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STATUS REPORT ON THE DANISH NATIONAL ITS ACTIVITETS AND PROJECTS

STATUS REPPORT 2014

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INTRODUCTION

This report is the second report which has been prepared in accordance with Article 17, 1 and 17, 3 in the Directive 2010/40/EU.

Article 17, 1 requires that member States submit to the Commission by 27. August 2011 a report on their national activities and projects regarding the priority areas, and article 17, 3 requires that a report describing the progress of the actions described in the first report shall be submitted every three years thereafter.

On the ITS comity meeting in December 2013 it was also requested that the member states should provide information on annual investments in ITS since 2010 in absolute values + % of total transport budget / infrastructure investment, and by types of road.

In chapter 2 and 3 of this second report the progress of the activities and projects mentioned in the first report are described. In Chapter 4 new projects not mentioned in the first report are described, and in chapter 5 an economic overview is presented.

As with the first report from 2011, the present report presents an overview of the national ITS activities also including ITS systems and services. The local systems and services are not described in the report.

1.1 THE CONTEXT OF THE DANISH ITS INITIATIVES AND ACTIONS

As described in the 2011 report a political agreement, "A green Transport Policy", was adopted in 2009, whereupon different types of funds were decided, one of them being funds for "New Technological possibilities" including ITS as an important subject. As part of this programme an "ITS Development Forum" was established. The Forum, which was to advice and evaluate ITS-projects, was set up with a majority of members originating from industry and research institutes.

In March 2011 the Development Forum published an ITS Strategy and a national ITS Action Plan which both included recommendations of new ITS projects and formed a platform for political decisions to achieve the goals described in the ITS Strategy.

A number of ITS projects financed through the mentioned fund under "A green Transport Policy" has been decided on a political level and implemented by the Danish Road Directorate.

The funds under "A green Transport Policy" runs from 2009-2015, and no decision regarding funding after 2015 has been taken. For this reason the future of a number of the established ITS systems are uncertain since there, for the time being, are no funding for operating and maintaining the systems after 2015. Similar a number of systems have received other types of time limited funding, while others have a more permanent budget.



2. ITS SYSTEMS AND SERVICES

The status report from 2011 gives an overview of the major ITS Projects in Denmark. Section 2.1 of this chapter describes what has happened to these projects since the 2011 report. For more detailed background regarding each of the projects, please see the first status report from 2011.

Since the 2011 report a number of new projects has been decided and/or implemented. To give an updated picture of the situation in Denmark section 2.2 describes these projects in the same way as earlier projects were described in the 2011 report. Section 2.2 also serves as background information for the economic overview described in chapter 4.

2.1 MAJOR ITS SYSTEMS DESCRIBED IN THE 2011 REPORT

2.1.1 Traffic information at the Copenhagen motorway network and around Malmö (Sweden)

Since 2011 no major changes has been made to the system and the system is working in a satisfactory way. It is however being investigated if detectors on small stretches of the system could be shut down and replaced by data collection from real time GPS systems. No other changes are foreseen for the time being.

2.1.2 Traffic management, information and bridge tolling at “The Øresund Link” between Sweden and Denmark

The ETC system has been updated to comply with CEN-standard EN 15509, but otherwise there have been no major changes to the system which is working in a satisfactory way. No changes are foreseen for the time being.

2.1.3 Traffic information and management at the Motorring 3, M3, around Copenhagen

The last part of the road works was finished in 2012. Today the system remains more or less unchanged. For the time being no changes for the systems are foreseen, but the future of the system is uncertain due to uncertainty regarding funding for operation after 2015.

2.1.4 Traffic management, information and bridge tolling at The Storebælt fixed link.

The ETC system has been updated to comply with CEN-standard EN 15509, but otherwise there have been no major changes to the system which is working in a satisfactory way. No changes are foreseen for the time being.

