June/July 2010

traffic
TECHNOLOGY INTERNATIONAL

New look, more features, better than ever

GNSS tolling
Behind the scenes of the Eindhoven trial

What lies beneath
Showcasing the ingenuity in tunnel management

WWW.TRAFFICTECHNOLOGYTODAY.COM

Planned for perfection

How ITS can help your special event run smoothly

PLUS

Dr Andreas Kossak
"Politicians do not like it much when you do not share and support their opinion"

A round of applause
Houston, we have a solution: our coverage of ITS America's Best of ITS Awards

Environmental awareness
Jean-Charles Pandazis discusses the eCoMove project

Clean-up operation

By marrying the perfect eco-driver with the perfectly eco-managed road network, the team behind this newly launched EU-funded project feel that 'green ITS' technologies can make a significant contribution to reducing the impact of transport on the environment. **Saul Wordsworth** is the first to the story

Illustration courtesy of Magictorch

Most of us think we are pretty decent drivers but that doesn't mean the way that we drive is good for the environment. If we're all honest, we probably spend far too long in low gears, allow ourselves to become snarled up in jams that we could avoid, or maybe even leave the engine running for minutes at a time while waiting for passengers. Such examples are wasteful if performed by each of us individually, or by fleets of truck drivers. We can, of course, try and remember to drive more slowly or gently, or listen into traffic information to optimize our route. We can even attend eco-driving courses that show us ways to keep fuel wastage and, as a consequence, emissions to a minimum. But all too often the best of intentions get forgotten and default behavior ensues.

Road transport is responsible for 70% of all transport greenhouse gas emissions, which themselves make up one fifth of all global emissions. This means that private and commercial vehicles account for 14% of all CO_2 emissions. Any attempt to reduce this number, however small, would add to our tentative collective efforts to address global warming. Hence the reason why eCoMove is so important.

Funded through the European Commission's 7th Framework Programme of Information Society Technologies, the eCoMove project has been established to tackle the problem of energy efficiency by combining ICT (Information and Communication Technologies) and ITS – known collectively here as 'green ITS' – to achieve cleaner and more energy-efficient mobility of goods and people.

How it works

The eCoMove concept intends to achieve this reduction through the exchange of information between vehicles (V2V) and between vehicles and traffic infrastructure (V2I). This constant communication and swapping of information should allow driver, vehicle and traffic system to optimize the driver's route and driving style, thereby improving overall energy efficiency.

"Each eCoMove application will use cooperative data exchange as either originator or recipient," explains Jean-Charles Pandazis (see *Behind the scenes*), who prior to joining ERTICO built a successful career with Bosch Corporate Research as R&D engineer, project manager and group manager within the field of ADAS. "With eCoMove, a vehicle equipped with an onboard eco-driving system and communication platform will be able to exchange data with the infrastructure and other equipped vehicles, just as an eCoMove-equipped roadside traffic management unit will be able to exchange data with equipped cars and trucks."

eCoMove's communication platform will be adapted from technology developed during

Behind the scenes

This multimillion dollar project is being coordinated by Jean-Charles Pandazis, head of EcoMobility at ERTICO. "The idea behind eCoMove is that for any given trip there is a minimum energy consumption that could be achieved by the perfect eco-driver traveling through the perfectly eco-managed road network," he explains.

"In reality, though, this never happens. Today the main contributing factors toward wasted fuel consumption are inefficient deceleration and lack of anticipation, traffic congestion, driving too fast, inefficient traffic light control and poor management of work zones – in other words, a blend of driving behavior and traffic management and control. Through a combination of technologies – including pre-trip planning, real-time eco-driving support and post-trip feedback – eCoMove will address each of these contributing factors in turn and hopefully reduce traffic fuel usage by up to 20%. That's the magic figure, but I think we can go further," Pandazis predicts.

Better IT,
higher passenger occupancy and freight loading could lead to further fuel consumption reductions of 20%

> Drivers will be assisted before, during and after driving with dedicated eco-applications that will make all drivers aware of how it is possible to drive in an optimal way to reduce fuel consumption and CO_2 emissions

previous projects, particularly CVIS and SAFESPOT. As well as the core technology already discussed, the eCoMove project is divided into three application subprojects – ecoSmartDriving, ecoFreight and Logistics, and ecoTraffic Management and Control – plus one horizontal subproject, Validation and Evaluation.

ecoSmart Driving

The ecoSmartDriving applications focus on everyday drivers and similar to all other eCoMove applications are based on existing information functions that can be provided by traffic management, other vehicles, advanced navigation systems and in-vehicle systems. Luisa Andreone of Centro Ricerche Fiat (CRF) is project leader for this particular subproject: "Drivers will be assisted before, during and after driving with dedicated eco-applications that will make all drivers aware of how it is possible to drive in an optimal way to reduce fuel consumption and CO_2 emissions. There are a number of key elements within ecoSmartDriving, including navigational maps that provide real-time data on traffic congestion, route planning and road conditions to give a view of the road ahead."

