-climate-summit-has-only-modest-aims-theatre-absurd
[5] http://www.naturvardsverket.se/Sa-mar-miljon/Statistik-A-O/Vaxthusgaser--utslapp-av-svensk-konsumtion/
[6] http://www.iea.org/newsroomandevents/pressreleases/2013/june/name,38773,en.html
[7] See Appendix 8 "Good business – a strategy for sustainable procurement" SOU 2013:12. http://www.regeringen.se/sb/d/16941/a/210399

ways of working together and meeting have developed rapidly over recent years. These changes are happening quickly. It had previously been obvious that staff used to fly to meet people in person, and paper documents were distributed at the meetings. But nowadays meetings are arranged virtually and distributing documents in paper format has given way to sharing digital material with each other.

It is important to note that on many occasions it is not simply about a switch from one solution to another. The solutions are normally part of a much bigger change, a change that includes everything from the processes for how decisions should be made, to documents that are "crowd developed", which means they have been jointly developed in ways not previously possible, to international brainstorms, i.e. quick meetings with the help of solutions, such as the IP telephony program Skype, which allow you to collaborate in real time with groups from all over the world.

The portal presented in this feasibility study is a proposal for tools to enable the systematic selection of forms of mobility and meetings that can contribute to a more effective and resource-efficient organisation.

1.2 Mobility and transformative solutions

Two key concepts in this document, "mobility" and "transformative solutions", require a more detailed presentation.

The term "mobility" is used as a generic term, including within the EU, to cover both traditional physical travel and the new opportunities that are now available for virtual meetings/work/decentralised production. See e.g. EARPA[8] which writes:

> "New forms of mobility replace the personal car: Connectivity and texting – "virtual mobility", Telecommuting and video conferencing."

The concept of mobility focuses on the service, or function that is delivered – not on the technical solution behind it. Two areas where mobility plays a crucial role are "external meetings" and "internal work". The two areas are related and the same solutions can often be applied to both.[9]

1. Mobility related to external meetings includes both physical journeys such as plane, road and rail travel, and virtual solutions such as video and teleconferencing. These meetings are usually well defined and have an agenda. Many times people come together who have never met before.

[8] http://www.earpa.eu/ENGINE/FILES/EARPA/WEBSITE/UPLOAD/FILE/2013/earpa_key_note_conference_2_october_2013___thilo_bein.pdf
[9] See for example http://www.epomm.eu/newsletter/electronic/1007_EPOMM_enews.html

2. Mobility related to internal work includes the need to physically commute by car, bus and train, from home to a specific workplace. The term also covers work using laptops, smart phones, tablets and other assistive technologies with software that enables business operations without being physically present at a specific workplace. Meetings are an essential part of the internal work, many internal meetings are spontaneous and have no agenda and have participants who in most cases already know each other.

By using the term mobility, rather than transport, this makes a definition possible that includes more than just the physical transport. This expanded perspective can help to increase competition and innovation, as well as the ability to achieve major emission reductions as new solutions can be delivered in comparison to previously. As a basis for the broader definition there is the modern technology that makes it possible to meet virtually instead of physically.

The term "transformative solutions" is defined as solutions that contribute to at least 80 per cent (or Factor 5, which is another way of describing an improvement of 80 per cent) less resource consumption and CO_2 emissions in relation to how the operation/service is conventionally provided.[10] Transformative solutions are therefore solutions that often provide a service/function in a completely different way than has conventionally been the norm.
A common feature of these solutions is that they often involve an overriding need for new thinking and initiatives. They also require an analysis of the needs that the purchase must meet that are not restricted to improvements to current technologies and systems.[11]

1.3 The origin of the feasibility study

NPS began work on transformative solutions for mobility as part of the procurement investigation, see "Good business – a strategy for sustainable public procurement" (SOU 2013:12).[12] The investigation contacted NPS and the required support in order to implement pilots to see how it was possible for a framework agreement to support a new generation of solutions that contribute to reducing environmental impacts, greater innovation and providing small businesses with an opportunity to deliver transformative solutions.

The project began with a needs assessment conducted jointly to identify suitable areas for a framework agreement. It was important to identify contemporary areas in terms of the procurement, areas that could also be relatively easy to

[10] For more information on transformative solutions, see the UN's project Low-Carbon Leaders for Transformative Solutions http://transformative-solutions.net
[11] For more information about transformative solutions, see the UN project "Low-carbon leaders for transformative solutions": http://transformative-solutions.net
[12] http://www.regeringen.se/sb/d/16941/a/210399

illustrate when it comes to how a transformative solution might appear. Based on these criteria, two areas were tentatively selected; profiling and gift items and mobility.[13]

Profiling and gift items were selected as the development of the area has progressed quickly and both suppliers and agencies had no interest in dematerialised solutions, i.e. eBooks, customised mobile apps, music downloads, etc. There was, in other words, both a supply and a demand while the current structure primarily focused on traditional physical gifts and profiling items. The area was thereby suitable for examining the way in which a feasibility study and a framework agreement could be designed to enable and support more transformative solutions.

Mobility was selected because the area has great potential both economically and ecologically, in addition to which there are great opportunities of disseminating possible solutions through exports.[14]

Based on interviews, workshops and projects that were implemented during the process of the procurement investigation in order to practically test the feasibility of supporting transformative solutions, three general conclusions were drawn:[15]

1. There are massive opportunities to use public procurement to drive transformative solutions in Sweden and in cooperation with other countries.

2. Various companies and clusters of companies are already working with various transformative initiatives and are ready to develop them, but lack clear positive signals.

3. Many procurers/buyers are interested in actively pursuing the development of transformative solutions.

Based on this supporting data, the feasibility study on the Portal for optimised meetings and mobility has been implemented. The primary focus of the feasibility study is current meetings that government agencies have; internal meetings, meetings between agencies and meetings with external operators. The ability to implement the broader changes needed, for example, to achieve sustainability goals, means that questions concerning organisation, digitisation, tele-work and relevant technology is also covered.

[13] SOU 2013:12, p. 452: http://www.regeringen.se/content/1/c6/21/03/99/c477c8f2.pdf
[14] SOU 2013:12, p. 453: http://www.regeringen.se/content/1/c6/21/03/99/c477c8f2.pdf
[15] http://www.regeringen.se/content/1/c6/21/03/99/56482355.pdf

1.4 Aims and goals of the feasibility study

The purpose of the feasibility study is to collect information on the needs identified by government agencies along with the developments in the supplier market in the area.

The feasibility study also highlights the preconditions for procurement and states the direction and extent of input data to allow NPS to subsequently conduct the procurement of a computer system in the form of a portal for meetings and mobility.

The goal is to develop supporting data that provides assistance and recommendations for a future decision on whether any procurement is to be conducted.
All recommendations made in the context of this feasibility study could be re-examined, modified and adapted into a possible future procurement, as this would be a separate project in which new information can be added and conditions may change over time.

The feasibility study focuses on:

- Conducting a situational analysis, including a questionnaire to explore the interest in and possible synergies with related work.
- Identifying if a life-cycle analysis can be conducted that is suitable for a portal where various meeting/mobility needs can be compared and, if this is the case, describe this life cycle assessment.
- Develop specific proposals on how a mobility portal can be created that will allow government agencies to compare different meeting options in a customised way in a manner that supports innovation, effective competition and sustainable development, according to governmental and the EU's existing goals.

1.5 Scope

The purpose of the feasibility study has not been to produce a specific requirement specification for possible future procurement, but to provide an overall description of a portal that can be developed in discussions with a supplier. The feasibility study describes the current situation and experiences related to both the need for a portal and how a portal could be structured. The focus is on the situation in which Swedish agencies currently find themselves, with current plans and development processes that can be assumed provided that the climate-related objectives adopted by Sweden and the EU are achieved.

A portal will enable transformative shifts in government agencies, and in this case the shift means that government agencies are given the opportunity to choose from different ways of satisfying their needs for meetings and mobility.

This not only means the ability to choose a more environmentally friendly version of the current way of delivering a service, such as through environmentally-friendly aviation, or to change a way of physically moving to another one. The portal is also to include virtual meetings and provide agencies with the option of selecting virtual solutions in the planning of meetings.

The portal is planned to be based on user needs and support the government and the EU's sustainability goals that are related to meetings and mobility, such as a fossil-free fleet of vehicles and a greater number of travel-free meetings. The portal's calculations can be used to great benefit by basing them on life cycle assessments which in addition to direct emissions also include the impacts from the underlying infrastructure. This is to more accurately compare the impact of different ways of providing mobility and meetings.

The project's focus is on what can be implemented immediately and where there is an existing and significant interest among government agencies.

1.6 Associated framework agreements

NPS has a number of framework agreements that relate to meetings and mobility. When it comes to physical journeys, there are framework agreements in place for things like air travel, rail travel, hotels, taxis and company cars. When it concerns virtual meetings, there are framework agreements for video conferencing, teleconferencing, computer/tablet devices and software for meetings.

Through an overview of the use of framework agreements in these areas, NPS has a unique opportunity to coordinate and develop framework agreements if this is preferable.

Current framework agreements cover large parts of the needs required from a mobility perspective in order to be successful when it comes to providing transformative mobility solutions. Both short-term and long-term mobility strategies can be supported by including a range of physical mobility solutions such as plane, train and road, supporting functions such as hotels, as well as virtual mobility solutions such as video conferencing and teleconferencing.

1.7 Method for feasibility study

Work on the feasibility study has been conducted in accordance with the National Procurement Services's project management methodology. This comprises:

- Initiation of the project with a definition of the project's main objectives in the form of a project directive,

- detailed planning, that is, a project description and planning of project activities,
- implementation, which has included information gathering, analysis and preparation of the feasibility study report,
- delivery of the feasibility study with the previous quality assurance.

The feasibility study is based on a situational analysis including meetings and mobility, strategies at a EU level, and existing work in Sweden in related fields. In addition to a review of the relevant documents and research, discussions have been held with experts in the relevant fields. The feasibility study also included a questionnaire featuring both quantitative and qualitative questions posed to all government agencies. As a complement to the questionnaire, a number of interviews were conducted with industry experts.

A reference group meeting with participants from various 'calling off' agencies participated in the feasibility study and contributed with valuable information and useful feedback.

1.8 Related work

"Europe 2020"[16], is the 10-year plan that the EU Commission presented in March 2012. The plan contains goals for smart, sustainable and inclusive growth. Two essential and mutually interdependent elements of this 10-year plan are the need for innovation and the need for environmentally sustainable development. Public procurement is a key instrument for achieving both goals.

In terms of innovation, Sweden, as part of its national innovation strategy, has highlighted public activities and procurement processes as one of three priority areas with the responsibility to promote effective innovation:

> Public operations that are innovative and that drive the demand for innovation [...] This can sometimes be achieved by setting policy objectives, influencing the formulation of standards, making government data available, designing procurement processes to ensure˚ they are open to new solutions, implementing innovative procurement or design processes for community planning that promote new solutions.[17]

A key driver of innovation, and an end in itself, should be to meet the set environmental targets. Sweden currently has a range of objectives that relate to

[16] http://ec.europa.eu/europe2020/index_en.htm
[17] http://www.regeringen.se/content/1/c6/20/11/84/529b3cb3.pdf

the need for reduced environmental impacts and, more specifically, reduced CO_2 emissions.

These objectives include that:

1. Half of Sweden's energy consumption will be derived from renewable sources by 2020.
2. By 2030, Sweden will have a vehicle fleet that is independent of fossil energy.
3. Sweden's net greenhouse gas emissions will be zero by the middle of this century.
4. 20 per cent more efficient energy use by 2020.
5. 10 per cent renewable energy in the transport sector [year] 2020.[18]

A major focus is on transport, as this constitutes a substantial part of Sweden's emissions. Transport accounted for 33 per cent of greenhouse gas emissions in Sweden in 2011. When you include international shipping and air carriage, transport accounts for 41 per cent of Swedish emissions.[19] Government agencies has reported total carbon emissions from travel and transport at around 400,000 tonnes per year. This is equivalent to about 2 per cent of Sweden's total carbon emissions from transport and 0.6 per cent of Sweden's total emissions.[20] This figure is significant in itself, but underestimates the role of agencies as their actions towards many of the market operators is seen as indicative of what is important and the direction in which new solutions should be developed.

The goals for reducing emissions from transport have recently progressed from merely including goals for reductions in existing systems to include various recommendations for how agencies should contribute to a transition to a smarter mobility system. It is not possible to reduce emissions enough by only making current transport systems better; a shift that involves less physical transport is necessary. This realisation has, among other things, resulted in the following recommendations that are contained in the Government's “IT for Greener Management – Agenda for IT for the Environment 2010-2015”:

The agencies should:

- prepare a meeting and travel policy
- increase the availability of travel-free meeting options
- facilitate the use of alternative travel-free meetings
- monitor the use of travel-free meeting options[21]

[18] http://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Uppdelat-efter-omrade/Klimat/Klimatpolitik/
[19] http://www.trafikverket.se/Privat/Miljo-och-halsa/Klimat/Transportsektorns-utslapp/
[20] http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6565-2.pdf
[21] http://bit.ly/KAM-SIC2

Work is currently underway at many government agencies to achieve these goals that are aimed at reducing the environmental impacts of meetings and mobility.

That the agencies identify new ways to meet, and work on not only stating the positive aspects by the agencies improving their efficiency, becoming more attractive employers and reducing their environmental impacts.[22] By enabling virtual meetings, other organisations, businesses and citizens will find it easier to get in touch with the agencies. Opportunities for agencies to have virtual meetings is made easier for other organisations that are looking to reduce their climate impacts and achieve their goals. Two examples of organisations that have recently invested their resources to improve travel-free meetings are the County Administrative Board in Dalarna[23], and Region Västra Götaland[24].

Two initiatives that this project partly has synergies with and complements is "Travel-free meetings at government agencies" (REMM), run by the Swedish Transport Administration[25] and "Environmental Management in the State" run by the Environmental Protection Agency[26].

1.8.1 REMM

In 2011, the Swedish Transport Administration was commissioned by the government, in consultation with the Environmental Protection Agency, the Swedish Energy Agency and the E-delegation, to be promotive in growing the proportion of travel-free meetings. The "Travel-free meetings at agencies – REMM" project was conducted over the period 2011-2013. The project helped to coordinate the work in a number of agencies selected by the government.

The agencies in REMM are encouraged by the government to increase the proportion of travel-free meetings within and between agencies. The REMM group therefore took the initiative to establish a technology network of government representatives with the aim of:

- obtaining an overall picture of the problems involved with communicating travel free between agencies.
- generating an understanding of the technical, practical and safety conditions that apply.
- creating a forum where knowledge, experience and ideas are exchanged in order to develop proposals for solutions.