2.1.5 Traffic information and warning systems in the Triangle Area

The system is being dismantled in 2014 and will be replaced by two ITS-systems in a section surrounding the Vejle Fjord Bridge and a section surrounding the New Little Belt Bridge (see chapter 2.2.4 and 2.2.7)



2.1.6 Traffic information and management at the Køge Bugt Motorway, M10, from Copenhagen to the City of Køge that is located around 40 km southwest of Copenhagen (M10 system)

The M10 system was originally implemented as a part of a road widening project. After completion of the road works, a part of the system was made permanent, and another part was reallocated to the widening of the next stretch of the M10 motorway. The system deployed between kilometre 12 and 24 is permanent in nature, whereas the system south of this location is deployed temporarily to help with the ongoing road works. The temporary system is further described under 2.2.2. The elements, components and objective of the system are still as described in the 2011 report. The widening of the last stretch of M10 is expected to be finalized in 2018. No decision has yet been made regarding to which extend the system will be made permanent after this date, but no funds have been allocated for operation after the end of the roadworks.

2.1.7 Traffic management and information at the motorway tunnel across the inlet Limfjorden and at the City of Aalborg

The system went in to operation in late 2011 as expected and has been working in a satisfactory way since, no major changes has been made to the system and no changes are foreseen for the time being.

2.1.8 Traffic management and information at the Guldborgsund Motorway tunnel that connects the two islands Falster to the East and Lolland to the West and 10 km from the City of Nykøbing F

No changes have been made to the system since 2011, and no changes are foreseen for the time being.

2.2 MAJOR ITS SYSTEMS NOT DESCRIBED IN THE 2011 REPPORT

2.2.1 Traffic management at Holbækmotorvejen, M11, between Folehaven and M3

Kind of system and location

Traffic management and information systems on the Motorway M11 from Copenhagen to the ring motorway 3 (M3) has been deployed temporarily to help with the ongoing road works at the location. The system went into operation in early 2014, and will be discontinued when the ongoing road works is finished.

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.



- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system is to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works.

Costs of the system

Implementation costs have been around 1 mills € and operational and maintenance costs are around 0.1mill € per year.

Coverage of the system

The systems covers approximately 5 km of the M11 motorway.

Status and perspectives

No further changes are planned before the roadwork is expected finalized in 2018, at which time it is expected that the system will be discontinued

Relevant priority area(s)

Priority area 1 about data and 3 about safety

2.2.2 Traffic management at Køge Bugt Motorvejen, M10, between Greve and Køge

Kind of system and location

Traffic management and information systems on the southern section of motorway M10 from Greve to Køge has been deployed to help with the ongoing road works at the location. The motorway on this section is being widened from 6 to 8 lanes. The system went into operation in late 2012

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.
- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system is to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works

Costs of the system

Implementation costs have been around 5.0 mills € and operational and maintenance costs are around 0.8 mill € per year.



Coverage of the system

The systems covers around 14 km of the M10 motorway.

Status and perspectives

The widening of the last stretch of M10 is expected to be finalized in 2018. No decision has yet been made regarding to which extend the system will be made permanent after this date, but no funds have been allocated for operation after the end of the roadworks.

2.2.3 Pilot project using the hard shoulder on the Hillerød motorway, M13, for driving in the morning rush hour**Kind of system and location**

The pilot project with hard shoulder running (HSR) on the Hillerød motorway (M13) between Værløse and Bagsværd is the first of its kind in Denmark. HSR is implemented on a 2 km long stretch and only in the direction towards Copenhagen. The motorway has 2 lanes in each direction and the average annual daily traffic is around 60,000 vehicles/day. The system went into operation in early 2014

Elements and components

The ITS system consists of 3 cross sections with a VMS on each side of the road showing when HSR is allowed and also showing the speed limit which is reduced when HSR is allowed.

The monitoring of the stretch is based on 13 video cameras with infrared light for visual inspection of the stretch (10 ptz and 3 fixed) and Automatic incident detection system based on loops that detects stopped vehicles and ghost drivers. Furthermore the project has involved reinforcement of 2 km hard shoulder and establishment of two safe havens

The system is monitored and manually controlled by DRD's Traffic Information Centre.

Objective of the system

The main objectives are to demonstrate how HSR could reduce congestion in the morning rush hours and ensure a more efficient and – if possible – safer traffic flow with reduced travel times, shorter queues and less time with queueing. The pilot will be evaluated in autumn 2014 and should provide experiences used for future possible projects regarding HSR.