Road transport
is the third-largest source of UK greenhouse gases and accounts for over 20% of total emissions

The first application within this subproject is called ecoTripPlanning – a pre-trip application that will enable green routing complemented by relevant information that can support the reduction of fuel consumption in areas such as parking availability. During the journey itself, Dynamic Green Routing will be available, which integrates the information from traffic centers, other vehicles and ecoMaps. The ecoDriving Support module will provide information for the driver about how to drive depending on traffic, location, road and environment, as well as the driver's style, vehicle type and fuel usage. The ecoInformation application meanwhile will guide the driver as to how to tune other vehicle functions to minimize fuel consumption.

Once the journey is complete, ecoPostTrip comes into play. Based on the drivers' personal storyboard, this is an essential component as it will be the key to understanding how each person drives. The information collected will then be used to optimize particular eco-driving strategies as well as the provision of customized information to the driver.

ecoFreight & Logistics

The applications for ecoFreight & Logistics aim to improve truck energy efficiency by introducing a learning driver coaching system and a planning and routing system that give all stakeholders the possibility and motivation to strive for optimal eco-behavior. "The challenges are twofold," says Guillaume Vernet from Volvo, who heads up the subproject. "The first is to overcome the potential of traditional eco-driving training wearing off over time; the second is to achieve sustainable eco-driving via adaptive coaching and incentives."

The first application, the ecoDriver Coaching System, will support the driver at different stages of his learning. During the pre-trip phase, an ecoDriving training system implemented in a virtual simulator will train the driver with the eCoMove system for relevant situations. During the trip itself, a real-time eco-driving system will provide appropriate instructions to the driver using an interface, and once the journey has been completed, a cooperative fleet management back-office system will analyze trends, provide feedback and handle possible driver incentives and bonus schemes. The second application, Cooperative ecoFleet Planning & Routing, will enable route and driving planning for different

A day in the life of eCoMove

Susan and Alan are married. Susan drives to work while Alan drives for a living. Susan's daily commute begins with her inputting her destination into her in-car navigation device. She discovers the nearest motorway junction is closed due to roadworks, but the alternatives are computed using historical data already stored in the system so she sets off on her new route. After five minutes she reaches a sharp bend, so her eco-drive assistant advises the optimal deceleration profile for the smoothest outcome. She then approaches a slope and is given the recommended acceleration and gear selection. Next she meets a barrier at a railway crossing, which the system informs will remain closed for 90 seconds before automatically turning off the engine. Once the train has passed, she restarts the engine and eases off. Susan arrives at work and receives a summary of her eco-driving performance compared to the past three months along with the amount of time, money and fuel she has saved compared to driving without the eco-drive assistant.

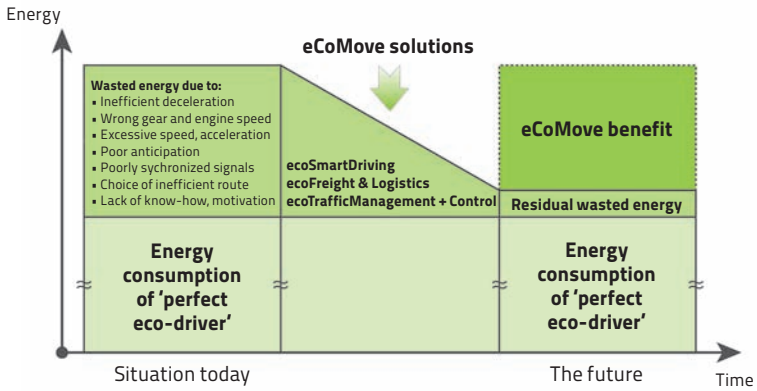
Alan, meanwhile, works for a haulage company that has recently invested in a fleet of eCoMove vehicles. His transport manager uses the eco-fleet management system to calculate optimal routes based on historical data, real-time traffic data from traffic information services and data shared directly by other vehicles on the road. This route is then displayed on the driver's eco-driving support system. Alan sets off and follows the route he has been given. After being guided to his allocated parking space he picks up the package. He then drives off and heads for the city center. As he approaches a set of traffic lights, his truck sends its position to the traffic control center, which puts his vehicle into the green wave phase. Calculating distance and speed, the truck adjusts its approach and drives through the lights on green without having to stop. Once Alan arrives at his destination, all relevant speed, gear change and acceleration/deceleration data is automatically sent to his manager. The data shows that Alan has improved his fuel economy on the previous month and so he receives a cash bonus.

