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An overview of the latest development on “ECO-Driving”

Brussels, 28 January 2010

Kris Jooris

Key Driving Competences

KEY DRIVING competences

Agenda

- Objective of Key Driving
- What is ECO-Driving
- Factors of motivation
- Focus on Eco Attitude survey
- Research on human behavior about ECO Driving
- How to achieve sustainable change in driving behavior?
- Methodologies in place
  - Standard Training
  - Simulator
  - Integrated approach
- Focus on successful solutions
- Conclusion

What is ECO-Driving?

•Eco-driving is an advanced way of driving that reduces fuel consumption, greenhouse gas emissions and accident rates. Eco-driving is about driving in a style suited to modern engine technology: smart, smooth and safe driving techniques that lead to average fuel savings of 5-10%.

•Eco-driving offers benefits for drivers of cars, vans, lorries and buses: cost savings, increased safety (less accidents) as well as improved ecological records (less emissions and noise levels).

•In European countries the directive 2003/59/EC is been implemented since September 2009 to promote this advanced way of driving.

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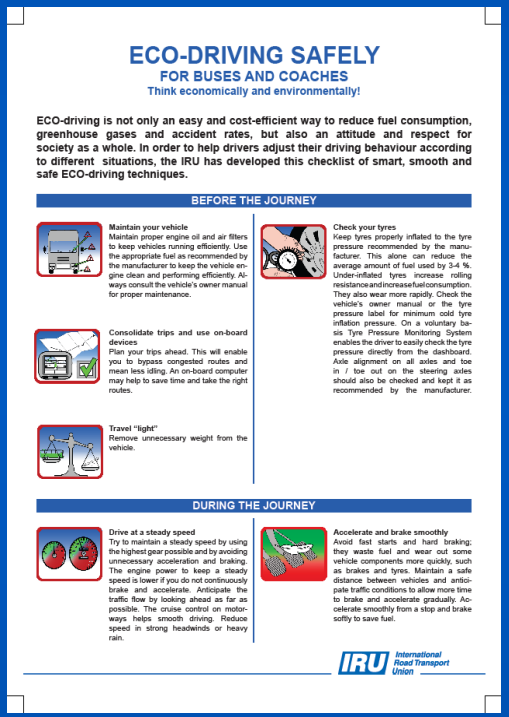
How to ECO-Drive?

KEY DRIVING competences



ECO-DRIVING SAFELY

FOR BUSES AND COACHES

Think economically and environmentally!

ECO-driving is not only an easy and cost-efficient way to reduce fuel consumption, greenhouse gases and accident rates, but also an attitude and respect for society as a whole. In order to help drivers adjust their driving behaviour according to different situations, the IRU has developed this checklist of smart, smooth and safe ECO-driving techniques.

BEFORE THE JOURNEY

Maintain your vehicle
Maintain proper engine oil and air filters to keep vehicles running efficiently. Use the appropriate fuel as recommended by the manufacturer to keep the vehicle engine clean and performing efficiently. Always consult the vehicle's owner manual for proper maintenance.

Check your tyres
Keep tyres properly inflated to the tyre pressure recommended by the manufacturer. This alone can reduce the average amount of fuel used by 3-4 %. Under-inflated tyres increase rolling resistance and increase fuel consumption. They also wear more rapidly. Check the vehicle's owner manual or the tyre pressure label for minimum cold tyre inflation pressure. On a voluntary basis Tyre Pressure Monitoring System enables the driver to easily check the tyre pressure directly from the dashboard. Axle alignment on all axles and toe in / toe out on the steering axles should also be checked and kept it as recommended by the manufacturer.

Consolidate trips and use on-board devices
Plan your trips ahead. This will enable you to bypass congested routes and mean less idling. An on-board computer may help to save time and take the right routes.

Travel "light"
Remove unnecessary weight from the vehicle.

DURING THE JOURNEY

Drive at a steady speed
Try to maintain a steady speed by using the highest gear possible and by avoiding unnecessary acceleration and braking. The engine power to keep a steady speed is lower if you do not continuously brake and accelerate. Anticipate the traffic flow by looking ahead as far as possible. The cruise control on motorways helps smooth driving. Reduce speed in strong headwinds or heavy rain.