[22] http://www.ericsson.com/res/docs/2013/next-generation-working-life.pdf
[23] http://www.lansstyrelsen.se/dalarna/Sv/nyheter/2013/Pages/en-miljon-kronor-.aspx
[24] http://www.vgregion.se/sv/Ovriga-sidor/Smart-Energi1/Overenskommelser/Resfria-moten/
[25] http://bit.ly/KAM-SIC3
[26] http://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledningar-A-O/Miljoledning-stod-for-statliga-myndigheter/

- developing realistic proposals for solutions that enable and facilitate the agencies to be able to invite in and to attend travel-free meetings with other agencies (as well as with other external participants).
- generating proposals for possible operators that could be responsible for managing this.[27]

The network worked, among other things, through the following activities:

- Initial meetings on creating and uniting around an agenda in November 2012.
- An introductory workshop in December 2012 in which "technology representatives" from the various REMM agencies participated.
- The work has been divided into five work groups, based on the identified problem areas and associated technical sub-areas.
- Managers are appointed for the work groups and sub-areas/issues.
- A number of initial (on-line) meetings with the groups where problem focusing and work procedures are determined.
- Virtual "hearings" with various representatives from software and hardware manufacturers/suppliers and security managers.
- Discussions are held in the common workspace "Base camp" divided into the various issues.
- Tests of the various software and hardware between the network members.
- Questionnaire – inventory of RM technology at Swedish agencies.[28]

Five critical areas of concern were identified, and the work was divided into various work groups who have investigated each area:

1. Directory service
2a. Connectivity – Video conferencing
2b. Connectivity – Lync federation
2c. Connectivity – Common standard
3. Support and follow-up[29]

Through the work that has been described, REMM has contributed to a greater understanding of the agencies' opportunities of arranging travel-free meetings and establishing platforms for the exchange of experiences and knowledge regarding travel-free meetings. The project gave particularly important contributions in terms of understanding the technical and organisational barriers

[27] REMM's Technical network – report 17/04/2013
[28] REMM's Technical network – report 17/04/2013
[29] REMM's Technical network – report 17/04/2013

to travel-free meetings.[30] By allowing various experts and users to meet, the project could systematically identify a range of areas where increased cooperation is vital, for example, compatible systems at all agencies and the ability to share information about successful projects.

Examples of identified technical barriers include: settings for firewalls, locked computers and other technical security procedures. Additional barriers include the lack of common bridge functions, incompatible equipment and software, and the lack of a common directory function for travel-free meetings. In summary, the technical barriers are inhibiting efficient and environmentally appropriate cooperation between government agencies.[31]

Furthermore, REMM has helped to develop indicators to be able to evaluate the effects of travel-free meetings. The International Institute for Industrial Environmental Economics (IIIEE) has been heading the research project "Travel-free meetings – what are the effects and how do you evaluate them?" since 2011 with a view to developing indicators for monitoring travel-free meetings, as well as a framework for the evaluation of:[32] effects on travel. The project also aims to determine the time, energy, economic, environmental and social consequences that the increased use of travel-free meetings might bring.

REMM and the Portal for optimised meetings and mobility

Work with REMM is interesting from two aspects in relation to the portal for meetings and mobility. First, through the work contributing data and analysis that allows the portal to be used. And as many agencies already have tools to think and act in a transformative way and, in this process, have identified specific opportunities on which the portal can build.

The portal can be assumed to be easier to implement because of the work carried out by REMM, including the construction of two areas that REMM identified as priorities:

1. The portal can contribute to information about the influence of different ways of meeting as early as the planning stages of the meetings.
2. The portal can contribute to better information sharing between agencies when it comes to efficient ways of arranging meetings.

Although travel-free external meetings, REMM's focus, is an important part of the portal's function, the portal has a wider field of application than merely supporting travel-free meetings within and between agencies. In addition to

[30] http://www.trafikverket.se/Foretag/Trafikera-och-transportera/Planera-persontransporter/Hallbart-resande/Tjanste--och-pendlingsresor/Resfria-moten/REMM--resfria-moten-i-myndigheter/
[31] https://v-vevungen.ita.mdh.se/polopoly_fs/1.38635!/Menu/general/column-content/attachment/Inbj_REMM-webbinarium_130422.pdf
[32] http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=3051109&fileOId=3051124

including other external meetings, the portal can be used to support other goals, such as a fossil-free vehicle fleet by 2030, by optimising the use of things like physical transport where this is necessary.

The difference between REMM and the portal is that REMM is a temporary project that adopts a holistic approach in order to accumulate the necessary skills in a specific area (travel-free meetings), while the portal will serve as a tool that covers a larger area (travel and mobility) with a view to be around as long as there is a need and demand.

1.8.2 Environmental Management in the State

Environmental management systems are an aid to assign responsibility, prioritise, communicate, monitor and control initiatives for a better environment. Government agencies must, by regulation, introduce and develop environmental management systems. Each year the agency must document, monitor, report and improve its environmental management. The Environmental Protection Agency supports the agencies in this work.[33]

Some of the environmental work that is reported in the annual reports "Environmental Management in the State" relate to transport and mobility. The Environmental Protection Agency provides the document "Reporting step by step".[34] This includes the following information:

> **Meeting and travel policy**
> A new, or more clearly communicated, meeting or travel policy may be a step to gaining better control over business travel and serve as a way of reducing the costs and environmental impacts from travel. By having a meeting/travel policy, travel can be monitored so that it is made more environmentally friendly or is less prevalent.
>
> **Virtual meetings – tele conferencing and video conferencing**
> Virtual meetings are a practical alternative to physical travel and often lead to a drop in physical travel, which is good for efficiency, economy and the environment. Investigate the opportunities for the agency to develop these types of meetings.[35]

Environmental Management in the State and the Portal for optimised meetings and mobility

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[33] http://www.naturvardsverket.se/Stod-i-miljoarbetet/Vagledningar/Miljoledning/
[34] http://www.naturvardsverket.se/upload/stod-i-miljoarbetet/vagledning/miljoledning/Redovisning-steg-f-steg.pdf
[35] Pages 15-16 http://www.naturvardsverket.se/upload/stod-i-miljoarbetet/vagledning/miljoledning/Redovisning-steg-f-steg.pdf

The reports that the Environmental Protection Agency compile are interesting from two aspects in relation to the portal. Firstly, through Environmental Management in the State, provide an opportunity to assess the trends in various areas relevant to transport and mobility. Secondly, through the requirements in place for the reporting of environmental impacts and various environmental objectives, there is an opportunity for the portal to build on the structure that Environmental Management in the State has in order to help agencies to report and even see how different choices affect the objectives they have.

If you study the trends for emissions a little closer it is notable that almost all official transport emissions are continuing to rise, or are only marginally dropping over recent years.[36] Through the Environmental Management in the State, the Environmental Protection Agency has compiled data that includes the area of mobility/meetings, which indicates that the introduction of video conferencing has reduced travel at agencies, but is still not enough to contribute to an overall reduction in emissions.[37]

Tabell 2. Utsläpp av koldioxid från resor och transporter i ton

Trafikslag	2009	2010	2011	2012
Flyg under 50 mil	13 978	12 909	15 393	14 750
Flyg över 50 mil	82 009	87 740	86 608	89 290
Bil	49 793	55 345	51 146	53 533
Tåg	22	2	1	1
Buss	548	637	210	248
Maskiner	94 938	91 700	246 012	248 075
Totalt	**241 288**	**248 423**	**399 370**	**405 897**

Figure 1: Emissions from travel and transport from government agencies in tonnes. Machinery and other vehicles account ("maskiner") for the lion's share of the reported carbon emissions. This could be different kinds of work machinery but also ferries, patrol boats, snowmobiles, helicopters, etc. A few government agencies are responsible for the bulk of the emissions. Source: Environmental Management in the State in 2012[38]

In terms of the collection of data, it is worth noting that the period ahead will require additional reporting of how virtual meetings are used.

Environmental Management in the State is a valuable process that allows for the analysis of sustainability trends and whose structure/reporting requirements can be reflected in the structure of the portal. Portal users should, for example, be

[36] Page 12 http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6565-2.pdf
[37] Page 24 http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6515-7.pdf
[38] Page 12 http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6565-2.pdf

able to monitor their environmental objectives through the portal, and the portal could help government agencies to automatically report the meeting-related aspects of their environmental management.

1.9 Needs assessment

1.9.1 Questionnaire

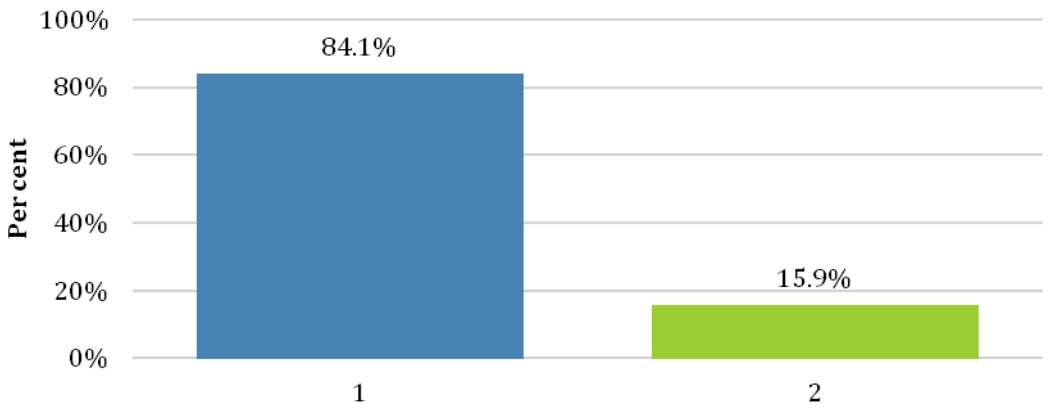
The project has conducted a questionnaire aimed at government agencies. The questionnaire was sent to 359 unique respondents and was answered by 216 people (response rate 61%).

The purpose of the questionnaire was to study the need for a portal and the functions that were to be prioritised. Furthermore, the aim was to gain an understanding of the current situation and existing climate-related objectives at the government agencies.

1.9.2 Results from the questionnaire

Below are the results from the key questions in the questionnaire.

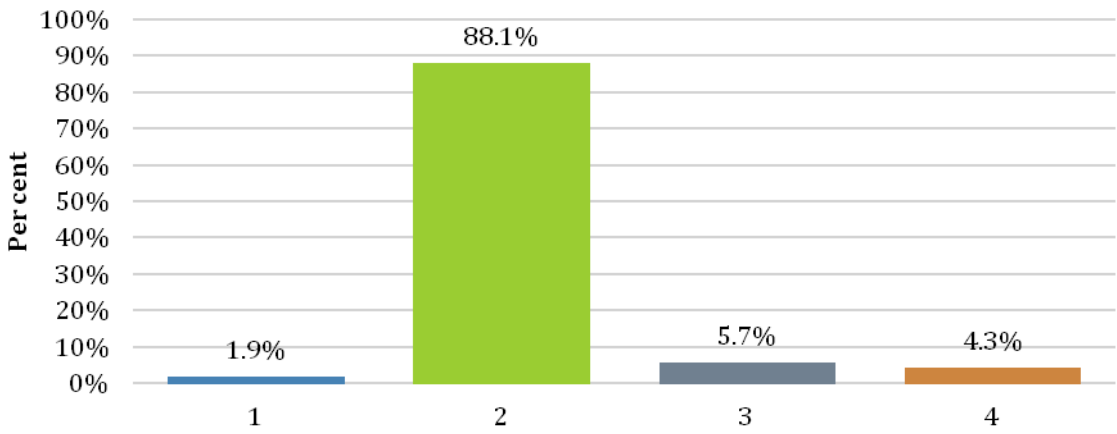
Do you think that there is a reason for building a portal that allows an agency the opportunity to acquire information on the impacts of how different travel classes impact on the ability to achieve their own and state goals in areas such as climate?



	Name
1	Yes, I think it can contribute to better meeting patterns (direct and long term)
2	No

Over 80% of respondents believe that there is reason to create a portal. The most common comments on the issue are related to the extreme importance of clarity and transparency, which they believe the portal can deliver. Furthermore, many responded that the portal has the opportunity to be a vital aid in long-term strategic planning, where the procurement and use of framework agreements are an important element, by illustrating the consequences of different choices.

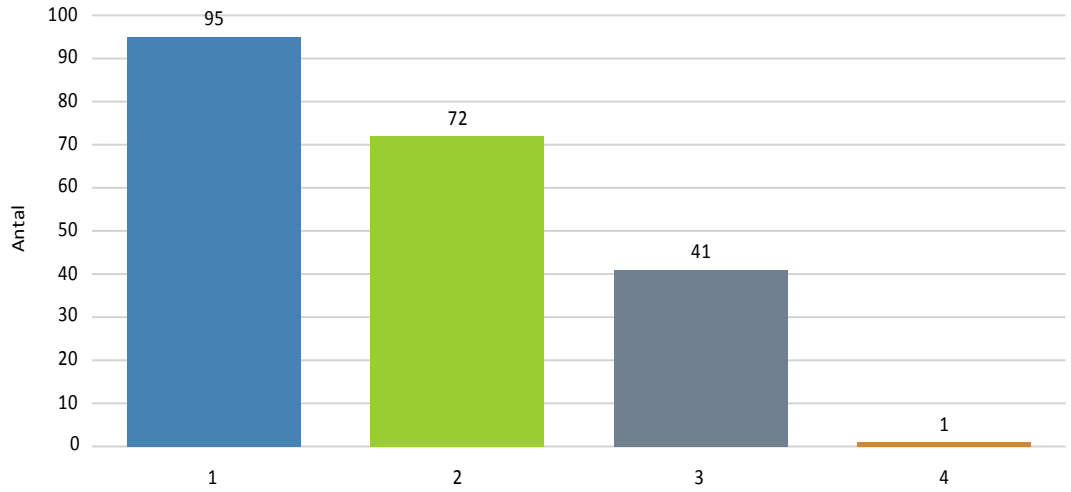
Do you have access to tools that can compare different ways of providing meetings?



	Name
1	Yes
2	No
3	Don't know
4	Comment here such as information about the tools currently used:

Only 1.9% responded by saying that they have access to tools that enable them to compare different ways of providing meetings. The great support for the Portal for optimised meetings and mobility can be partly explained by this shortcoming.

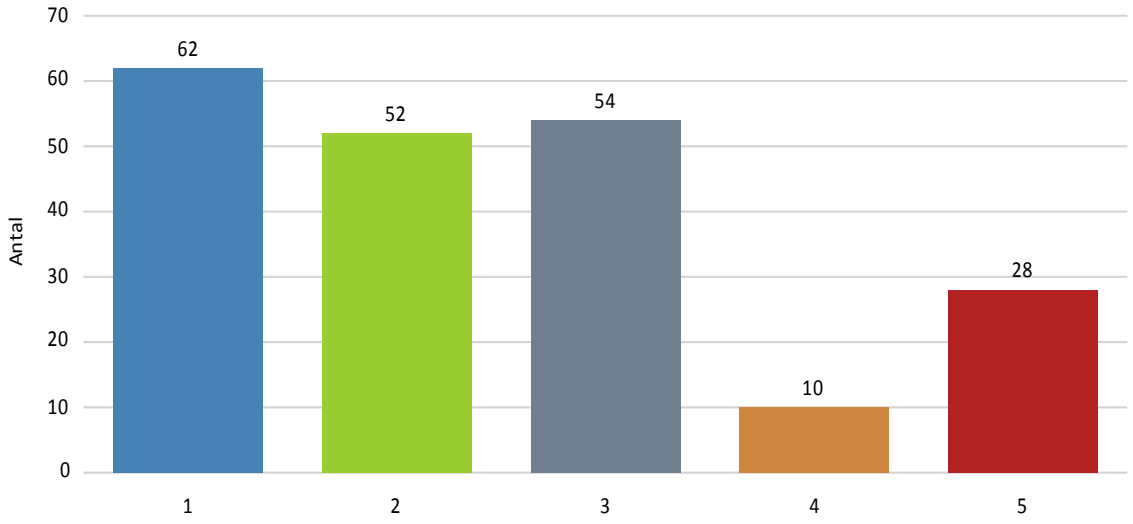
Do you currently have a strategy for working that includes both physical and virtual mobility (e.g. car sharing, video conferencing, tele-work) and that is supported?