Costs of the system

Implementation costs have been around 3 mills € and operational and maintenance costs are around 0.1 mill € per year.

Coverage of the system

The system covers around 2 km of the M13 motorway.

Status and perspectives

The HSR system was put into operation in December 2013, and overall it has worked very satisfactory in operation. So far the automatic incident detection system seems reliable with short reaction times regarding stopped vehicles and few false alarms



Preliminary results indicates almost 2 min ~ 20% shorter travel time for most drivers, smoother traffic flow, fewer and shorter queues and less traffic on parallel routes during the rush hours. The pilot will be evaluated more thoroughly in autumn 2014. The collected results, experiences and recommendations will be used in future HSR projects, and to decide the future of the M13 HSR system.

Relevant priority area(s)

- Priority area 1 about data and 3 about safety

2.2.4 M40 (Middelfart – Nørre Åby)

Kind of system and location

Traffic management and information systems on the Motorway M40 from Middelfart to Nr. Aaby has been deployed temporarily to help with the ongoing road works at the location. The system went into operation in 2013. The system will be discontinued when the ongoing road works are finished, but a small part relating to the New Little Belt Bridge are expected to remain and be operated under the bridge operating budget.

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.
- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system is to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works

Costs of the system

Implementation costs have been around 1.5 mills € and operational and maintenance costs are around 0.1 mill € per year.

Coverage of the system

The systems covers around 10 km of the M40 motorway.

Status and perspectives

No further changes are planned before the end of the roadwork at which time the system are expected to be discontinued.

Evaluation of effects on traffic flow and behaviour of road users is ongoing

Relevant priority area(s)

Priority area 1 about data and 3 about safety



2.2.5 Elsinore Motorway, M14, northern section

Kind of system and location

Traffic management and information systems at the northern part of the Elsinore motorway, M14.

- Traffic management and information systems at the The Elsinore motorway, M14. The traffic management and information system went into operation in 2012, The M14 are currently being widened from 4 to 6 lanes at a road section of 6 km from Gl. Holte to Horsholm S. the road works at M14 started in March 2013
- The main goals for the implementation of the ITS system were to ensure the best possible traffic flows and traffic safety before, and during the road works.

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.
- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system is to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works. It is a strategic issue to keep as much of the traffic as possible on the M14.

Costs of the system

- Implementation costs were around 5,5 mills € and operational and maintenance costs are roughly 1 mill € per year.

Coverage of the system

- The systems covers around 14 km of motorway.

Status and perspectives

- The system is designed to be permanent, but there are no funds allocated for operation after the end of the road work, therefore the future of the system is uncertain.



Relevant priority area(s)

- Priority area 1 about data and 3 about safety

2.2.6 Elsinore Motorway, M14, southern section**Kind of system and location**

Traffic management and information system on the southern section of motorway M14 from Lyngby to Copenhagen has been deployed permanently to ease congestion and improve traffic safety. The system covers the southbound traffic only i.e. traffic going towards Copenhagen and went into operation in 2012.

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.
- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system is to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works.

Costs of the system

Implementation costs have been around 2.0 mills € and operational and maintenance costs are around 0.3 mill € per year.

Coverage of the system

The system covers around 7 km of the M14 motorway.

Status and perspectives

The traffic management system are designed to be integrated with a new tunnel system that is being erected by Copenhagen municipality, but for the time being operating budgets are only available until the end of 2016

2.2.7 M60**Kind of system and location**

The Triangle Area consists of six municipalities located close to the cities Kolding, Vejle, Fredericia and Middelfart, and sometimes the western part of the island Fyn is regarded as part of the Triangle Area. The Triangle Area is important for the traffic because two of the main Danish corridors are crossing each other in the area. One of the corridors is the E45 going from Frederikshavn in the north



through Jutland to Germany via Frøslev at the German-Danish border. The other corridor is E20 coming from Sweden and via the Oresund fixed link, Copenhagen, Great Belt fixed Link and Odense to Esbjerg from where there are ferry boats to Harwich in UK.

