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EU Transport GHG: Routes to 2050?

Intelligent Transport Systems (ITS)

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Partners

www.eutransportghg2050.eu



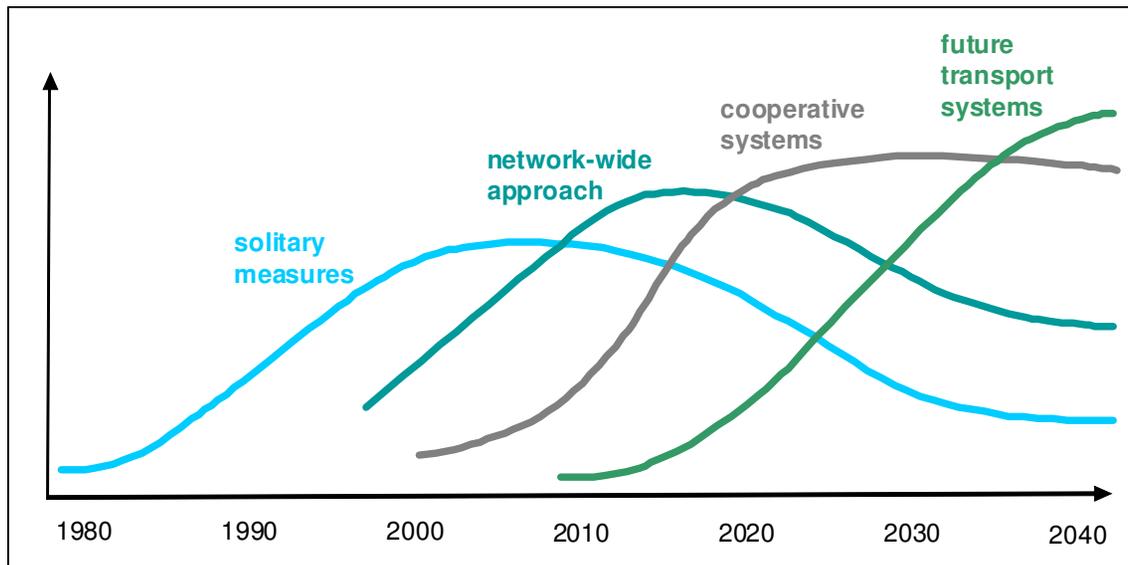
Variants of ITS

- Driver assistance systems
- Traffic management
- Traffic information systems

- ITS may be located in:
 - Vehicles
 - The infrastructure (roadside)
 - In the vehicle without being part of the vehicle (nomadic devices)

- Main areas of application:
 - Safety
 - Relates to emissions reduction by decreasing the accident related congestion
 - May lead to reduced 'hardware' safety requirements and thus reduced weight (?)
 - Improving traffic throughput
 - Reducing emissions

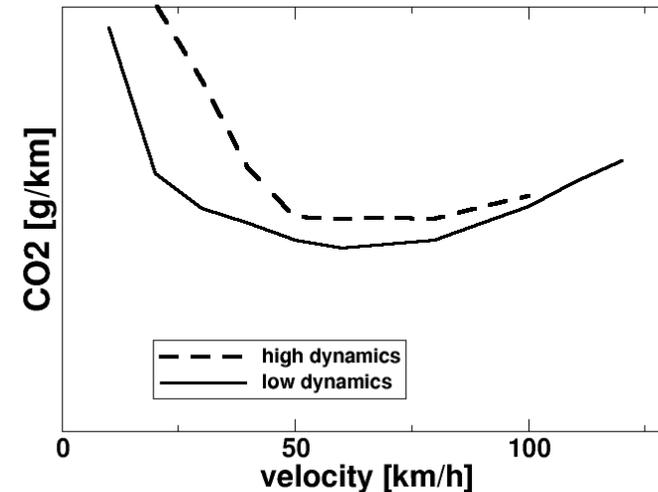
Developments in ITS



1. Solitary measures (local traffic management or in-car adaptive cruise control)
2. Network-wide approaches (for traffic management), requires
 - Improved data collection
 - Improved processing methods
 - Algorithm development
3. Cooperative systems (vehicle-to-vehicle or vehicle-to-infrastructure communication)
4. Future systems (2050): traffic management integrated with driver assistance and information systems

ITS and emissions reduction (means)

- Reduce the number of kilometers traveled
- Optimize the average speed
- Optimize the traffic composition
 - E.g. by means of congestion charging
- Optimize the vehicle dynamics
 - Congestion is only small part of all kilometers driven (reducing congestion has little effect)
 - Less congestion may lead to more traffic (which has a negative impact on GHG emissions)
 - Influencing driving dynamics is most efficient if this applies to a large part of the road network (the efficiency of local measures is not significant)



- For all but the highest average velocities, the measures to reduce vehicles dynamics, i.e., reducing accelerations and decelerations, will reduce the CO2 emissions, by 5% to 20%, for the same powertrain technology

ITS and emissions reduction (systems)

Eco solutions	Eco driving assisted by Energy use indicator and Gear shift indicator, Map-enhanced eco driving, Automatic engine shutdown, Fuel efficiency advisor, Tyre pressure indicator
Stand-alone (in-car) systems	(Adaptive) cruise control, Lane keeping assist, Emergency braking, Fuel efficient route choice, Pay As You Drive (PAYD), Speed Alert
Advanced traffic management	Congestion charging, Road charging, Dynamic speed limits, Dynamic traffic light synchronisation, Green waves, Slot management, Freight trip planning systems
Cooperative systems	Cooperative adaptive cruise control, Congestion assistant, Platooning, cooperative traffic lights
Future	Optimization of ITS w.r.t. emissions reduction (requires that measures must be accepted by the driver)

Cost of ITS

- Infrastructural requirements (May decrease over time because of increasing in-vehicle or vehicle-to-vehicle system performance)
 - Service providers
 - Personnel
 - Traffic management centres
 - Monitoring and data processing facilities
 - Computer servers
 - Variable road signage
 - Sensors
- Software
 - ICT
- Hardware
 - Infrastructural requirements
 - In-vehicle requirements
 - Sensors
 - GPS
- PR/marketing

Barriers

- Systems can be difficult to implement because of the amount of stakeholders
 - Organisational issues
 - Legal issues
- High initial investments
- Difficult to reach sufficient penetration rates
 - Many systems don't make it past the trial stage
 - Penetration is unpredictable and system dependent
- For high effectiveness of advisory systems, high compliance is needed

Issues

- The effect of ITS is highly dependent on local conditions
- There exist few quantitative evaluations of ITS with respect to GHG emissions
 - Suitable modelling approaches are currently being developed
 - Several field tests are taking place in 7th framework projects
- Few studies look beyond 2020
- Co-benefit: ITS measures that reduce emissions are likely to decrease noise annoyance because of increasing driving smoothness and decreasing congestion.

Open questions

- Role of ITS in 2050?
- How does ITS affect emissions in 2050?
 - Likely to facilitate a transport increase
 - Effect on average speed?
 - Traffic composition in 2050?
 - Relation between vehicle dynamics and emissions in 2050?