Accelerate and brake smoothly
Avoid fast starts and hard braking; they waste fuel and wear out some vehicle components more quickly, such as brakes and tyres. Maintain a safe distance between vehicles and anticipate traffic conditions to allow more time to brake and accelerate gradually. Accelerate smoothly from a stop and brake softly to save fuel.

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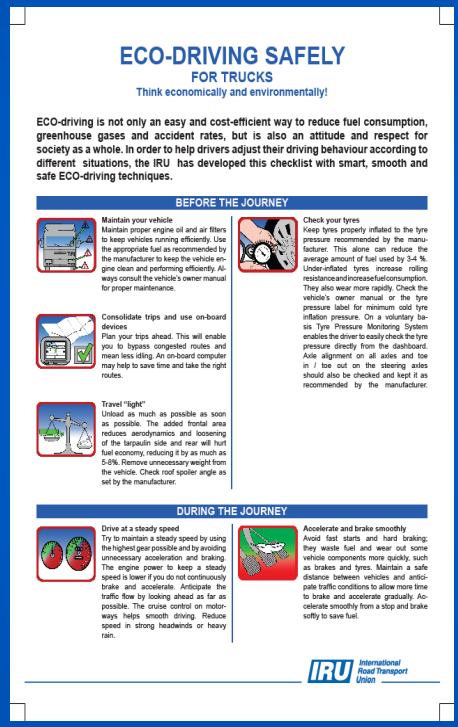
1.Shift up as soon as possible

2.Anticipate in traffic and maintain a steady speed

3.Decelerate Smoothly

4.No Idling

5.Use your vehicle in the most efficient way (optimize tire pressure, control breaking systems, …)



ECO-DRIVING SAFELY

FOR TRUCKS

Think economically and environmentally!

ECO-driving is not only an easy and cost-efficient way to reduce fuel consumption, greenhouse gases and accident rates, but is also an attitude and respect for society as a whole. In order to help drivers adjust their driving behaviour according to different situations, the IRU has developed this checklist with smart, smooth and safe ECO-driving techniques.

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Consolidate trips and use on-board devices
Plan your trips ahead. This will enable you to bypass congested routes and mean less idling. An on-board computer may help to save time and take the right routes.

Travel "light"
Unload as much as possible as soon as possible. The added frontal area reduces aerodynamics and loosening of the tarpaulin side and rear will hurt fuel economy, reducing it by as much as 5-8%. Remove unnecessary weight from the vehicle. Check roof spoiler angle as set by the manufacturer.

DURING THE JOURNEY

Drive at a steady speed
Try to maintain a steady speed by using the highest gear possible and by avoiding unnecessary acceleration and braking. The engine power to keep a steady speed is lower if you do not continuously brake and accelerate. Anticipate the traffic flow by looking ahead as far as possible. The cruise control on motorways helps smooth driving. Reduce speed in strong headwinds or heavy rain.

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Eco-driving versus Motivations

The Transport Operator:


+


The Driver:


+

+

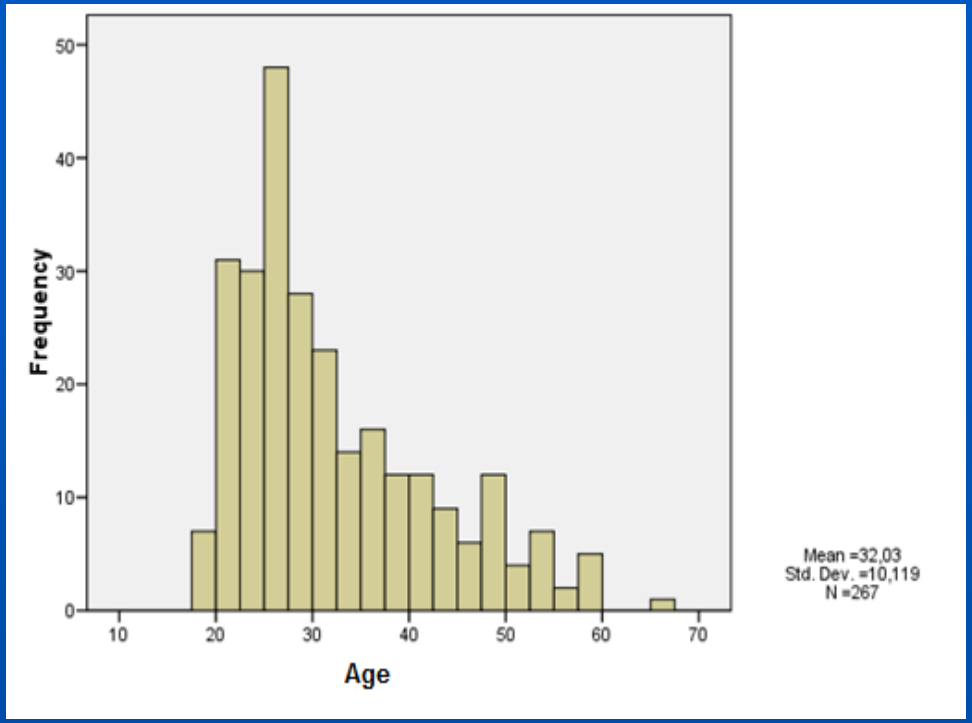

Eco Attitude survey-1

- **Research project in cooperation with University Ghent- Prof. M. Vansteenkiste**

Part 1: What kind of motivation factors do you have to drive eco-responsibly?