	Name
1	Yes
2	No
3	Under development
4	Don't know

Of the agencies that responded, more than half, 114 or 54%, lacked a strategy in which both physical and virtual mobility are included. A relatively large proportion, 41 or 19%, have a strategy under development. The fact that such a large proportion are working on developing a strategy implies that the development of a portal could occur during dynamic periods when demand for data and new thinking can be assumed to be great.

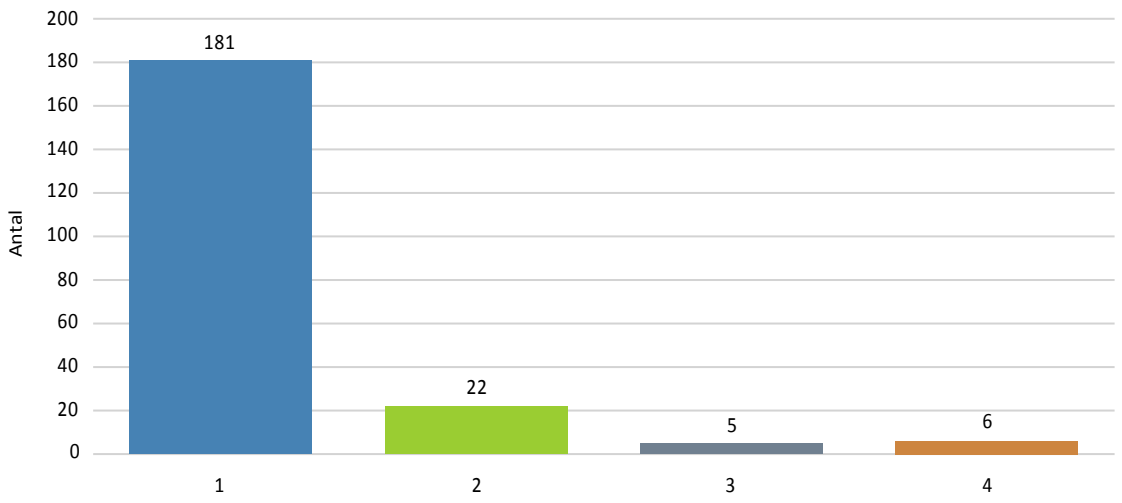
Do you have goals and strategies for meetings and mobility, i.e. physical travel and virtual meetings/work, which will contribute to reducing CO_2emissions?



	Name
1	Yes, both goals and strategies
2	We have a goal with no strategy
3	No, neither goal nor strategy in this area
4	Don't know
5	Comment here, e.g. information about other relevant goals and strategies:

Of the respondents, 62 or 30%, have both goals and strategies. A number of respondents commented that they are looking in particular at ways of reducing the number of journeys by flights by increasing the number of virtual meetings.

Today's trend of change when it comes to emissions from transport/meetings is not expected to be sufficient to reduce CO_2 emissions in order to achieve Swedish climate targets according to the planning schedule and new tools are therefore needed. However, in order to avoid duplication and ensure synergies in relation to a possible portal, we would like to review current needs and the use of the tools. Please select the option that best describes your situation:

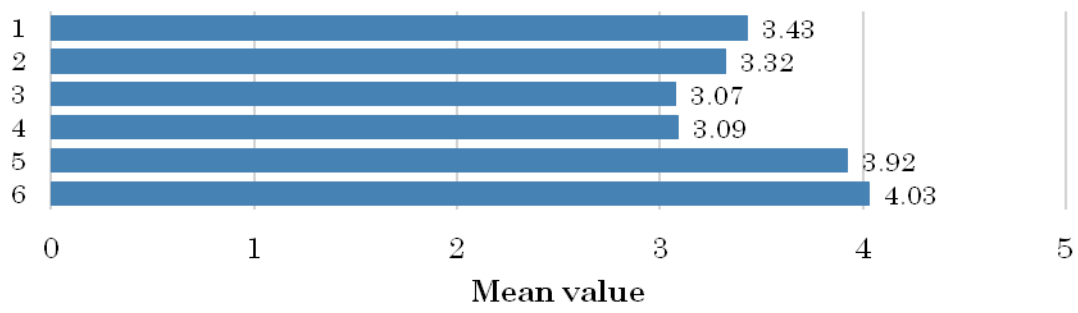


	Name
1	A. We still do not have the necessary tools to help us achieve the set environmental objectives for transport/meetings at the same time as this supports effective meetings.
2	B. We have a work in progress situation concerning tools for more efficient/environmentally friendly transport/meetings that we are happy to discuss with NPS in order to ensure synergies.
3	C. We already have all the tools we need to achieve the efficiency targets and environmental objectives for the scheduled transport/meetings and are happy to share these tools.
4	Enter your e-mail for contact regarding options B and C.

Only 5 or 2%, of government agencies believe that they have the tools they need. Of these four seem to be tools of the more basic model which are primarily suited to small agencies whose staff do not travel much. There was no information on the last tool which is why it is likely that even this is a basic tool for smaller agencies whose staff do not travel a lot. Slightly more, 22 or 11%, have tools

under development. By far the largest proportion, 181 or 87%, still lack the tools for achieving environmental objectives for transport/meetings.

What type of information would you rather have on the platform (rank from 1-6)?



	Name of series
1	General information about the various environment impacts from travel/meetings (car, plane, video conferencing, etc.).
2	Specific figures on, for example, the impacts of CO_2-e from various travel/meetings that you choose yourself (e.g. a meeting in Brussels by plane, train, video conferencing) where you can also choose the type of plan/equipment.
3	Tailored information that makes it possible to compare the environmental impacts of different choices of transport/meetings in relation to your agency's objectives.
4	Tips on how you can achieve the objectives you set for your government agency in relation to the equipment/organisation you have.
5	Information on how you are fairing in relation to the objectives of society when it comes to meetings (e.g. the proportion of travel-free meetings) and CO_2-e emissions from travel.
6	Information on how you are fairing in relation to similar government agencies in terms of the proportion of travel-free meetings and CO_2-e emissions from travel and the measures taken/what equipment they have.

The two most popular functions in a future portal, based on the mean value, were tailored information (3:07 average), and tips on how the government agency can achieve its goals (3.09 average). Each of these parts enjoyed relatively large support, but from different groupings. The government agencies that had

environmental objectives and strategies were more interested in comparing themselves with agencies other than those who lacked goals and strategies.

1.9.3 Reference group meetings with government agencies

The project held a meeting with a reference group of 13 representatives from 13 different agencies. The represented government agencies were the Swedish Energy Agency, the National Museum, Dalarna University, the Environmental Protection Agency, the Swedish Consumer Agency, the Swedish Pensions Agency, the Swedish Prison and Probation Service, Skåne County Police, the Cultural Board, the Swedish Coast Guard, Stockholm University, Lund University and the Swedish Transport Administration.

The purpose of the meeting was primarily to benefit from the reference group's expertise and experience in the relevant fields, and to explore synergies between the work of the various agencies.

The meeting was structured so that NPS could start by presenting the work and the context for the meeting. Following the introduction, Anders Wijkman presented the results from the procurement investigation, the focus of his presentation was “Transformative solutions – a must for a sustainable Sweden”.

After Wijkman's review, Thomas B. Johansson presented the results of the investigation on a fossil-fuel independent vehicle fleet. Johansson emphasised the fact that public procurement has been identified as one of the most important tools for achieving government objectives. The last of the experts Per Schillander, Deputy Project Manager, REMM and Peter Arnfalk, Lund University/Arnfalk Consulting, presented the work conducted within the REMM project.

In the reference group, different perspectives and preferences for the portal were represented. However, the reference group were united about the positive aspects of continuing the work on a portal for optimised meetings and mobility.

Two key needs for flexibility were highlighted in relation to a future portal:

1. The various needs of agencies
   The portal should offer optimal meetings for both large and small agencies, as well as for agencies with meeting managers and those who have no organisation for meetings. An overview of special needs, such as work on confidential information, is important in order for different types of solutions to be provided.

2. Different needs of different users
   According to the participants, there are four different groups that should be able to use the portal:
   a. Overall strategic managers. These include GD and management teams that have overall responsibility for the development of the agency. These should be able to see the consequences of different choices and also be supported in achieving their specific goals. Being able to provide a visual and clear dashboard, should be explored.
   b. Department managers. These have similar needs to the general strategic managers, but must be able to break down goals and information at a departmental level.
   c. Responsible for meetings, purchasing and the environment. These have specific goals and should be able to see how different choices affect their respective goals. If possible, the portal should encourage cooperation between various central functions by showcasing good examples and how different choices affect different goals.
   d. Individual employees. These should be able to receive simple and clear information about how their choices will have different consequences. This information should not only be conveyed at levels for individual users. It should also be possible to see how they are fairing in relation to the set objectives, and if the user is at the forefront, or lagging in relation to the objectives set by the government and the EU.

Several participants pointed out that current practices and culture at government agencies is leading to far too many meetings with questionable benefits. Support and tips to encourage the government agency to work more efficiently with a greater focus on results was requested for a future portal.

Travel to and from work is the largest social cost on most government agencies, an issue that was raised at the meeting. During a discussion among the participants, it was concluded that a credible strategy for time saving, reduced environmental impacts and lower costs related to meetings cannot exclude commuting. At the same time it was noted by several participants that there are many special needs to take into account both social (e.g. people's willingness to travel to a physical office) and labour (e.g. handling of confidential documents).

As regards the portal, some of the participants thought that it should integrate the use of existing practices and existing data collection. This is because it is already difficult for government agencies to collect relevant data, particularly in terms of travel-free meetings and smarter working practices for current operations. If the portal can be linked to a booking system, calendar and existing reporting procedures, this would simplify data collection.

Being able to use the portal to support more long-term decisions and strategies was highlighted by several people as one of the more important needs. One possible function was discussed that the portal could calculate the environmental, economic and timing implications over the coming 5-10 years, depending on the types of technology selected to provide the meetings.

Several participants highlighted the portal's potential to generally contribute to the increased understanding of the consequences of various meetings by communicating and providing results from various optional meeting opportunities in a simple and instructive way.

One area that was highlighted as generally important was the ability of agencies to interface with citizens and other target audiences virtually in the future. The need for virtual meetings was seen as key because physical travel in the future, due to aspects like the need for reducing greenhouse gas emissions going forwards, cannot be seen as the obvious alternative. Another aspect that was raised was credibility as an agency, in a situation where citizens and other target audiences expect travel-free meetings to be an option.

1.9.4 Dialogue with portal experts

A dialogue was established with representatives from organisations such as Global e-Sustainability Initiative (GeSI)[39], Luis Nevis, chairman of GeSI and the World Business Council for Sustainable Development (WBCSD)[40] and Peter Bakker, CEO at WBCSD, in order to better understand the opportunities of having a meeting portal and the opportunities that different operators have to contribute to the portal.

[39] http://gesi.org,
[40] http://www.wbcsd.org/home.aspx

Experts on data and illustration for decisions from various meeting/mobility means were also consulted, including;

- Magnus Swahn, Operations Manager Network for Transport and Environment (NTM)[41];
- Mattias Höjer, Professor and Director, Centre for Sustainable Communications (CESC)
- Mikhail Chester Assistant Professor Civil, Environmental, and Sustainable Engineering Affiliate Faculty in the School of Sustainability. Arizona State University.[42]
- Lorenz M. Hilty, Professor of Informatics and Sustainability at the Department of Informatics of the University of Zurich and head of the Informatics and Sustainability Research (ISR) group.[43]
- Roland Hischier, Senior Expert "Life Cycle Assessment", Empa-Swiss Federal Laboratories for Materials Testing and Research, Technology & Society Laboratory, Environmental Risk Assessment and Management Group [44]

The key elements of these discussions are included in sections 3.1, 3.2 and 3.3, and 4.2.

2 TRENDS

In this section, we start by presenting the global trends for the development of transport and the need to consistently reduce emissions, and that it takes more than just marginal improvements to the current solutions. The Swedish situation is then described based on global trends.

2.1 Trends in transport development globally

Today, the transport sector is responsible for approximately one quarter (23-24 per cent) of global CO_2 emissions which originate from burning fossil fuels, where 17-18 per cent of global CO_2 emissions come from road transport.[45] Based on a business-as-usual scenario, the International Energy Agency (IEA) has estimated that fuel consumption and CO_2 emissions from the global transport sector will rise by over 50 per cent in 2030, and almost double between 2000 and 2050.[46]

[41] http://www.ntmcalc.org/index.html
[42] http://chester.faculty.asu.edu/research.html
[43] http://www.ifi.uzh.ch/isr/people/hilty.html
[44] http://www.empa.ch/plugin/template/empa/*/137014/---/l=2
[45]http://www.unep.org/transport/gfei/autotool/understanding_the_problem/Trends_and_scenarios.asp#emission
[46]http://www.iea.org/media/files/GlobalFuelEconomyInitiativePlanofAction20122015.pdf

In parallel with the surge in emissions from the transport sector, the global international community has agreed to keep the rise in global warming below 1.5-2°C.[47] This target relating to limiting global warming requires that emissions are not only stabilised but significantly reduced by more than 50 per cent by 2050.[48]

The international principles for sustainability, including climate negotiations, are based on what are known as "common but differentiated responsibilities"[49], which means that the countries that are rich and that have contributed most to global emissions should also take the most vigorous measures.[50] This is to ensure that poor countries, that have not produced a lot of emissions and are still lacking elements of a basic infrastructure, are allowed to increase their emissions somewhat.[51]

According to the broader global community, emissions must reduce by more than 50 per cent, given that "Common but Differentiated Responsibilities", means that rich countries like Sweden must reduce its emissions in the order of 80 per cent or more. This is also what countries such as the UK have as a target.[52] Other countries, such as Denmark, have gone further and aim to have zero emissions from their energy and transport sector by 2050.[53]

While the need for substantial reductions in carbon emissions has been established by scientists and world leaders, the World Bank says that, even if all the current actions and commitments to limit climate change are fully implemented, there is still around a 20 per cent probability that a temperature increase of 4°C will have occurred by the end of the twenty-first century.[54]

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[47] http://unfccc.int/key_steps/cancun_agreements/items/6132.php
[48] http://www.pik-potsdam.de/news/press-releases/archive/2009/on-the-way-to-phasing-out-emissions-more-than-50-reductions-needed-by-2050-to-respect-2b0c-climate-target
[49] According to the principle of Common but Differentiated Responsibilities all states have a common responsibility to protect the environment and promote sustainable development. However, different states must bear differentiated responsibilities depending on the diverse social, economic and ecological situation in the country in question.
[50] http://unfccc.int/kyoto_protocol/items/2830.php
[51] http://www.unep.org/pdf/2012gapreport.pdf
[52] https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050
[53] http://www.ens.dk/en/policy/danish-climate-energy-policy
[54]http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf

Similarly, the IEA has warned that current policies for reducing emissions are inadequate, and that these strategies actually lock us into an unsustainable energy infrastructure. Without further action, the energy infrastructure and energy-intensive industries that are built after 2017 must be free of CO_2 emissions. This is because the objective of avoiding dangerous climate change (which is defined by the IEA as maximum warming may be up to 2 degrees) must be achievable.[55]

According to the IEA, which is a conservative organisation, a reduction in greenhouse gas emissions of 10 giga-tonnes may be possible by 2050 through a combination of a shift in the way of providing mobility (shift), efficiency and sustainable fuels.[56]

In other words it is possible to achieve the required reductions in greenhouse gas emissions, and do so in a way that is sustainable based on other environmental aspects and also from an economic and social sustainability aspect. However, this requires that we not only focus on improving existing solutions, we must also incorporate new solutions.