Kind of system and location

Traffic management and information systems at the E45 East Jutlandish Motorway, M60. The M60 has been widened from 4 to 6 lanes at a road section of 17 km from Vejle North to the motorways section Skaerup, and the traffic management and information systems went into operation in 2012. The main goals for the implementation of the ITS system were to ensure the best possible traffic flows and traffic safety during the road works.

Elements and components

- Traffic information and status presented on the Internet and disseminated via the Danish national radio and local radio stations.
- Traffic information includes traffic density, present travel time, predicted travel time and average speed.
- VMS's used for travel time information, and for warning the drivers about accidents, lost objects, stopped cars in one of the lanes, icy or oily road surface etc.
- Visual monitoring carried out through PTZ-cameras
- Speed harmonisation carried out through variable message signs

Objective of the system

The main goal of the system was to ensure best possible traffic flows, give reliable traffic information and improve traffic safety during the road works. It was a strategic issue to keep as much of the traffic as possible on the M14.

Costs of the system

Implementation costs were around 5,5 mills € and operational and maintenance costs were roughly 1 mill € per year for the temporary system, and for the present system around 0.5 mill € per year.

Coverage of the system

The system covers around 37 km of motorway during the roadworks, and the present system covers around 20 km.

Status and perspectives

Today the system is partly dismantled and replaced by a smaller system. The current system consists of:

- Traffic information presented on the Internet and disseminated via the Danish Broadcasting Company and local and regional radio stations.
- Queue-warning, high wind warning and travel times on variable message signs.
- Speed harmonization up to, and across Vejle Fjord Bridge

No further changes are foreseen for the time being.

Relevant priority area(s)

Priority area 1 about data and 3 about safety



3. ITS ACTIVITIES

In this chapter progress and/or status for the activities described in the first report are clarified, for the sake of convenience the paragraph numbers from the first report are maintained in this report. For more detailed background regarding the activities, please see the first status report from 2011

3.1 STANDARDS AND NATIONAL ROAD NOTES

The Danish Road Directorate is together with other road authorities in Denmark committed to create a coherent and effective transport system across the road authorities' road networks. We adapt not only to the European standards but often also to the international ones. We work on harmonization of the ITS systems and services to the benefit of road users and to improve transport efficiency for the society and are represented in different projects and organisations developing new standards, among others Cen TC 278.

Since the 2011 report The Danish Road Directorate has initiated a project aiming at using standards to create a more coherent digital infrastructure for the road sector as a whole, and to ease exchange of data between both public and private stakeholders. This project are to some extent inspired by the INSPIRE project, and involve major stakeholders in Denmark such as The Danish Road Directorate, Local Government Denmark (the interest group and member authority of Danish municipalities), and the Danish Geodata agency.

3.2 EDUCATION, PROFESSIONAL TRAINING, LITERATURE AND DESK RESEARCH

For the bigger ITS implementations The Danish Road Directorate has carried out evaluations to expand the knowledge about costs and benefits etc.

The Danish Road Directorate sees large interests and needs for cost-benefit analyses and assessment of the feasibility of ITS measures. The Danish Road Directorate has elaborated a method for assessment of the socio-economic feasibility of ITS measures. As one of the tools The Danish Road Directorate has carried out a catalogue with all the effects known from evaluations of the ITS measures in 2011 – 2013.

The socio-economic value of most effects are calculated or estimated. The Danish Road Directorate has estimated the value of traffic information in order to calculate the feasibility of the traffic information. The value of traffic information has been estimated by means of a state of preference analysis.

In 2014 The Danish Road Directorate published a summary report that includes all evaluations of ITS on highways during the period 2005-2013. The report contains conclusions about effects and socio-economic feasibility of every ITS System. The conclusions of the report are:

- ITS can raise the level of service during road works
- ITS can prevent congestion
- Traffic safety can be improved by ITS
- Service for road users is improved by ITS



- ITS can contribute positively socio-economic

3.3 DESCRIPTION OF TRAFFIC INFORMATION SERVICES

An updated list of current traffic information services, corresponding to the one imbedded in the 2011 report can be found in appendix 1.