- Survey validated in 2009 on **276** belgian car drivers between 18 and 68

- Now in process to be validated within group of professional truck drivers



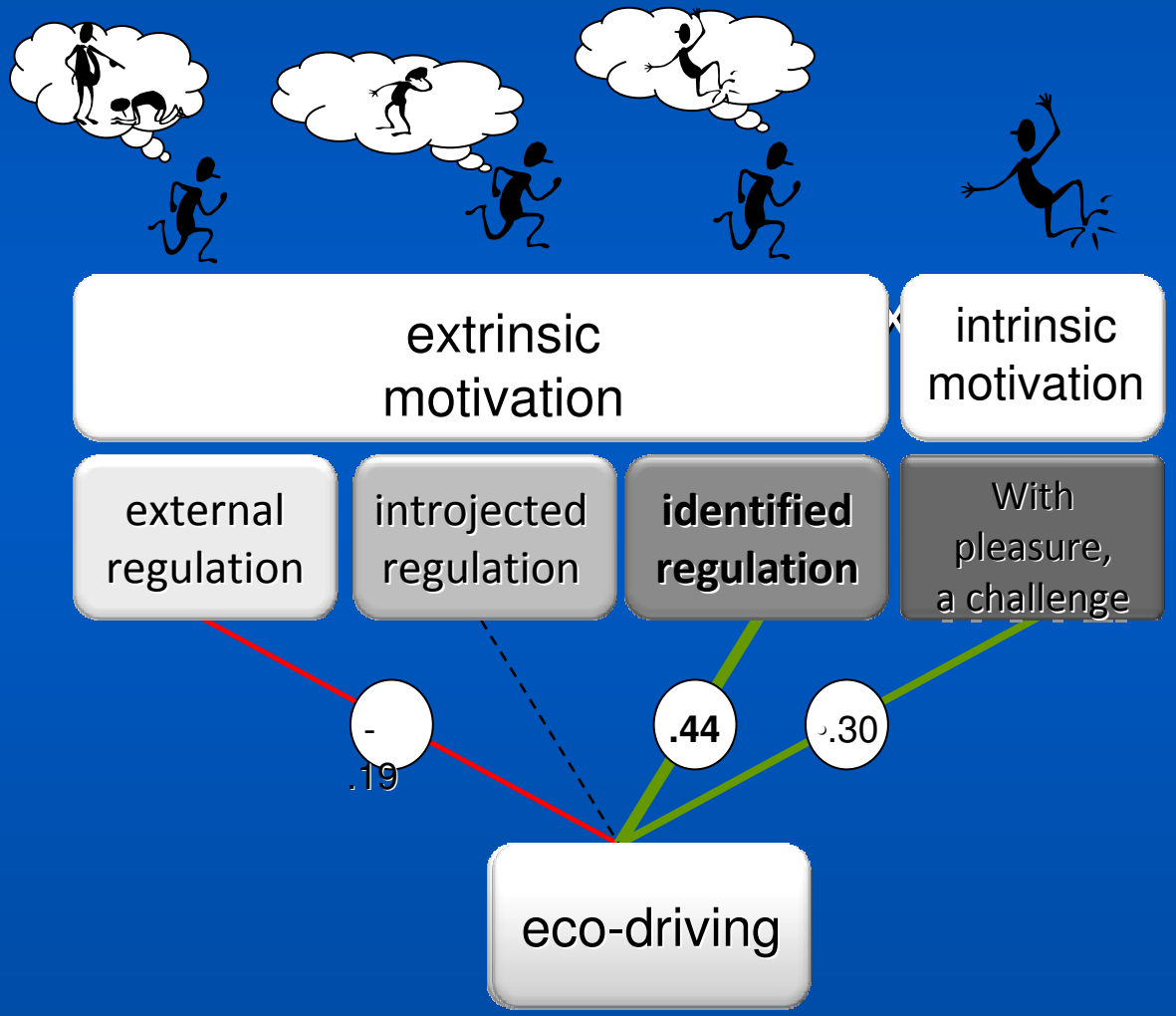
Eco Attitude survey-2

Some prejudices countered by this survey:

Any relation between applying eco-driving and …. ?

Age?	YES
Gender?	NO
# Kilometers / year?	NO
Company car owner?	NO
Training eco-driving fulfilled ?	YES