At an international level, more and more people are now focusing on the need for transformative solutions, i.e. solutions that deliver the same or similar services but with much less environmental impact. Given the situation,the EU Environment Commissioner Janez Potoènik, for example, has stressed that:

> "[E]co-innovation should go beyond incremental environmental improvements and efficiency gains, and aim at breaking out of locked-in systems and thinking"[57]
>
> .

Similarly, the head of the Organisation for Economic Cooperation and Development (OECD), Mr. Angel Gurría, has expressed:

> "[W]e should see transformative zero-emission technologies as opportunities that will deliver a range of environmental benefits and economic opportunities."[58]

[55] IEA (2011)
[56] http://www.iea.org/publications/freepublications/publication/transport2009.pdf
[57] Eco-Innovation Observatory, 2013: http://ec.europa.eu/environment/ecoap/about-eco-innovation/policies-matters/eu/20121015-potocnik-eco-innovation-requires-systemic-rethink_en.htm
[58] http://www.oecd.org/env/the-climate-challenge-achieving-zero-emissions.htm

> ”We should view the transformative zero-emission technologies as an opportunity that will deliver many different environmental and economic opportunities.”

Moving purchasing from a situation where the current system of physical meetings and travelling is marginally improved, to a situation where new opportunities such as travel-free meetings and flexible work patterns are included is therefore important.

2.2 Trends in transport development in Sweden

It may well be worth considering the change in mobility required from a historical perspective. In the˚1950s, the share of public transport was close to 50 per cent of the total kilometres travelled. Since then, the total travel (excluding flights) in kilometres has increased almost sixfold. The passenger transport work by public transport has more than doubled over the same period. The significance of public transport seen over this long period, decreases measured as a proportion. Of all travel in Sweden by road, rail and sea, public transport only accounts for 18 per cent of all passenger kilometres today.

The substantial reductions required globally have resulted in a series of objectives that future transport/mobility needs must take into account. Sweden currently has the following climate objectives:

1. Half of Sweden's energy consumption will be derived from renewable sources by 2020.
2. By 2030, Sweden will have a vehicle fleet that is independent of fossil energy.
3. Sweden's net greenhouse gas emissions will be zero by the middle of this century.
4. 20 % more efficient energy use by 2020.
5. 10 % renewable energy in the transport sector by 2020. [59]

Objectives number two and five are directly related to the transport sector, but all five are related to how transport/mobility should be provided in the future.

Sweden has long focused on its current climate impact for the transport sector. For a long time, steps have focused on improvements to the current system, such as fuel-efficient cars and a shift from private cars to public transport. However, climate targets on greenhouse gases are not possible to achieve by simply improving the current system. This is partly the reason why the investigation of

[59] http://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Uppdelat-efter-omrade/Klimat/Klimatpolitik/

a car fleet that is independent of fossil energy by 2030 includes travel-free meetings, e-commerce and carpooling.[60]

The Swedish Transport Administration has recognised the need to go beyond technical solutions in the current physical transport system.

> ”[Sweden has] targets for a fossil-free vehicle fleet by 2030 as well as targets whereby Sweden will have zero greenhouse gas emissions by 2050. Technical measures in energy-efficient vehicles and fuels will be insufficient to achieve these goals. A new direction is also needed in the planning and development of society and infrastructure.” [61]

The Swedish Transport Administration has illustrated the challenge in the graph below, where the results of agreed actions are contrasted with the set climate targets.

Objectives: The proportion of travel-free meetings should increase.
Business travel accounts for about 10 per cent of our travelling in Sweden. Physical meetings are important in order to build up positive and well-functioning relationships both internally and externally. However, travel is resource demanding and has negative impacts on the environment. Different travel-free meeting options can offer new and better forms of meetings with higher availability in time and space.

The agencies should:
• prepare a meeting and travel policy,
• increase the availability of travel-free meeting options,
• facilitate the use of alternative travel-free meetings and
• monitor the use of travel-free meetings options.
The above quote is from “IT for a greener administration – Agenda for IT for the Environment 2010-2015”, in particular the basis

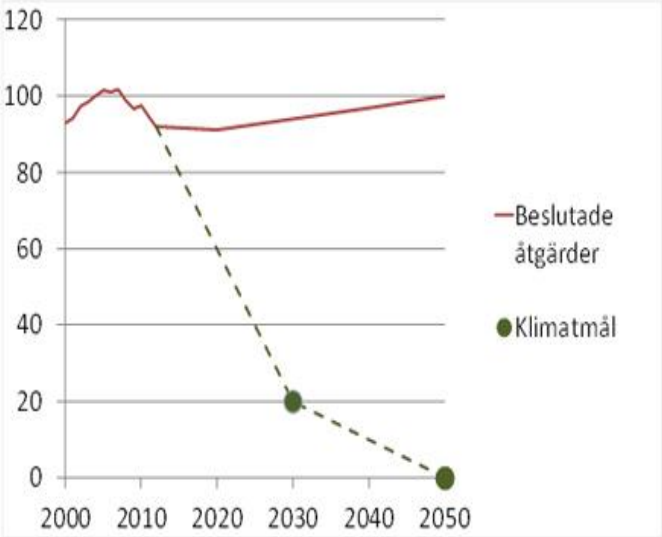

Figure 2: Greenhouse gas emissions from road traffic in Sweden (index 2004 = 100)[62] comparing decided measures (“Beslutade åtgärder”) with Sweden´s climate target for transport (“Klimatmål”)

[60] http://www.sou.gov.se/content/1/c6/21/33/59/5514a299.pdf
[61] http://www.trafikverket.se/Privat/Miljo-och-halsa/Klimat/
[62] http://www.trafikverket.se/Privat/Miljo-och-halsa/Klimat/

The key to achieving a sustainable development for transport/mobility in Sweden is reducing emissions from passenger transport. Overall, domestic freight transport accounts for just over 30 per cent of energy consumption, and passenger transport for about 70 per cent. It should be noted that this data should be treated with some caution as it is based on a calculation where a number of uncertainties are included.[63]

As mentioned, the traditional way of approaching the challenge of passenger transport has been to focus on how much of car travel can be transferred to public transport, for example, according to the following reasoning detailed on the Swedish Transport Administration website:

> "Passenger car and truck traffic must be reduced if climate targets are to be met, and this requires planning a society of attractive and accessible urban areas where availability is made possible on foot, by cycling and by taking public transport at the same time as the car is given a diminished role as a mode of transport. Freight transport needs transferring from road to rail and sea while truck transport logistics need to be more streamlined. This change also contributes to other targets, such as reduced air pollution, less noise and improved health through increased physical activity."[64]

However, the increased use of public transport will not be enough. The Swedish National Road and Transport Research Institute (VTI) writes in the following report "The role of public transport in the government's target for a fossil fuel independent vehicle fleet":

> "Public transport is also environmentally friendly and its ability to shrink distances between people means that there is a continued need for developed and well-functioning public transport systems. However, the report indicates that dramatic changes in society are required in order to double the use of public transport and that not even this will help to eliminate the dependence on fossil fuels by 2030 to any great extent."[65]

A doubling of travel by public transport would, according to VTI, mean an increase from 16.1 billion passenger kilometres to 32.2 billion passenger kilometres. [66] Total travel is expected to increase from 133 to 173 billion

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[63] https://www.energimyndigheten.se/Global/Statistik/Transportsektorns_energianvandning_2012.pdf
[64] http://www.trafikverket.se/Foretag/Planera-och-utreda/Samhallsplanering/Transportsnalt-samhalle/
[65] http://www.vti.se/sv/publikationer/pdf/kollektivtrafikens-roll-for-regeringens-mal-om-fossiloberoende-fordonsflotta.pdf
[66] http://www.vti.se/sv/publikationer/pdf/kollektivtrafikens-roll-for-regeringens-mal-om-fossiloberoende-fordonsflotta.pdf

passenger kilometres between 2010 and 2030. In this scenario, emissions will therefore increase significantly.[67]

Only when the focus moves from current products to the function/service required can transformative solutions be systematically supported. This means that competition may increase as new suppliers are able to offer solutions where only a limited number of specific suppliers have been given the opportunity to deliver traditional solutions.

Achieving these targets requires more than marginal improvements to the current system. A portal that makes it possible to go beyond marginal environmental improvements to current solutions (often called green procurement) could make an important contribution. Green procurement is still an important tool to drive improved technology, but other tools are needed to make it possible to identify and support new ways of providing the required function/service.

3 COSTS AND IMPLICATIONS OF THE VARIOUS SOLUTIONS

3.1 Direct and underlying CO2e/environmental impacts

Life cycle assessments of mobility requires that the design, maintenance, and renovation as well as the operation of infrastructure, and energy production in addition to the energy required to drive a vehicle, are all included as part of the overall picture. Although there have been many life-cycle analyses of passenger transport in many countries, these studies rarely include the infrastructure and its impact.

Neither vehicles nor digital communications equipment such as laptops and video conferencing equipment can operate without an underlying infrastructure. The type of infrastructure needed varies depending on the technology and mode of transport. In the US, it has emerged that the impact from infrastructure is greatest for passenger travel and lowest for flight or travel at high speed.[68;69] This means that there is a disproportionate investment, both financially and environmentally in infrastructure for short-distance travel modes compared to long-distance travel modes. Digital communication also has an underlying infrastructure which, in scientific studies, has proved to be several times more resource or energy-efficient than the physical transport infrastructure when it comes to delivering a meeting, for example.[70]

[67] http://www.vti.se/sv/publikationer/pdf/kollektivtrafikens-roll-for-regeringens-mal-om-fossiloberoende-fordonsflotta.pdf
[68] Mikhail Chester and Arpad Horvath, 2012, High-speed Rail with Emerging Automobiles and Aircraft to Reduce Environmental Impacts in California's Future, *Environmental Research Letters* 7(3), doi:10.1088/1748-9326/7/3/034012
[69] Mikhail Chester and Arpad Horvath, 2009, Environmental Assessment of Passenger Transportation Should Include Infrastructure and Supply Chains, *Environmental Research Letters* 4(2), doi:10.1088/1748-9326/4/2/024008.
[70] Wagener, Wolfgang (2008) "Connected and Sustainable ICT Infrastructure"

The inclusion of the impacts from the underlying infrastructure of a transportation system's life cycle can alter environmental outcomes of different modes of transport considerably, and lead to a more complete analysis of the impact of passenger transport.[71]

The analysis of the infrastructure life cycle assessments pursuant to transport include the initial design (materials and processes), maintenance, renovation (such as reinforcement of the carriageway or the routing of optical fibre) and operation (e.g. roads, energy use at airports or the use of servers and base stations). The framework developed to quantify these effects has largely been used in the US.[72] Figure 3 shows the importance of infrastructure in relation to other life cycle components for physical transport.

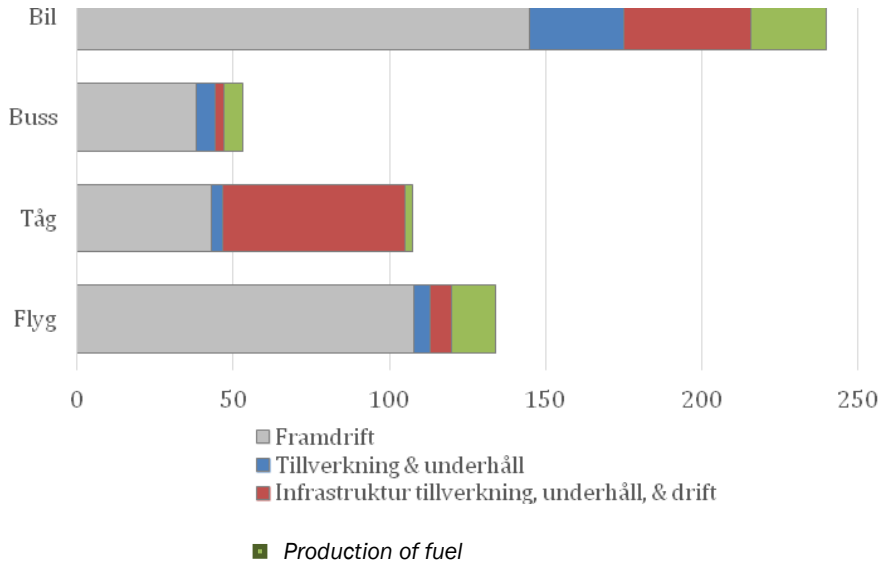

Figure 3: Greenhouse gases in the life cycle assessment (in grammes CO2e per passenger kilometres travelled (PKT)) for average modes of transport in the United States. The average occupancy rate is 1.6 passengers per car, 40 passengers per bus with 40 seats, 40 passengers per train with 80 seats, and 100 passengers per aircraft with 130 seats. The costs of petrol in the US averages USD 8.50 per vehicle kilometre travelled (VKT)/litre (2005). The aircraft is a typical mid-size aircraft, similar to a Boeing 737-600. [73] *Comparing the emissions from propulsion ("Framdrift"), manufacturing and maintenance ("Tillverkning & underhåll"), infrastructure manufacturing, maintenance and operation (Infrastruktu tillverkning, underhåll & drift) for the following modes of transport car ("Bil"), bus ("Buss), train ("Tåg") and aircraft ("Flyg")*

http://www.cisco.com/web/about/ac79/docs/wp/ctd/connected_infra.pdf
[71] Mikhail Chester and Arpad Horvath, 2009, Environmental Assessment of Passenger Transportation Should Include Infrastructure and Supply Chains, *Environmental Research Letters* 4(2), doi:10.1088/1748-9326/4/2/024008.
[72] Mikhail Chester and Arpad Horvath, 2009, Environmental Assessment of Passenger Transportation Should Include Infrastructure and Supply Chains, *Environmental Research Letters* 4(2), doi:10.1088/1748-9326/4/2/024008.
[73] Mikhail Chester and Arpad Horvath, 2009, Environmental Assessment of Passenger Transportation Should Include Infrastructure and Supply Chains, *Environmental Research Letters* 4(2), doi:10.1088/1748-9326/4/2/024008.