Optimism

"Other projects may work toward optimizing the engine but this is not our area. This is about efficient driving," stresses Jean-Charles Pandazis. For him and his colleagues, the key to the success of eCoMove is to produce something simple and user-friendly and for this to be achieved the interface with the driver is vital. How the information is presented is the key to getting both commercial and non-commercial vehicle drivers to use the technology, thereby changing their driving behavior.

"We believe there is great value in eCoMove," he says. "At the end of the project when we have shown the results we hope that car companies as well as the traffic companies will be motivated to deploy our solution. People will then possess a vehicle that will be more eco-friendly and that will help them to fit their needs in a cost-effective way."

And what of its wider impact? If applied worldwide, eCoMove could at a stroke reduce all greenhouse gases by 2%. Although this is not likely to happen overnight, by lighting the touch paper, he says that eCoMove may yet be shaping a greener driving future for everyone.



(Left) **eCoMove Vision targets a perfect eco-driver traveling through a perfectly eco-managed road network** (Below) **Cooperative data exchange as enabler of eCoMove solutions**

transport scenarios. The pre-trip application cooperates with other systems such as traffic management, map data and eco-cooperative horizon to take the optimal route and adapt truck parameters accordingly. The final application, In-vehicle Truck ecoNavigation, will use the routing application developed in ecoSmartDriving but include truck attributes to calculate the most fuel-efficient route.

ecoTraffic Management and Control

The final application subproject is managed by Jaap Vreeswijk of Peek Traffic: "Applications for this module aim to find a balance between the collective interest of road operators to optimize the overall performance of the transportation system (including energy efficiency) and the individual interest of road users to travel the quickest route at the lowest cost," Vreeswijk reveals. "The challenges to overcome fuel waste related to traffic management are excessive stops, poorly optimized traffic lights, unstable traffic flows and congestion."

The first application, ecoAdaptive Balancing and Control, looks at balancing traffic demand and network capacity by distributing traffic over a road network and facilitating this traffic locally with traffic light control. Vehicle-to-infrastructure interaction plays a key role in acquiring real-time vehicle fuel consumption data, and in return informs drivers about the optimal route choice and traffic light status. The second application, ecoAdaptive Traveller Support, provides personalized recommendations to vehicles for both efficient vehicle operation and an optimized driving strategy, including speed profiles. The third and final application, ecoMotorway Measures, aims to improve the stability of traffic flows on motorways by optimizing vehicle speeds, headways and lane-change maneuvers.

Over the next eight years, road passenger transport in Europe is forecast to increase by 19%, while freight transport is set to go up by 50%

Validation and evaluation

The aim of the Validation and Evaluation subproject is to validate the functionality of the systems and applications as well as evaluate if the key reduction in energy consumption of 20% overall can be achieved. Several validation tests will be carried out at sites in Germany, including Helmond, Munich, Düsseldorf and Berlin, in addition to motorways in France – a task that will be managed by Stefan Trommer of DLR. "The eCoMove consortium will have to take on some of the most difficult challenges facing both the automotive and ITS industries," Pandazis suggests. "In other words, how to create truly cooperative technical solutions to deliver substantially reduced energy consumption and greenhouse gas emissions from road transport."

In all, eCoMove constitutes a partnership of 32 companies. The main stakeholders in this impressive list features companies in automotive R&D (Ford, BMW, CRF, DAF trucks and Volvo) and Tier 1 automotive equipment (Bosch and Continental). It also features digital maps (NAVTEQ, Tele Atlas), traffic management systems (Peek Traffic, PTV and Vialis) and communication system suppliers (NEC and Q-Free), along with systems integrator Logica, which is developing the architecture and integration of the eCoMove solution. The partnership also includes university and research institutes specializing in modeling, simulation and validation (DLR, ika from RWTH Aachen University, TNO and the Technical University of Munich), along with the RACC (motoring association) and Go Green (eco-driving trainer), which brings its experience and point of view to guide eCoMove in developing a product that can be accepted by the end user.