

# [ ICT for Clean & Efficient Mobility



Working Group Final Report  
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## [ Agenda



The Environmental Challenge  
The EU Action Plan  
The Working Group - the Integrated Approach  
Green ITS Measures & recommendations  
Conclusions



## [ The Environmental Challenge



Global warming by CO<sub>2</sub> is a fact & a major threat

CO<sub>2</sub> emissions by road transport can be reduced by

- Vehicle technology
- Fuel and how it is used
- Type of vehicle and how it is driven
- Efficiency of the road network, traveller's modal choice

Need to reduce dependence on oil-based fuels

Air pollution is health hazard, cities must preserve air quality



## [ The EU Action Plan



2006 - EC Action Plan

- 20% reduction in energy consumption by 2020
- increase renewables to 20% of total energy use

Smart transport & logistics should reduce energy consumption by 26%



## [ The Working Group

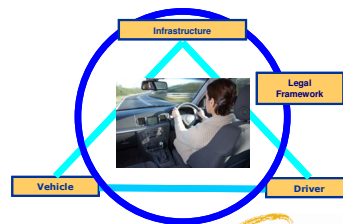
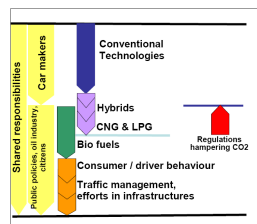
eSafety Forum Working Group on ICT for Clean and Efficient Mobility - established December 2006 with the purpose to

- Identify and promote the potential benefits that ICT (information & communication technologies) and ITS (intelligent transport systems) applications & services can bring towards cleaner and more energy-efficient mobility for people and goods.



## [ The Integrated Approach

- Involve wide range of relevant stakeholders
- Look for complementary measures to vehicle technology
  - » Improving traffic management, adjusting infrastructure, increasing the use and availability of alternative fuels, changing driving behaviour and influencing consumer demand through taxation



## [ “Green” ITS Measures

“Green ITS” areas with greatest potential for environmental impact:

1. Eco-driving support
2. Eco-traffic management
3. Eco-information and guidance
4. Eco-mobility services
5. Eco-demand & access management
6. Eco-freight and logistics management
7. Eco-monitoring and modelling



## [ Eco-Driving Support

Change drivers' actions (“Golden Rules”  
Training, awareness, real-time information,  
incentives & penalties, etc.

Green ITS to support driver to adopt, maintain  
a more fuel-efficient driving style

- In-vehicle features (display of fuel consumption, stop-start assist, eco-navigation, gear-change indicator, advanced transmission, tyre-pressure monitoring)
- Add driver support (enhanced vehicle & driver monitoring, internet coaching, adaptive cruise control, extra map content, vehicle-infrastructure communication)



## [ Eco-Driving Support

- Eco-journey support
  - » on-line and mobile traveller information services: environmental conditions, multi-modal choices, before and during the journey;
- Enhanced navigation
  - » using adapted algorithms for dynamic route guidance, e.g. with historic data, least-fuel routing etc.
- Cooperative eco-driving
  - » driver feedback and guidance on a more fuel-efficient driving behaviour (e.g. CO<sub>2</sub> production or cost/saving in Euros)
- On-board monitoring, online coaching
  - » advise & build in “golden rules of eco-driving”



## [ Eco-Driving Support

Eco-drive training reduces fuel consumption up to 20% after training, long-term effect of 7% under everyday driving conditions

- 7% saving = 16bn fewer litres of petrol/diesel (EU 27)

European Climate Change Programme estimates eco-driving could save 50 million tonnes of CO<sub>2</sub> emissions in Europe by 2010

TNO research institute estimates cost savings to society up to € 128 per tonne CO<sub>2</sub> saved.



## [ Eco-Driving Recommendations

- Research is needed into how the “golden rules of eco-driving” might be automated within onboard and off-board services;
- Multi-media campaigns should be launched in a coordinated way to create awareness and acceptance for eco-driving measures;
- Automotive manufacturers should explore the potential for additional optional eco-driving support functions such as eco-driving feedback display, reporting and analysis, on-line coaching etc.;
- On-line services should be promoted that support eco-driving behaviour through comparison with the performance of a driver’s peers, through competitions and incentives, etc.



## [ Eco-Traffic Management

Traffic congestion costs about 2% of EU GDP, extra fuel consumption and CO<sub>2</sub> emissions.

Help traffic flow more smoothly

- Fewer vehicle stops, acceleration-deceleration cycles
- Help drivers travel at optimum speed
- Giving drivers information and guidance
- Use tools of demand management
- Deploy latest generation of dynamic UTC



## [ Eco-Traffic Management



### Effectiveness of dynamic urban traffic management

- In UK cities journey time down by 8% (cars) and 6% (buses), and a 20% reduction in delays
- In Italy UTOPIA increased private traffic speed by 15,9% on average, 35% in peak times.
- Parking Guidance & Information System could reduce parking space search by 50%
- Traffic light synchronization can increase intersection throughput by 15%.



## [ Eco-Traffic Management



### Variable Message Signs

- can divert traffic from problem areas, optimise section speed & capacity, lead to 10-30% fewer accidents, 2-8% less emissions.

### Intelligent Co-operative Systems (V2V, V2X)

- German INVENT: already 20% equipped vehicles would reduce traffic jams, lead to smoother traffic flows.
- CVIS (Cooperative Vehicle Infrastructure Systems) and COOPERS projects are developing interactive traffic management to reduce delay, fuel consumption, increase traffic fluidity



## [ Eco-Traffic Management recommendations



- Research and development is needed into a new generation of urban traffic control systems that can be optimised according to environmental criteria, such as least overall fuel consumption, or that minimise CO<sub>2</sub> or pollutant emissions;
- Those cities where there is not a modern adaptive urban traffic and parking management system should be encouraged and helped to invest accordingly;
- A guidebook should be compiled featuring best practice on energy-efficient traffic management strategies and measures, and distributed widely to urban traffic managers;
- New public-private partnership models for cooperative system deployment should be explored.