A Swedish life cycle assessment for transport would, in addition to infrastructure, include vehicle manufacturing/maintenance, and energy production. Vehicle related life cycle processes will be modelled.[74] Energy production will also be modelled through a distribution assessment of petrol, diesel and ethanol use in Sweden.[75] The assessment of the infrastructure will include material production, construction and maintenance processes, and the different systems' use of energy. Central components modelled for each mode of transport include:

- Passenger cars: construction and renovation of roads.
- Bus: stations.
- Boat: construction of port facilities.
- Train: stations and the construction of railways and maintenance. Signalling and train control system.
- Flights: runway, asphalt and runway construction. Energy use of airport buildings.

For all material, processes, equipment and energy use, an analysis will be prepared and distributed in vehicle kilometres for travel. From this normalised unit, per passenger kilometre or per journey, calculations can be developed, for example, the difference between flying and travelling by car or train. Standard LCA data for conventional modes of transport can be found in the Ecoinvent database.[76]

One potential option is to connect parts of the platform to the Network for Transport and Environment (NTM). NTM is a non-profit organisation that was initiated in 1993 to create a common set of values for how to calculate the environmental performance of the various modes of transport. The association includes a database for various physical transportation and is currently working to include the underlying infrastructure.[77]

Depending on the focus and resources, the impacts can be analysed including by:

1. Energy consumption
2. Greenhouse gases
3. Sulphur oxide
4. Nitric oxide
5. Airborne particles, PM_{10} (particulate matter less than 10 micrometers)
6. Airborne particles, $PM_{2.5}$ (particulate matter less than 2.5 micrometers)
7. Volatile organic compounds

[74] Something that could be created using SimaPro and the Ecoinvent database
[75] Something that could be created using a model from the Argonne National Laboratory called "Regulated Emissions, and Energy Use in Transportation" (GREET)
[76] www.ecoinvent.org
[77] http://www.ntmcalc.org/index.html

8. Carbon monoxide

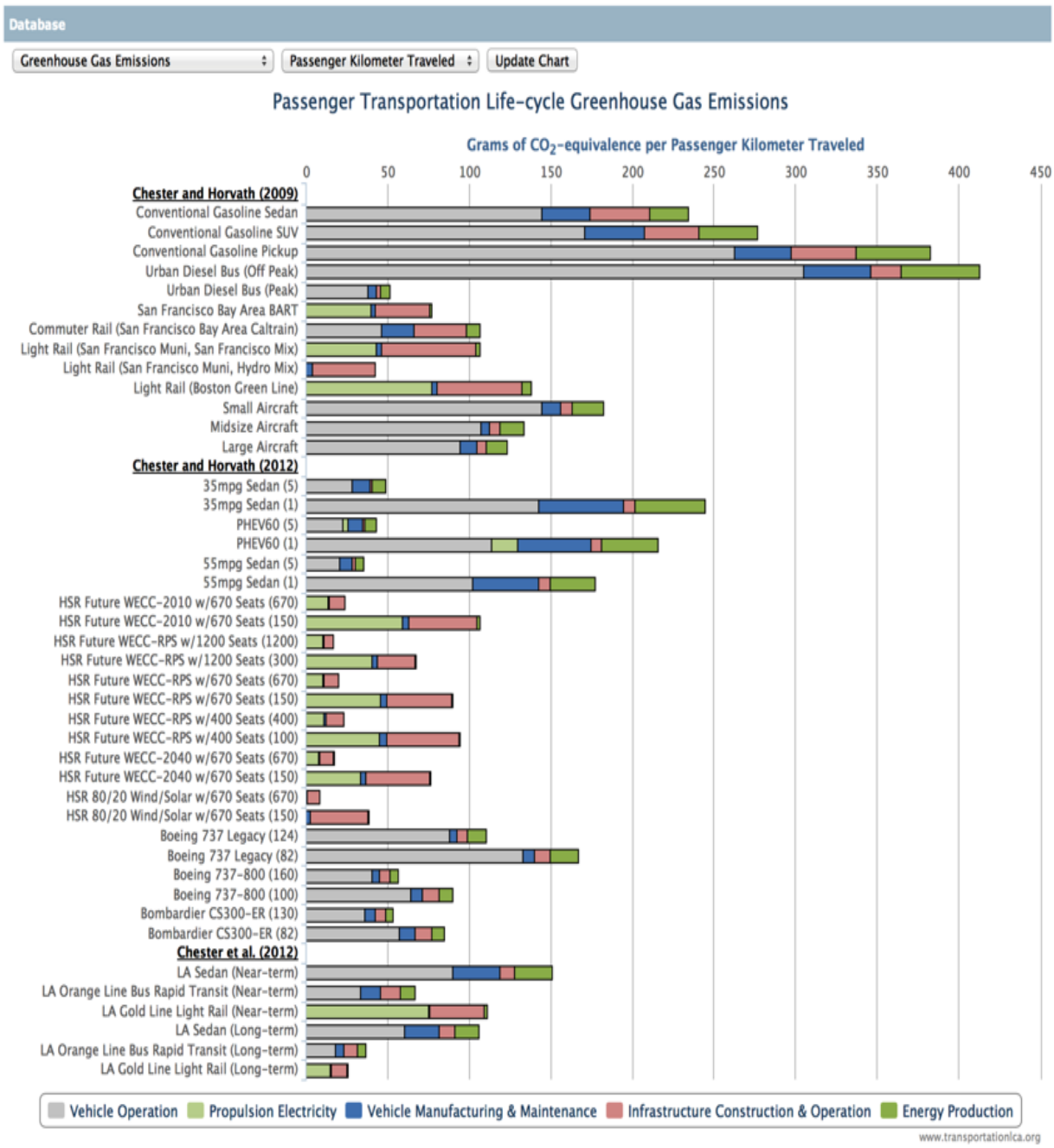

Figure 4: The LCA analysis including the underlying infrastructure for the different modes of transport, such as roads for cars, airports for aircraft and railways for trains. Source: The transportation LCA database (tLCAdb) [78]

[78] http://www.transportationlca.org/tlcadb.html

This system is optimised in order to compare the impact per passenger kilometre, but for such a comparison to be possible for different types of services, where telework is included for example, calculations must be based on functionality. See below for an illustration of the principles, given that the focus is on commuting/work.

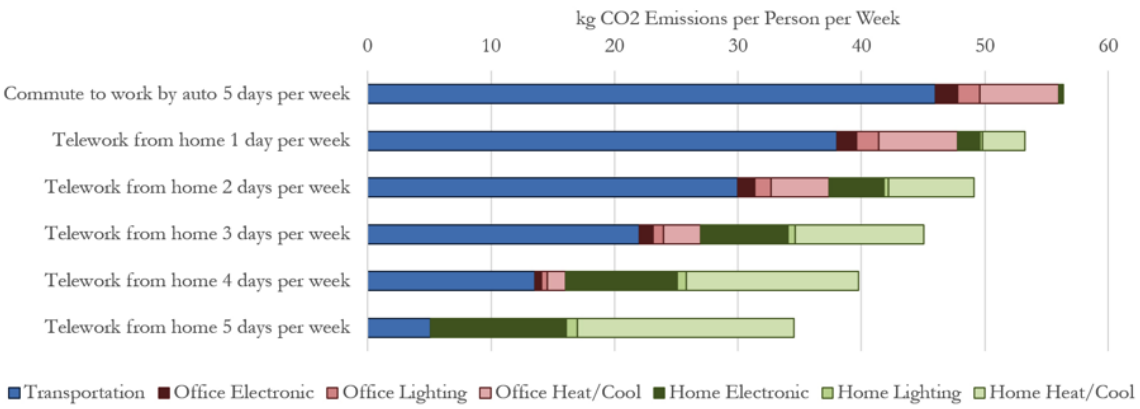

Figure 5: LCA analysis based on the commuting function. Source: The transportation LCA database (tLCAdb) [79]

Calculations of the environmental impacts from the underlying infrastructure have also been made previously for Swedish conditions by IVL.[80]

The portal should be able to use the data that is described above through a system that will automatically update the portal. Through a graphical interface, the user could opt to include various types of carbon impacts and greenhouse gas emissions in the portal. See above (Figures 4 and 5), for example, from an LCA database where all aspects are included for greenhouse gas emissions. [81]

3.2 Direct monetary costs and time

One reason that often weighs heavily when an organisation implements major changes, such as shifting the focus from physical mobility to virtual mobility, is the ability to increase productivity and reduce costs.

Business travel in Sweden costs an estimated SEK 50 billion per year, but including lost work time and other expenses that travel brings, the total cost comes to over SEK 100 billion. If travel-free meetings alone were to replace every fifth trip in Sweden, the annual savings in travel costs would be something like SEK 20 billion.[82]

[79] http://www.transportationlca.org/tlcadb.html
[80] Håkan Stripple and Martin Erlandsson, "Methods and Possibilities for Application of Life Cycle Assessment in Strategic Environmental Assessment of Transport Infrastructures" (2004) http://www3.ivl.se/rapporter/pdf/B1661.pdf
[81] http://www.transportationlca.org/tlcadb.html
[82] http://publikationswebbutik.vv.se/upload/5577/2010_058_resfria_moten_en_handledning.pdf

When comparing the total cost of travel to a meeting in Stockholm, Manchester or Tokyo with the costs of a video or telephone conference, the potential for savings through travel-free meetings is obvious. In the example, one person from their own organisation attends the meeting, one work day is set aside for the Stockholm meeting, two days for the Manchester meeting and three days for the Tokyo meeting. Only the actual meeting time is deemed necessary to set aside for the travel-free options. The amounts specified are not exact and are constantly changing, but can be seen as an example for the financial gains that travel-free meetings can deliver. Information on how costs are calculated is available on www.trafikverket.se/resfri. [83]

Destination	Stockholm	Stockholm	Stockholm	Manchester	Tokyo
Transportmedel	Bil	Tåg	Flyg	Flyg	Flyg
Resekostnader	4 700 kr	5 000 kr	7 400 kr	12 600 kr	18 800 kr
Videomötesskostnad	800 kr	800 kr	800 kr	1 300 kr	2 800 kr
Telefonmöteskostnad	300 kr	300 kr	300 kr	400 kr	600 kr

Figure 6: Cost of meetings. Source: Travel-free meetings - A tutorial, Swedish Transport Administration [84] Comparing modes of transport ("Transportmedel") travel costs ("Resekostnader"), video meeting cost ("Videomeeting cost"), Telephone meeting cost (Telefonmöteskostnad) for cars ("Bil"), train ("Tåg"), aircraft "("Flyg") from Gothenburg.

By using rough approximations, which includes time expenditure for various meeting configurations (which often means a huge loss of productivity when it comes to physical travel due to the absence from ordinary activities), estimates can be made for resource savings.

The monetary savings that travel-free meetings can deliver for government agencies are made evident when comparing traditional meetings with virtual meetings, with air tickets and hotels frequently being considerably more expensive than the cost of video conferencing. For flexible working arrangements, resource savings are more complicated to calculate. The reason for this is that employees account for a large part of the cost, monetary as well as quality of life, when commuting to work.

The portal should potentially include information about the various forms of cost savings and cost increases that allow the user to easily see the consequences of different meeting, transport, and communication options.

[83] http://publikationswebbutik.vv.se/upload/5577/2010_058_resfria_moten_en_handledning.pdf
[84] http://publikationswebbutik.vv.se/upload/5577/2010_058_resfria_moten_en_handledning.pdf

3.3 The impact on noise from the mobility solution

There are additional indirect effects from mobility that can be included in the LCA analyses such as reduced noise levels. By using virtual mobility and thereby reducing physical transport, the number of vehicles can be reduced which contributes to lower noise levels. To ensure a substantial noise reduction, a corresponding reduction in transport is required. Instead of a simple linear relationship, where a certain change of a factor can result in a proportionally equally large change to another factor, the noise problems are then usually described as a "tipping point", in Swedish often referred to as the threshold effect where problems appear and disappear at certain levels. An example showing how the noise level relates to the volume of transport is illustrated in the image below.[85]

The portal should be able to include other indirect and systemic effects depending on which issues are prioritised.

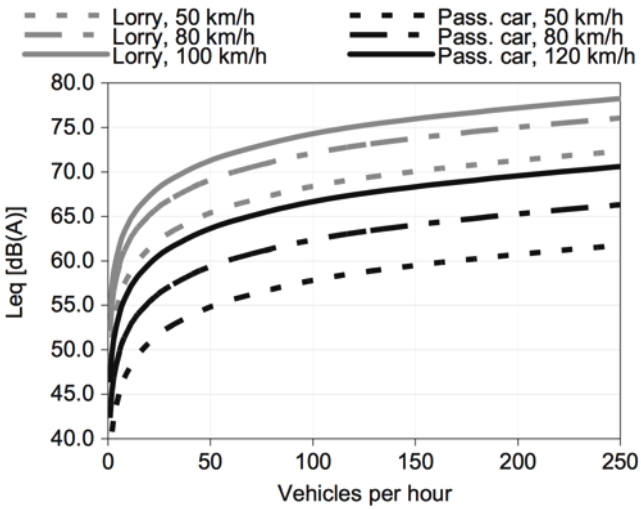

Figure 7: The noise impact from transport. Source Traffic noise in LCA, International Journal of Life Cycle Assessment: [86]

[85] http://www.uns.ethz.ch/people/formerhead/scholzr/publ/1713.pdf
[86] http://www.uns.ethz.ch/people/formerhead/scholzr/publ/1713.pdf

4 IMPLEMENTATION

4.1 Incremental implementation

The portal is intended to be developed on a continuous basis in communication with the users based on their observations

The portal will be able to meet the varying needs and preferences of different users. This means that the portal must provide for unit managers that are responsible for strategy who are looking for an overview of the various choices and consequences of strategies within a few years' timeframe, as well as the needs of individual employees who are looking for an overview regarding the environmental impacts of different ways of organising a specific meeting

Implementation of the portal should be such that it is possible to meet the needs of the two extremes, and everything in between, when it comes to users by:

Contributing supporting data for strategic decisions when analysis of large amounts of detailed data is required over a longer period, and for larger groups in situations where there are good opportunities for thorough changes.

- Contributing supporting data for individual choices of meeting/mobility in situations where only the overall data is required and the choices are minor

For points, 4.1.1 - 4.1.8, the different functions that should be implemented in stages are described below. The first three steps build on each other, the steps subsequent to this can be considered as independent modules that can be implemented independently of each other depending on interest.

4.1.1 Registration

Depending on how the user wants to use the portal, and the functions the portal is to have, the user will be able to choose between comparing different ways of meeting and registering to receive more detailed information. The government agency, department, and individuals could all have access to their own user accounts.

This is to enable the portal to provide customised information based on user preferences. This stage is described in Figure 8.