Where possible the text will comply with the template being in a fixed format with the following headings:

- Information service
- Purpose
- Milestones (if any)
- Partners (if relevant)
- Status
- Priority area related to the service



4. ECONOMY

On the ITS comity meeting in December 2013 it was requested that the member states should provide information on annual investments in ITS since 2010 in absolute values and in % of total transport budget / infrastructure investment, and by types of road.

All the ITS systems described in this report are on state owned and operated motorways. In the below table the investment in the mentioned ITS projects are described, as well as the road infrastructure investment in state owned and operated roads. No municipality roads or investments are included.

For the ITS systems the investments are placed in the year the systems went into operation, and it is to be understood that all that stated investments are approximately values stated in mill. €

	2010	2011	2012	2013
M70 Aalborg (2.1.7)		4		
M10 (2.2.2)			5	
M40 (2.2.4)				2
M14N (2.2.5)			5.5	
M14S (2.2.6)			2	
M60 (2.2.7)			5.5	
Total	0	4	18	2
Road infrastructure investment	312	303	272	191
ITS investment as % of Road infrastructure investment	0.0	1.3	6.6	1.0



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APENDIX 1 - DESCRIPTION OF TRAFFIC INFORMATION SERVICES AND PROJECTS IN DENMARK

Information Service	Purpose	Milestones (if any)	Partners (if relevant)	Status	Relates to priority area ...
Smartphone application (Trafikinfo)	To give live updated road and traffic information – using sound files – to the drivers when and where it is needed, in order to improve mobility and traffic safety.	iPad version and push function will be integrated in 2014	-	The old version with the name Trafikken.dk was in 2014 replaced with a new version Trafikinfo . There is both Android and iPhone version.	I + III
Mobile web service	To give live updated traffic information – easy to access with any mobile browser, in order to improve mobility and traffic safety	-	-	The mobile service is found here. http://mobil.trafikken.dk	I + III
Smartphone application (VinterTrafik)	To give live updated winter road and traffic information to the drivers before the journey. To improve mobility and traffic safety.	iPad version and push function will be integrated in 2014	Most of the Danish municipalities	Launched in 2013	
Web based Road and Traffic Information Map service	To present the live road and traffic information to the users in a way that gives them freedom to customize the map, so it contains the information they find relevant - in order to improve mobility and traffic safety.	An updated version of the map, with more features. ultimo 2011	-	The map can be found on www.Trafikken.dk	I + III
RDS-TMC	To broadcast free and	Continuously	Danish	The service is	I + III

	language independent Road and Traffic messages to the drivers on the move, in order to improve mobility and traffic safety.	updating	Broadcasting (DR)	running, and messages are broadcasted using DRs broadcasting network	
Regional internet portals	Presenting the travelers (primarily commuters) with an overview of live traffic information, so they can choose the best suitable mode of transport and hereby increase mobility.	A new regional portal was launched in 2011	Several municipalities, local police and public transport operators.	4 regional portals exists: Trafikken.dk/hovedstaden Trafikken.dk/Trekanten Trafikken.dk/Østjylland Trafikken.dk/Nordjylland In 2014 app's has been deployed so this service is now also available on smartphones and tablets	I
Text TV	Presenting live traffic information on Text TV – easy access on any TV – all in order to improve mobility and traffic safety.	Redesign of several Text TV pages this year (2011)	DR and TV 2	Text TV has been used as medium for many years, and we are now looking into automating the updates and redesigning the information pages	I + III
Web TV	DRD presents road and traffic prognoses/forecasts to a broad audience in journalistic edited format,			Web TV productions are made every Monday and Thursday (so twice	I + III

	using the web and mobile web solutions as medias for broadcasting. All in order to improve mobility and traffic safety. There is a special focus on events and large road works			a week). Link: http://www.vejdirektoratet.dk/da/trafik/webtv/sider/default.aspx	
Twitter	Quickly inform the public and especially the press about large incidents and blocked highways - especially in relation to extreme weather conditions.			Launched ultimo 2013	