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## [ Eco-Information & Guidance



### Navigation systems

- Avoid traffic jams through real-time traffic information
- Reduce mileage driven in unfamiliar areas by 16%
- Save up to 30% mileage searching for a parking place

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### Eco-navigation adds

- Enhanced map data (gradient) & real-time traffic info helps choose least-fuel route
- Avoid sensitive areas, air pollution peaks
- Multi-modal trip choices & guidance

### Portable navigation systems

- Outnumber in-built systems, forecast increase from 16 million users in 2008 to 70 million by end of 2014



## [ Eco-Information & Guidance



- Digital maps should be enhanced to include additional environmental attributes such as road gradient (slope), speed limits, truck-specific restrictions, road charging/ controlled access zone data, accident risk, historic traffic data etc.;
- Public authorities that own such data should offer them to digital map providers;
- Real-time traffic information (RTTI) service providers should offer enhanced information including critical weather conditions and multi-modal journey alternatives;
- Floating car/device data collection, processing and delivery needs to be promoted in a joint stakeholder effort

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## [ Eco-Mobility Services



ICT for complementary measures

Incentive schemes

- E.g. “green bonus”, “earn or pay-as-you-travel”
- Individual CO<sub>2</sub> budgets

Individual mobility

- High occupancy vehicle priority, car & ride sharing

Collective mobility

- Demand-responsive transport (shared taxis, mini- and midi-buses)
- Flexible bus routing & scheduling

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## [ Eco-Mobility Services



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- Research is needed into the public acceptance of eco-mobility services and how to promote a shift towards eco-friendly modes;
- Research is needed on the potential environmental benefits and fuel savings of ride-sharing, car-sharing and multi-modality concepts and end-to-end traveller support services;
- Deployment support and large-scale demonstrations are needed to build stakeholder acceptance of technologies and standards.



10th eSafety Forum Plenary Meeting - Brussels - November 6, 2008

## [ Eco-Demand & Access Management



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Demand management charges for use of road network, with ICT can vary by time, place, vehicle type

Access management controls vehicle access to specific areas, e.g to reduce congestion, improve air quality

Potential for impacts

- London congestion charging zone reduced CO<sub>2</sub> emissions by 16,4%, emissions of NO<sub>x</sub> and PM<sub>10</sub> by 12%, and congestion by 30% (2003 vs. 2002)
- Stockholm reduced traffic 15% in City Centre, emissions down 12-14%
- Rome access control zone cut traffic 15-20%, increased speed 4%, and PT use went up 5%



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## [ Eco-Demand & Access Management



Technologies and the operational framework for demand and access management should be harmonised across Europe, around a core of European standards



## [ Eco-Freight & Logistic Management



### Concept of “Intelligent Cargo”

- Enhanced and widespread capability to monitor, trace and safely handle moving goods
- Increased efficiency of transportation networks, by improving synchronization between stakeholders
- Improved sustainability of logistic systems.

ITS tools are fleet management systems & services



## [ Eco-Freight & Logistic Management

### Fleet (vehicle) management ITS functions

- Vehicle maintenance and financing
- Vehicle and driver despatching
- Telematics services (e.g. floating-vehicle data collection, vehicle tracking and geo-fencing, cargo tracing, remote diagnostics, electronic fee collection)
- Online transport auction to cut “empty hauling”
- Driver time and shift management
- Fuel monitoring and management
- Data collection for real-time, *a posteriori* use



## [ Eco-Freight & Logistic Management

ITS links movement of goods with the production, handling and delivery processes (“smart logistics”)

The global emissions savings from smart logistics in 2020 would reach 1.5 Gt CO<sub>2</sub> equivalent, with energy savings worth € 280 billions.

Efficient logistics measures enabled by ICT could reduce emissions by 27%



## [ Eco-Freight & Logistic Management

- For better decision making, new integrated tools for assessment and modelling of air quality, energy efficiency, CO<sub>2</sub> emissions and traffic need to be developed and tested in a real life environment;
- Research is needed to develop a standards-based open platform offering commercial vehicle fleet operators a range of services to improve fuel economy and reduce environmental impacts;
- Support actions are needed for the demonstration and deployment of Intelligent Cargo concepts;
- A multi-sector forum is needed to agree a common European approach to city logistics.



## [ Eco-Monitoring & Modeling

Vehicle-based collection of traffic, energy & environment data can increase information quality, coverage & timeliness

Integration of enhanced data with traffic & air quality models can provide better traveller information services, and enable optimised urban traffic control

Real-time energy consumption monitoring can support eco-driving services, and low-CO<sub>2</sub> route guidance & traffic management systems



## [ Eco-Monitoring & Modeling



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## [ Conclusions



Global warming and the need to preserve the environment must be addressed by the mobility sector, and quickly

Sustainable energy savings and mobility need the application of Information and Communication Technologies (ICT) - "Green ITS"

Substantial potential for new Green ITS technologies, applications and services dedicated to reduce environmental impacts or increase the energy efficiency of road transport.



## [ Conclusions

An integrated approach is needed to achieve sustainable mobility

- If all potential Green ITS measures would be implemented together and within a concerted European programme supported by all stakeholders, then an overall reduction of fuel consumption and CO<sub>2</sub> emissions in the order of 25% should be achievable.

WG, it is not possible today to form a reliable and quantitative estimate of all impacts