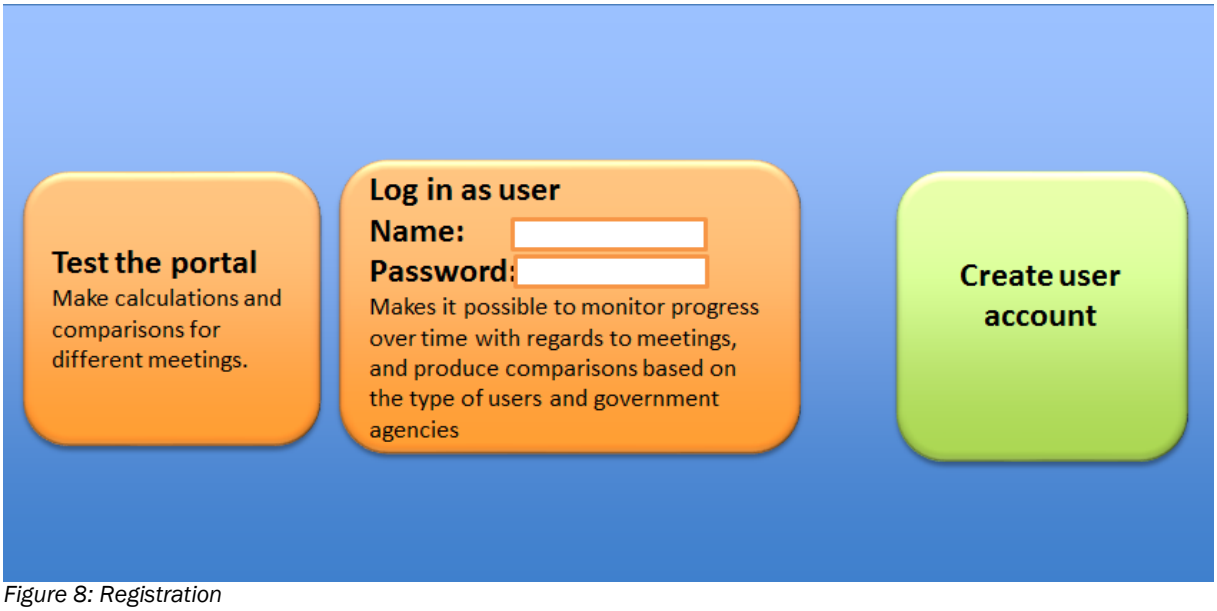

Figure 8: Registration

4.1.2 Stage 1: Overview

Stage 1: A platform with basic functions that will enable users to compare different meeting strategies depending on the nature of the meeting, i.e. if the meeting is to take place physically or virtually. The platform analyses the entire itinerary, any taxi fares and other segments to the journeys are all included in the analysis, including any hotel stays. For example, if a trip to Brussels is to be undertaken, this will include a physical journey; the trip to the airport, the flight, the journey from the airport to the hotel and from the hotel to the designated meeting place.

Standard data, which may be based on LCA analyses, can be used by the user to obtain a comprehensive overview of the environmental effects, cost and time of the various meeting strategies. This step is described in Figure 9.

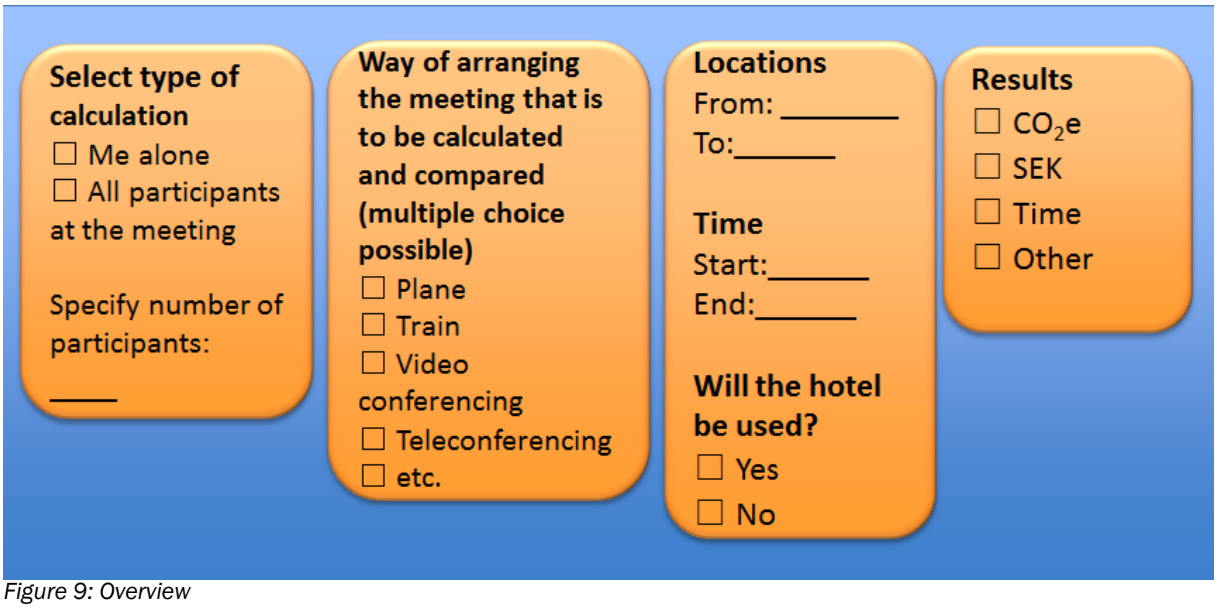

Figure 9: Overview

4.1.3 Stage 2: Links to framework agreements

In step 2, the portal can link to a government framework agreement to ensure that the user can read information about the relevant framework agreements directly through the portal. Based on the choices the user makes, the relevant framework agreement will be presented. If the user has entered data for a tailor-made meeting, recommendations may also be presented based on existing framework agreements that the agency has. This stage is described in Figure 10.

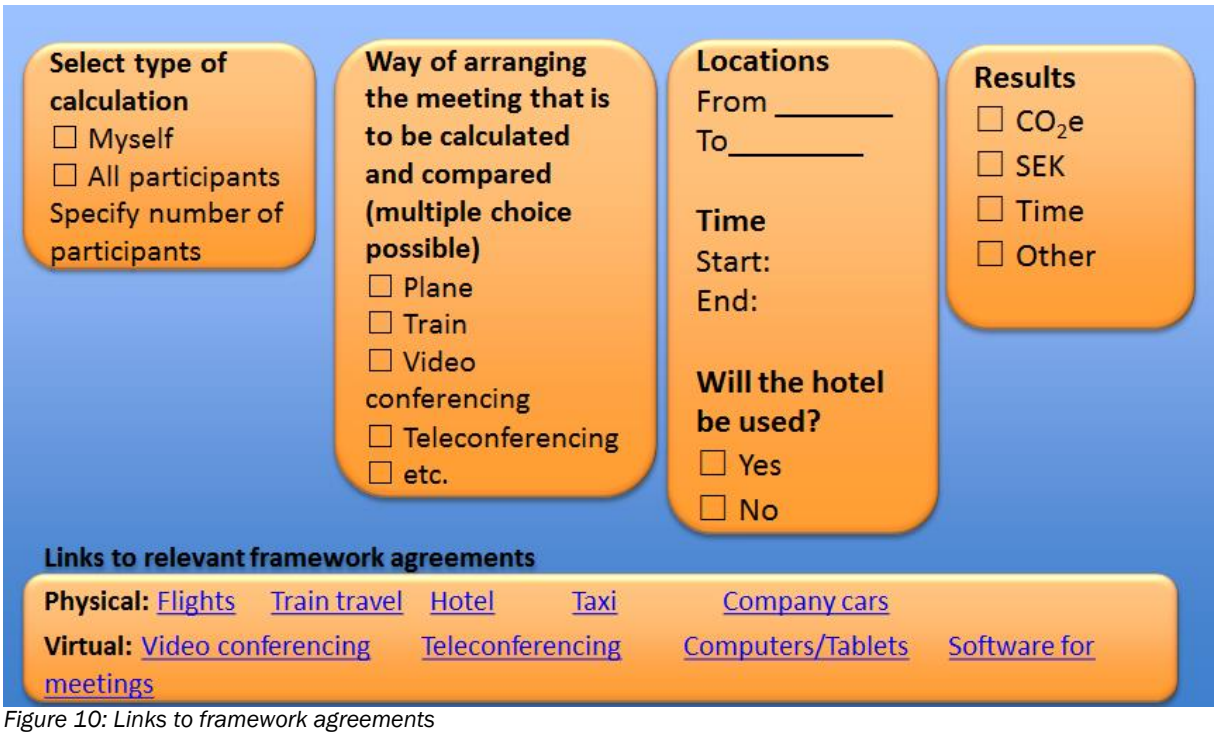

Figure 10: Links to framework agreements

4.1.4 Stage 3: Detailed data depending on the way of arranging meetings

In step three, it may be possible to select specific models such as aircraft, cars and video conference equipment in order to obtain more detailed information for different types of environmental impacts. The user could also have the option of using specific information regarding various meeting strategies in order to identify the differences between the different choices of meeting.

Whether it is possible for the user to choose different ways of viewing the results depends on how the portal is designed. But if there is a possibility to choose different future models, the user can, for example, gain an understanding of how climate impacts will be if current travel patterns continue. This step is described in Figure 11.

Figure 11: Detailed data depending on the way of arranging meetings

4.1.5 Stage 4: Customised information

In step four, you can be given the option of entering data regarding the statistics and goals of a single user or agency/department. In this way, the portal can be used as a planning tool that can predict the future greenhouse gas emissions of a government agency/department based on different meeting options. Provided that the user registers customised information in the portal, it may be possible to provide data on future emissions given the current trend and/or the life expectancy of the different solutions that are purchased.

It will also be possible to use the portal without customised information to obtain general data on the various meeting options presented. This step is described in Figure 12.

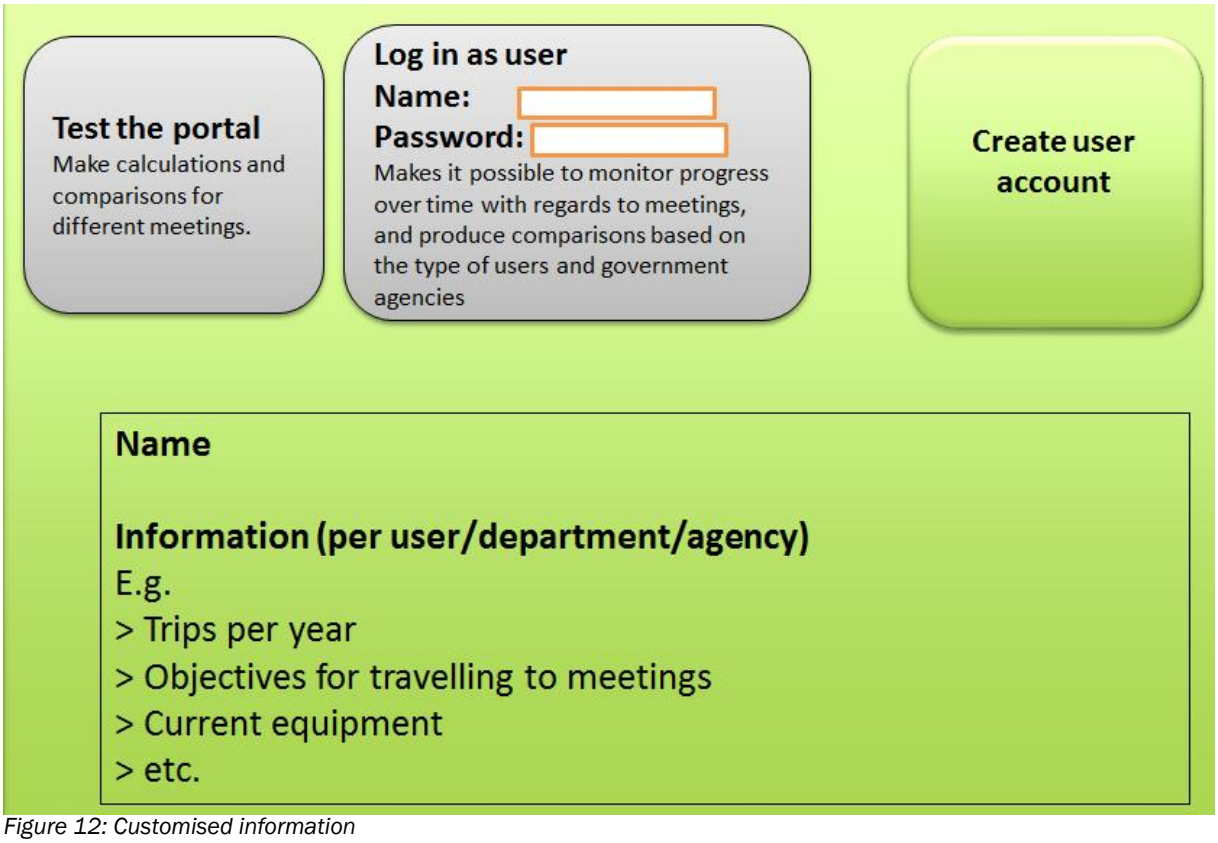

Figure 12: Customised information

4.1.6 Stage 5: Trend analysis

In step five, you should have the option of saving the results on the platform over time in order to analyse the trends. It should also be possible for users/government agencies to see whether the agency's set intermediate goals have been achieved. One possibility would be to set your own climate targets to ensure that the agency can continually see how they are fairing in relation to these.

Climate targets should be able to relate to competitions in which the agency participates, such as "One in Five", a project from the WWF where various businesses and government agencies worldwide set a goal to replace every fifth flight with a virtual meeting.[87] The competitions will enable government agencies, departments and individuals to compete with each other or work together, to accelerate the achievement of the set climate targets. This step is described in Figure 13.

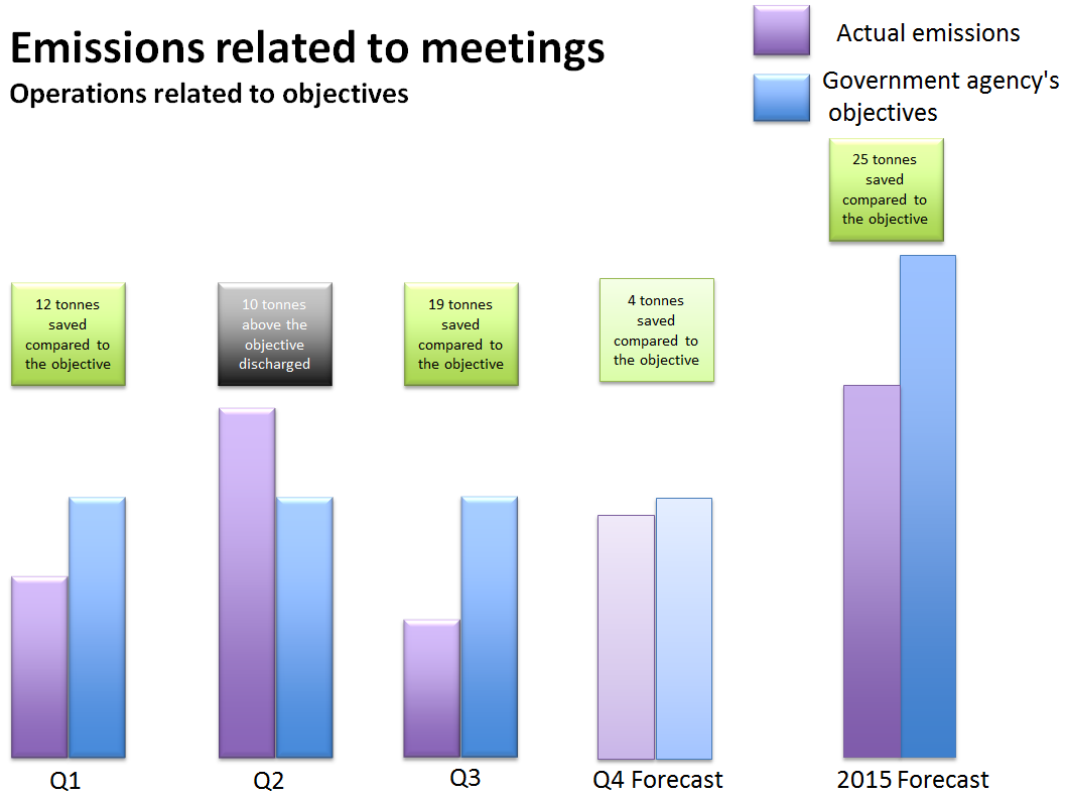

Figure 13: Trend analysis

[87] http://www.wwf.org.uk/how_you_can_help/get_your_business_involved/one_in_five_challenge/

4.1.7 Step 6: expanded mobility analysis

Step six proposes that an integrated meeting mobility portal is made possible in which travel to and from work is included. A meeting mobility portal that includes job commuting allows for better coordination of measures for a climate-efficient agency. The new portal application could also include the purchase of equipment/solutions that can be used to achieve the agency's climate targets, including everything from training for different types of meetings, to larger system solutions where various goods and services are included.

4.1.8 Future options

A portal that is built in a modular configuration gives the opportunity to further develop various functions as the need arises and new requirements are set. It would, for example be possible to integrate state framework agreements in the portal to ensure that users can analyse and plan the central mobility needs based on future planned purchases of goods and services. It would therefore be possible to obtain an estimate of future impacts, e.g. greenhouse gas emissions, at the time the various activities are planned. This function would allow linking the portal directly to the environmental reports required from the agency if there is interest.

4.2 Data and costs

In order for scientifically correct and fair calculations to be made when it comes to the effects of different meeting options, life cycle assessment calculations (LCA calculations) are required in most cases. LCA calculations are analyses, where the whole cycle, from the extraction of materials through use to reuse are included in the analysis.

4.2.1 Key data needed for LCA calculations for different ways of providing meetings and mobility

In order to develop a life cycle assessment for the Swedish transport system, the following types of key data are required:

1. The total amount of road infrastructure and other transport infrastructure in Sweden, expressed in kilometres (state, municipal, private, etc.).
2. Types of transport routes, e.g. railways, airports, etc. (i.e. classification of routes).
3. Typical route design (geometry, e.g. average width and depth of routes, and materials, such as surfaces like asphalt, cement, gravel).
4. Vehicle fuel consumption profiles or equivalent.

5. Vehicle travel profiles for Swedish households and businessmen (typical distance travelled, number of passengers, etc.).
6. Data on public transport (fuel/electricity consumption, number of passengers, etc.).
7. Annual estimates of the amount of travelling with different types of vehicles/models in order to prepare an analysis of materials, construction, and maintenance of the route network and then allocate carbon emissions to each type of vehicle and the number of passenger kilometres.
8. Data on the IT infrastructure used for video conferencing and teleworking.

4.2.2 Agencies that can deliver data

The agencies that can deliver this type of data are primarily Transport Analysis, which is an agency that provides decision makers of transport policy with a useful and relevant knowledge base;[88] and the Swedish Traffic Administration[89].

Data concerning the initial three points (1-3) can be provided by the Swedish Transport Administration which is responsible for the National Road Database (NVDB) The Swedish Transport Administration can supply geometries for the Swedish road network, such as the various lengths, widths and traffic flows of the types of road. They can also provide data about wear and tear on the national road network and for the rest of the road network (municipal and private) of the types that use asphalt and gravel.

With regard to points (4-7) Transport Analysis can provide travel surveys. Data on the vehicle fleet and its use is available from Traffic Analysis's travel survey RVU Sweden as well as from their road traffic database. After 2014, data can be obtained from Statistics Sweden or other relevant open databases. As regards public transport fleets, data is available from RVU Sweden, the Road Traffic Registry and the Local and regional public transport survey.

CESC at the Royal Institute of Technology (KTH) can provide data on the IT infrastructure used for video conferencing and teleworking.[90]

[88] http://www.trafa.se/sv/
[89] http://www.trafikverket.se
[90] http://www.cesc.kth.se/sv

5 POSSIBLE FUNCTIONALITY OF THE PORTAL

The following is an overview of the functionality that the portal should have. A supplier should be able to supply all points, assisted by subcontractors where necessary. An initial version of the portal does not need to have all the modules, but the supplier needs to deliver a version that is built in a way that allows additional modules to be added later.

There should be a built-in system designed to evaluate and review the data that the portal is based on.

1. The portal should make it possible to choose the way in which to meet, for example by car, plane, video conference, etc. General data for environmental impacts, time and expenses for each meeting strategy is to be included in the portal.

2. The portal should make it possible to select a range of specific models of cars, planes, trains and video equipment. It must be possible to update these models on a continuous basis. There should be a built-in system for evaluating and reviewing the underlying data in the portal on an annual basis. It should also be possible for users to add their own data for different ways of meeting.

3. The portal must make it possible to add the climate targets of the EU and Sweden to ensure that the current emission levels of government agencies can be compared to the targets. The portal should be able to visualise the user's current climate status, climate targets and potential ways of achieving the targets in an easy and instructive way. It must also be possible to add additional climate targets that are only visible to the user who created them.

4. The portal should allow a user to register an individual, department or agency in order to obtain customised information, such as about their targets and appropriate steps. The information should include, among other things, the choices that similar individuals, departments or agencies have made and how they performed in similar situations. The portal should also show how individuals, departments or agencies, as with the user's own targets, stand in relation to existing climate targets.

5. The portal should allow the user to simulate future mobility and meeting options, including a visualisation of the consequences depending on the

choices the user makes.

6. The portal should enable the user to review the business's internal and external mobility and meeting options. The portal should be able to calculate the environmental impacts, time and costs of various mobility and meeting strategies and provide suggestions on how the user's meeting options can be streamlined.

7. The portal should be able to notify the user about new modern working methods, such as virtual meetings and the digitisation of material. This includes the portal notifying about possible planning and equipment that the new working method requires, such as the digitisation of documents or equipment that can be used for both travel-free internal and external meetings and flexible working.

8. The portal should provide information on resource-saving ways of holding meetings. For meetings requiring travel, the portal should be able to suggest geographically strategic alternatives for meeting places. Information about the possibility of organising virtual solutions to the current location should also be provided. Additionally, the portal should provide suggestions for meeting times that make it possible for participants to use resource-efficient and environmentally friendly modes of transport. This could mean things like tips on times that enable as many attendants as possible to take public transport to the meeting.

6 MARKET

No specific meetings with individual suppliers were held during the feasibility study. The assignment was to formulate a comprehensive picture of the cost and delivery capabilities of various types of functionality and not to present supplier specific supporting data. The study revealed that there are several groups that could deliver solutions where it would be beneficial to invite them to continue working on the portal. The meetings held took place within the framework of the Global e-Sustainability Initiative (GeSI)[91].

6.1 Different players in the market

The market for delivering this kind of portal is large as many different companies approach the area from different angles. Many of the companies presented below work in several fields. The presentation is only intended to provide an overview of the different markets and give examples of companies that are in place to deliver a portal that the feasibility study describes.

[91] http://gesi.org/

1. Large-scale IT companies such as IBM, Cisco, Microsoft and Ericsson have, in recent years, been working intensively on developing tools that make it easier for organisations to manage large amounts of data to support sustainable development. These companies are already working with various portals and have the capacity to develop the kind of portal that is preferred.

2. Some companies like TCS, Wipro and Infosys are specialised at creating "dashboards", i.e. a visual and comprehensible display that contains the key figures that are important to the person reading them. Data visualisation objects often appear in the form of easy to read speedometers. This also includes "Enterprise Risk Dashboards", i.e. a display that helps companies to see risks. These companies also have the option of delivering various portals.

3. Another group of companies that are able to deliver are those companies that have been constructing internal information systems within various organisations for a long time. These companies have long-standing experience of combining different interfaces and generating standard reports. Companies such as SAP, SAS and Oracle are prominent in this category.

4. In recent years, companies have emerged that specialise in visualising complex data for different decision data. Through projects such as Visualizing.org[92] complex challenges can be presented in an instructive and easy to understand manner. This group includes companies such as ClearStory[93], BigML[94] and Chartio[95],

5. Smaller companies such as Frontwalker[96], Funka[97] and Doberman[98] work closely with local government agencies and other operators in Sweden for providing tailored solutions where large amounts of data can be processed and presented in easily understandable ways thereby ensuring that decisions can be taken. These smaller companies could also be potential suppliers.

6. Finally, there are those operators who only provide data and calculations. These can either be sub-contractors that build the portal, or separate

[92] http://visualizing.org
[93] http://www.clearstorydata.com/
[94] https://bigml.com/
[95] https://chartio.com/
[96] http://www.frontwalker.se
[97] http://www.funkanu.com/sv/
[98] http://doberman.se

companies. Many of these operators could also potentially be able to provide a portal, although their speciality is LCA calculations. Operators in this category include Arizona State University's Sustainable Infrastructure Systems laboratory[99], ECOFYS[100] and NTM[101].

7 CONCLUSIONS AND RECOMMENDATIONS

Based on the material collected and analysed during the feasibility study, the study can set a number of recommendations for possible procurement. These recommendations may be reassessed over time but are presented in the feasibility study based on the data collected at the present time.

7.1 The portal's functionality

The conclusion of the feasibility study is that the portal's basic functionality should be as follows:

1. The portal should provide information on the environmental impact and climate impacts from various forms of meeting. This is to facilitate the shift from traditional ways of communicating and meeting to new, more resource efficient and less environmental impacting solutions that are necessary to achieve the set climate targets.

2. The portal should have a modular construction and be based on verified data for the calculations that the portal is to deliver. The owner of the portal should be able to decide on changes to the data to be used. This means that a supplier must provide a dynamic solution enabling easy updating.

3. Users should be able to see what the results of different choices produce in specific areas given other data. The portal should also provide the option for users to provide their own data, however, the portal's data should always serve as a reference value.

4. The portal must have an intuitive and user-friendly interface as its target market cannot be expected to possess expert technical knowledge. It should also be easy to share information and results with other users of the portal.

[99] http://sustainableinfrastructure.lab.asu.edu
[100] http://www.ecofys.com
[101] http://www.ntmcalc.org

5. In a time of increased use of mobile devices and the need for real-time information, the various functions of the portal should be able to work on mobile devices.

6. The portal should have a welcoming website with a personal profile for the logged-in user who has previously been registered.

7. The user should be able to choose different ways of providing meetings, including individual meetings as well as continuous meeting planning over extended periods, in order for the user to be able to use the portal for both individual meeting choices and strategic planning.

As it is possible to deliver a portal in many different ways and the portal will be built in an area experiencing rapid change, the feasibility study recommends functional procurement.

7.2 The supplier market

The feasibility study has found that the market for this kind of portal is substantial as there are many different companies delivering customised solutions in which complex data and calculations are presented in a clear manner in systems that are modular based. This opens up the possibility that the portal can be supplied by one supplier, supported by a group of companies with different skills. This is because the supplier should be able to handle large amounts of data/calculations, customised presentations and integration into existing systems.

Before any procurement can begin, the feasibility study recommends meeting up with experts and potential suppliers to determine a) what is the most appropriate system for the delivery of LCA analyses, b) the most appropriate technological system for developing the portal, and c) how best to develop criteria in the portal's functionality based on the preferences expressed by government agencies and experts.

7.3 Proposals for continued work with reference group and market

The feasibility study analysed the opportunities and interest in the portal for optimised meetings and mobility. The next step should be to initiate a process to ensure the appropriate functionality in relation to the existing climate targets, a flexible development strategy and customised functions that are linked to the current and future planned processes of the users.

Because of the area's rapid development, the feasibility study proposes continuing with an iterative[102] and incremental development process.[103] This process means that the portal is developed in several parallel processes with continuous verification of the various modules. By using a circular process, it is also easier to include various demands from different users. A process of this kind makes it possible to effectively develop the functionality and stability that the portal requires, at the same time consensus is secured among all user groups over the course of the work.

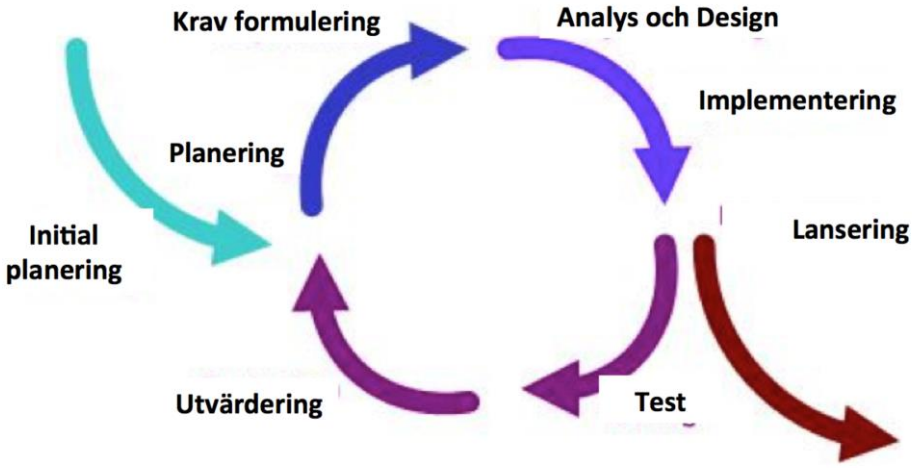

Figure 14: Schematic diagram of an iterative and incremental development process.

- ***The development of the portal's functionality according to the needs of government agencies***
  An initial process in which a reference group is divided into subgroups such as sub functions, different types of user and a group that ensures synergies with other work that is related to the portal. The different sub-categories within the reference group, can together with NPS, meet leading suppliers and experts in each area in order to clarify the possibility of constructing a preferred portal that satisfies all the needs of government agencies in the current situation, as well as future needs. As different subgroups complete their work, this is integrated into the overall process of finalising the portal.

- ***Hearing with suppliers in*** the ***market***
  In order to provide supporting data for a possible procurement concerning how the portal's basic functionality should be provided, NPS can arrange

[102] Iterative means that each step is continuously tested and evaluated.
[103] http://en.wikipedia.org/wiki/Iterative_and_incremental_development

hearings, where both Swedish and foreign experts participate. The first group of hearings focuses on data, the other on functionality and the last one on user friendliness. Based on these hearings, supporting data with detailed information and suggestions on the structure can be developed as the ability to generate in-depth discussions with individual suppliers is presented.

In these phases, planning, needs analysis, requirement definition, analysis/design and implementation of various proposals takes place that can be used as a basis for procurement.

7.4 Responsibility and ownership of the portal

The feasibility study has identified that a portal for supporting meeting planning provides significant synergies for reducing the environmental impacts that are currently caused by the many trips to and from business meetings made by government agencies.

A portal of this kind requires a considerable knowledge base being available on related products and services. Data collection and updates can be carried out most effectively if a coordinating operation can provide this.

General analyses can be conducted via the portal and the results can be used in the development of related framework agreements in order to streamline the work of the agencies.

The National Procurement Servicesis an organisation that has the experience and skills needed to procure and administer a portal without having to deploy any additional resources.

Through a strategic investment in a portal, NPS is able contribute to resource efficiency for the public sector.

Two possible options if NPS decides not to develop a portal for optimised meetings and mobility are:

- That interested agencies develop their own portals, which is more expensive and loses synergies.
- That no portal is developed and the agencies themselves try to select optimise meeting options. To date, this has not been shown to promote a positive trend when it comes to reducing greenhouse gas emissions to any significant amount.

The feasibility study's recommendation is that NPS is responsible for the portal's investment costs and operating costs over the initial three years and that an assessment is then made regarding outcomes and continued operation.

7.5 Environmental benefits

The environmental benefits of a well-functioning portal are significant, mobility constitutes a large amount of the environmental impacts which are not just current emissions of greenhouse gases, but also land use, air pollution and noise. Through the action of government agencies being seen as a reflection of the Government's priorities, new innovative climate solutions will not remain within the agencies but will be spread throughout society. By supporting the development of new environmental solutions, the authorities therefore play a trend-setting role in society.

In addition to reducing greenhouse gas emissions, a portal can make important contributions regarding land use, a drop in consumption of natural resources and reduced emissions of hazardous substances. The portal accomplishes this by encouraging the development of dematerialisation and efficient use of resources, which include reducing the need for underlying infrastructure for physical mobility.

7.6 Customer benefits

A portal can help government agencies to optimise meetings and mobility with the result that the agencies can achieve their environmental goals and reduce their overheads. The portal will therefore be able to contribute to the agencies being more effective. The latter, by supporting the development of more efficient meeting and mobility patterns which allows for new solutions.

Customers enjoy a simple tool that supports documentation of both individual and strategic meeting options, which contributes to greater transparency when it comes to different strategic choices by making it easy to see the consequences of the different options.

Customers also have a tool that can plan meetings easily for all those involved. Meeting organisers receive information about the type of meeting strategy, physical or virtual, that suits their meeting in the best way while the attendee of the meeting can get information on how to get to the meeting in a climate-friendly way.

By supporting effective meeting strategies, the portal can attract a new generation of staff in the long run with experience of an effective meeting and working climate, working for government organisations.

7.7 Recommendation

Based on the responses to the questionnaire, reference groups, expert statements and information from ongoing work at other agencies, the feasibility study's recommendation is that a portal for optimised meetings and mobility should be created.

The development of the portal should include innovative holistic solutions, the possibility of continuous updating and cost effective solutions.

The feasibility study recommends that NPS should procure and be responsible for a state run portal for meetings and mobility.

8 References

8.1.1 Meetings with government agencies - Reference group

As part of the project, meetings were held with the following government agencies participation:

The Swedish Energy Agency
Dalarna University
The Swedish Consumer Agency
The Swedish Prison and Probation Service
The Cultural Board
Lund University
Swedish Transport Administration
The National Museum
The Environmental Protection Agency
The Swedish Pensions Agency
Skåne County Police
The Swedish Coast Guard
Stockholm University

8.1.2 Questionnaire mailing to agencies

Questionnaire to agencies regarding reduced environmental impacts at meetings. Published from 02/12/2013 – 20/12/2013, 216 agencies responded to the questionnaire (Appendix 1).

8.1.3 Terms and abbreviations

CO_2

Carbon dioxide is a greenhouse gas that is formed by the complete combustion of carbon compounds in oxygen, and has a significant biological importance, such as when plants are to produce oxygen from carbon dioxide and sunlight. In terms of volume, carbon dioxide is the most abundant greenhouse gas, and in July 2013 constituted about 397 ppm (parts per million) of the atmospheric volume, an increase of one (1) ppm since July 2011. The increase of carbon dioxide, resulting from industrialism and its large-scale use of fossil fuels, is leading to an increased greenhouse effect, contributing to global warming and ocean acidification that may threaten ocean ecosystems.[104]

CO_2e

To measure the heat potential of greenhouse gases, a common unit of measurement of greenhouse gas called CO_2-equivalents (CO_2e), is used, which compares the greenhouse gases with the warming effect of the carbon dioxide. A carbon dioxide equivalent indicates the amount of greenhouse gas expressed as the amount of carbon dioxide that produces the same climate impacts. By way of

[104] http://sv.wikipedia.org/wiki/Koldioxid

example, the influence of 1 kg of methane is equivalent to a climate impact of 21 kg of carbon dioxide.[105]

Direct effects
These are direct emissions from an activity, such as exhaust emissions from cars and aircraft, or emissions that have been generated from the electricity required for video conferencing.

Fossil independent vehicle fleet
The Swedish government has set a target for Sweden to have a fossil-independent vehicle fleet by 2030, which is a step towards the vision of Sweden having a sustainable and resource efficient energy supply by 2050 without any net emissions of greenhouse gases into the atmosphere[106].

External meetings
External meetings are meetings that include operators outside of the organisation. These meetings are often planned and well-defined, and often include an agenda. External meetings may involve people who are at a distance from each other to a greater extent than internal meetings that are often held locally with colleagues at the workplace. External meetings include both physical journeys by plane, road and rail, and virtual solutions such as video and teleconferencing.

Function
See “Service”

Green procurement
Green procurement is defined by the European Commission (2012) as a process in which public government agencies seek to procure goods and services with a reduced environmental impact throughout their entire life cycle.[107] Today green procurement often means contributing to making current products marginally better from an environmental standpoint, or that environmental technologies are disseminated in order for the current systems to be less harmful to the environment.[108] It is interesting to note that the European Commission's definition with its focus on functionality supports the procurement of transformative solutions that offer the same functionality as conventional solutions, but with a lower environmental impact.

IEA (International Energy Agency)

[105] http://www.wwf.se/source.php/1264973/Guld%20i%20gr%F6na%20skogar_WWF-rapport_2009.pdf
[106] http://www.regeringen.se/sb/d/15703/a/196433
[107] http://ec.europa.eu/environment/gpp/glossary_en.htm
[108] http://www.pamlin.net/new/wp-content/uploads/Transformativa_l%C3%B6sningar_offentlig_upphandling_121212.pdf

The IEA, the International Energy Agency is an independent, political advisory body within the OECD, that was founded in 1974 with the main objective of reducing society's dependence on oil. The IEA's focus areas include energy security, economic development and improved environmental awareness.[109] In the latter area, the emphasis has changed from treatment technology and clean fuels to climate changes. The IEA plays a major role in promoting and developing alternative energy sources, rational energy policies and multinational energy technology collaborations.[110]

IIIEE (International Institute for Industrial Environmental Economics)
Education and research at the International Environment Institute starts from the basis of the demands set by industrial activities for securing sustainable development with the general designation known as Industrial Environmental Economics. The education and research projects that have been conducted address the prevention of industrial environmental protection strategies, including method selection, technical application and economic potential. Special emphasis is placed on the development and application of control measures and environmental management tools, at both a social and industrial level.

Indirect effects
Indirect environmental and social impacts of mobility mean that the influence from other places in the value chain are also included compared to the direct effects. The indirect effects include impacts from manufacturing to the handling of the product when it is no longer used.

As completely different solutions are being compared, the indirect effects also include the influence from the underlying infrastructure such as roads, parking lots, runways, etc. for physical mobility, and networks, servers, etc. for the virtual mobility.

Lock-in:
See “Lock-in”

Innovation procurement
The advance procurement of unknown solutions to a defined problem or need for which a solution has sometimes not yet been established,[111] and procurement of this kind is designed to bring forward the market introduction of new solutions that have not yet been commercialised.[112] The latter is usually called “pre-commercial procurement” which is designed to support the products and services that are in need of more research and development as a way of accelerating their

[109] http://www.iea.org/aboutus/
[110] http://sv.wikipedia.org/wiki/Internationella_energir%C3%A5det
[111] http://www.regeringen.se/content/1/c6/15/09/90/08ef1a0a.pdf
[112] http://www.regeringen.se/sb/d/16941/a/210399

commercialisation.[113] Innovation procurement generally has no particular focus on environmental concerns.

Innovation-friendly procurement
The starting point for innovation-friendly procurement is that innovative approaches are also to be applied in the context of traditional procurement to ensure that new, innovative solutions are not excluded from procurements but can compete with traditional solutions. Innovation-friendly procurement focuses on innovative solutions that already exist or that are developed to such an extent that the procurement could constitute an alternative to established products.[114]

Internal work
Meetings with colleagues within your own organisation is an important part of the internal work. Many internal meetings are spontaneous and have no agenda, and frequently include persons with close working relationships. Internal work includes the need to physically commute by car, bus and train, from the home to a specific workplace. This could also mean teleworking using laptops, smart phones, tablets and other assistive technical aids whose software enables you to work without being physically present at a specific workplace.

Life cycle assessments (LCA)
Method/techniques for analysing the environmental impact based on each stage of a product or service throughout its life cycle, for example, from material extraction, material processing, manufacturing, distribution, to use, operation/maintenance, repairs and recycling.[115] In addition to the direct emissions from a product or service, the portal calculations are based on life cycle assessments that include the influence of the underlying infrastructure, as well as aspects such as biodiversity, environmental pollutants and VOCs (volatile organic compounds).

Lock-in
Lock-in, or the associated concept of path dependence, implies that past and/or future decisions can lock ourselves in with suboptimal technologies and systems, reducing the possibility for alternative solutions that may later prove to be preferable.[116] Lock-in leads to innovation, mostly incremental and takes place within the framework of existing systems along predictable trajectories.[117] Lock-

[113] Edler & Georghiou (2007). Public Procurement and innovation – Resurrecting the demand side. Research Policy Vol. 36(1), pp. 949-963.
[114] http://www.regeringen.se/content/1/c6/15/09/90/08ef1a0a.pdf
[115] http://en.wikipedia.org/wiki/Life-cycle_assessment
[116] Alkemade, Frenken, Hekkert & Schwoon (2009). A complex systems methodology to transition management. *J Evol Econ*, Vol. 19(1), pp. 527-543: http://alexandria.tue.nl/openaccess/Metis232967.pdf
[117] Geels, F.W. (2012). A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. *Journal of Transport Geography*, Vol. 24(1), pp. 471-482.

in mechanisms make it difficult for new solutions to reach the market, and this explains why energy-intensive technologies and infrastructure continue to dominate despite the existence of potentially superior solutions that help reduce emissions.[118] Examples of lock-in mechanisms include: special interests that arise from investments in infrastructure, facilities and people; low costs arising from economies of scale; regulations and laws based on beliefs that take existing practices for granted, create entry barriers and legitimise the status quo; cultural values that influence people's lifestyles, preferences and usage patterns.[119]

Mobility
Used in this report as a generic term for both traditional physical travel, and new opportunities in virtual meetings and work. The concept of mobility focuses on the service, or function that is delivered and not on the technical solution behind it.

Portal for optimised meetings and mobility
The portal for optimised meetings and mobility presented in this document is a tool to be able to systematically choose forms of mobility and meetings that contribute to a more effective and resource efficient organisation.

Rebound effects
Rebound effects are usually explained as the loss of the benefits from a new energy-efficient technology compared to the benefits if consumption had remained constant. For example, if the fuel efficiency of a vehicle improves by 5 per cent, and it only results in a 2 per cent reduction in fuel consumption, the rebound effect is 60 per cent ($^{(5-2)}/_{5}$ = 60 per cent). The remaining 3 per cent may have been consumed by running faster and longer than before.[120]

Rebound effects
See “Rebound effects”

REMM
Between 2011-2013, the Swedish Transport Administration conducted the Travel-free meetings at government agencies (REMM) project. The purpose of the project was to coordinate the work in a number of agencies selected by the government. The goal was to increase and develop travel-free meetings within and between agencies.[121]

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[118] Perkins, R. (2003). Environmental leapfrogging in developing countries: A critical assessment and reconstruction. *Natural Resources Forum*, Vol. 27(1), pp. 177-188.
[119] Geels, F.W. (2012). A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. *Journal of Transport Geography*, Vol. 24(1), pp. 471-482.
[120] http://en.wikipedia.org/wiki/Rebound_effect_(conservation)
[121] http://www.trafikverket.se/Foretag/Trafikera-och-transportera/Planera-persontransporter/Hallbart-resande/Tjanste--och-pendlingsresor/Resfria-moten/REMM--resfria-moten-i-myndigheter/

Service
The provision of functions and solutions consisting of a combination of physical components (consumables and equipment), processes and customer service (maintenance, repairs, software) that interact in a system to solve a specific need.[122]

NPS (National Procurement Services at Kammarkollegiet)
The National Procurement Servicesis a procuring government agency tasked with procuring and managing framework agreements for government agencies. NPS procures the goods and services that are needed to a large extent or that amount to large values. In addition, Kammarkollegiet is responsible for the entire procurement of framework agreements for public administration in the field of information technology, where municipalities and county councils can also join these agreements.[123] The aim of coordinating the purchasing of government agencies is to improve the efficiency of public procurement by reducing administrative costs for procurement and by generating more economically favourable terms.[124]

Skype
Skype is both the name of the company and the company's main software. The company is active in the field of Internet-based communication, primarily IP telephony.[125] Using the fast text messaging, voice and video calls, users can hold meetings, group video calls, work with colleagues and communicate with fellow work colleagues as well as family members wherever in the world they may be.[126]

Transformative solutions
Solutions that contribute to at least 80 per cent (factor 5) less resource consumption and CO_2 emissions in relation to how a function/service is provided in a conventional way. These solutions often mean new mindsets and initiatives, and an analysis of the needs that purchasing must satisfy that are not restricted to improvements to current technologies and systems.[127]

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[122] Söderström (2004). From product to service – the development of business and environmental strategies in product oriented companies: http://hhs.diva-portal.org/smash/get/diva2:221239/FULLTEXT01
[123] http://www.avropa.se/Pages/Default.aspx?id=32&epslanguage=sv-SE
[124] http://www.kammarkollegiet.se/statens-inkopscentral/statens-inkopscentral
[125] http://sv.wikipedia.org/wiki/Skype
[126] http://www.skype.com/sv/about/
[127] For more information about transformative solutions, see the UN project “Low-carbon leaders for transformative solutions”: http://transformative-solutions.net

Underlying infrastructure
For physical mobility, the underlying infrastructure includes items like roads, parking lots, railway tracks and runways. For virtual mobility the underlying structure includes items such as networks and servers.

Greenhouse gases
The gases that contribute to the greenhouse effect are called greenhouse gases. The main greenhouse gases are carbon dioxide (CO_2), nitrogen oxide (NO), methane (CH4), chlorofluorocarbons, water vapour and ozone.[128]

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9 Appendices

Appendix 1 Questionnaire to government agencies regarding a portal for meetings and mobility

The National Procurement Services procures and manages agreements for other government agencies. The framework agreements for IT and telecommunications can also include municipalities and county councils.

The aim is to improve the efficiency of public procurement by reducing administrative costs for procurement to the government agencies and by generating more economically favourable terms.

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