Eco Attitude survey-3

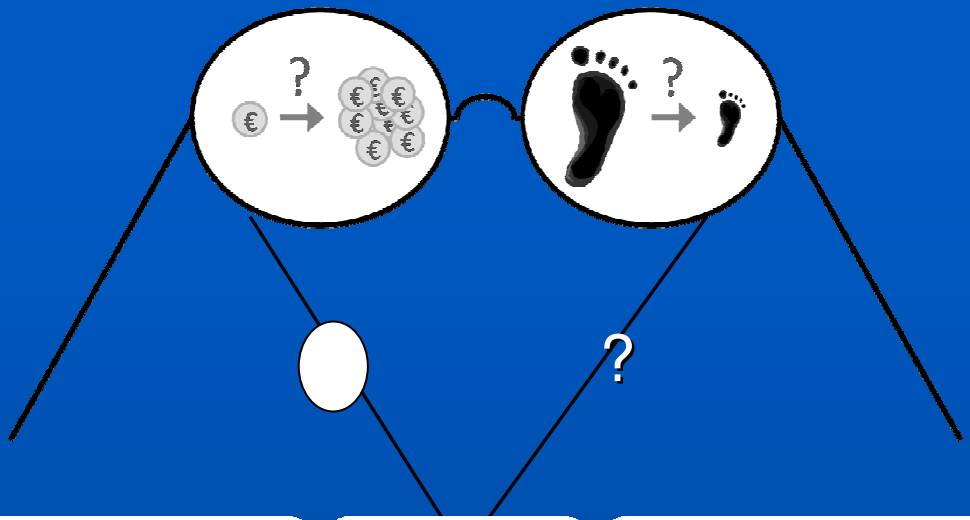


Eco Attitude survey-4

Research project in cooperation with University Ghent- Prof. M. Vansteenkiste

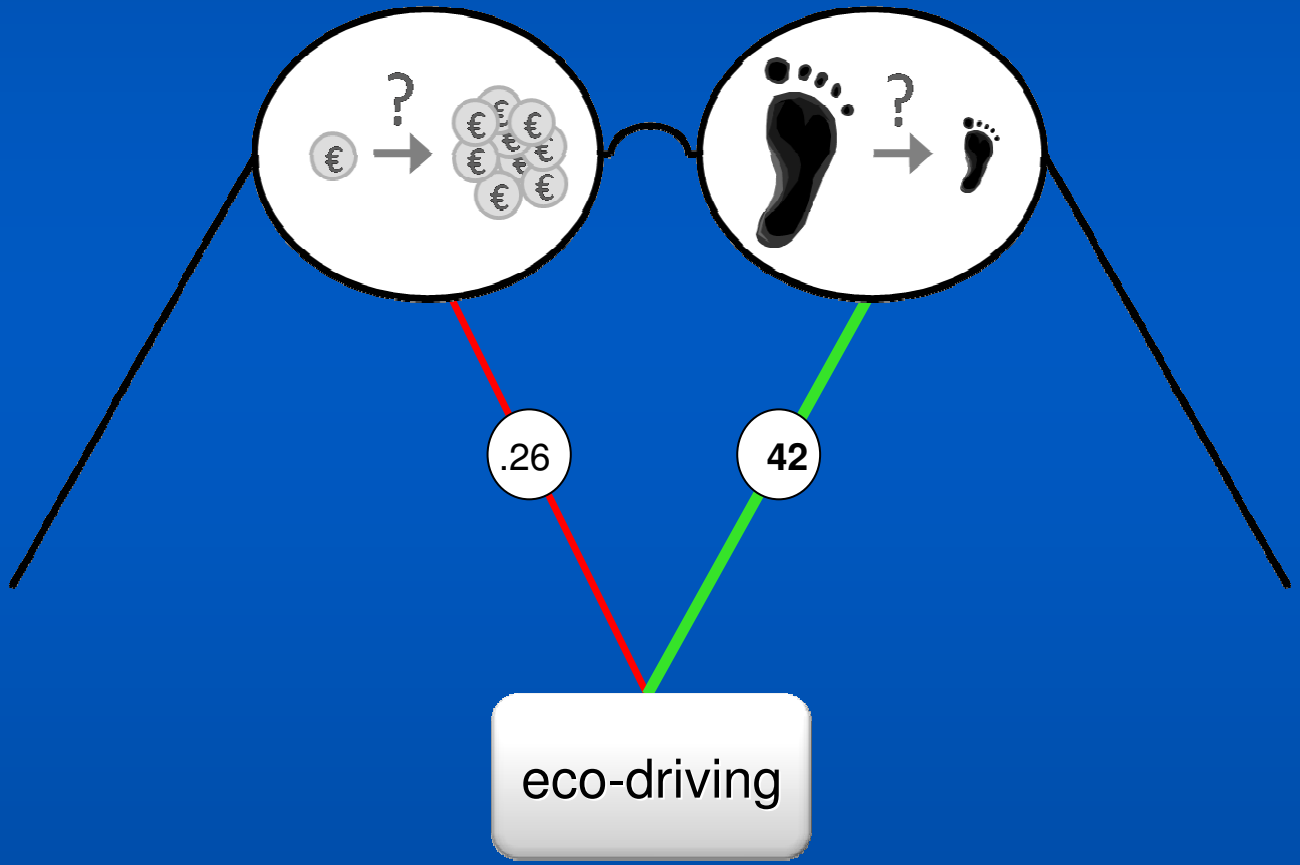
Part 2: What kind of goals do you aspire?

extrinsic goals ↔ intrinsic goals



Eco Attitude survey-5

extrinsic goals ↔ intrinsic goals



How to achieve sustainable change in Driving Behaviour?

How to measure and what to measure?

Objective Score

Independent of environment
- Coaching & management

Qualitative Analyse

- Evaluate Driving Sequence

Quantitative measure

- Measure occurences

Make it easy to understand but objective

Eco-score-tabel(JUNI 2009)	
Chauffeur	Totaal
BOIRON F Franck (18)	69
BOUVARD Bruno (21)	69
CAVOUE Jean-Paul (23)	90
CHESNEL DOMINIQUE (939)	78
Franky Vroman (26)	62
DAZON Sébastien (28)	87
DECRON Charlie (29)	92
DELHOMME Michel (30)	79
DENIZART Fabien (31)	95
DION Franky (13)	60
FEIGESPAN Jean-Michel (33)	67
GIRARD PASCAL (98)	84
Gemiddelde score	78

How to achieve sustainable change in Driving Behaviour?

Focus on 2 axes:

improving competences + improving motivation

Using tools (independent from manufacturer) for

- Assessment
- Training
- Monitoring

Integrated approach

Assessment + Training + Monitoring

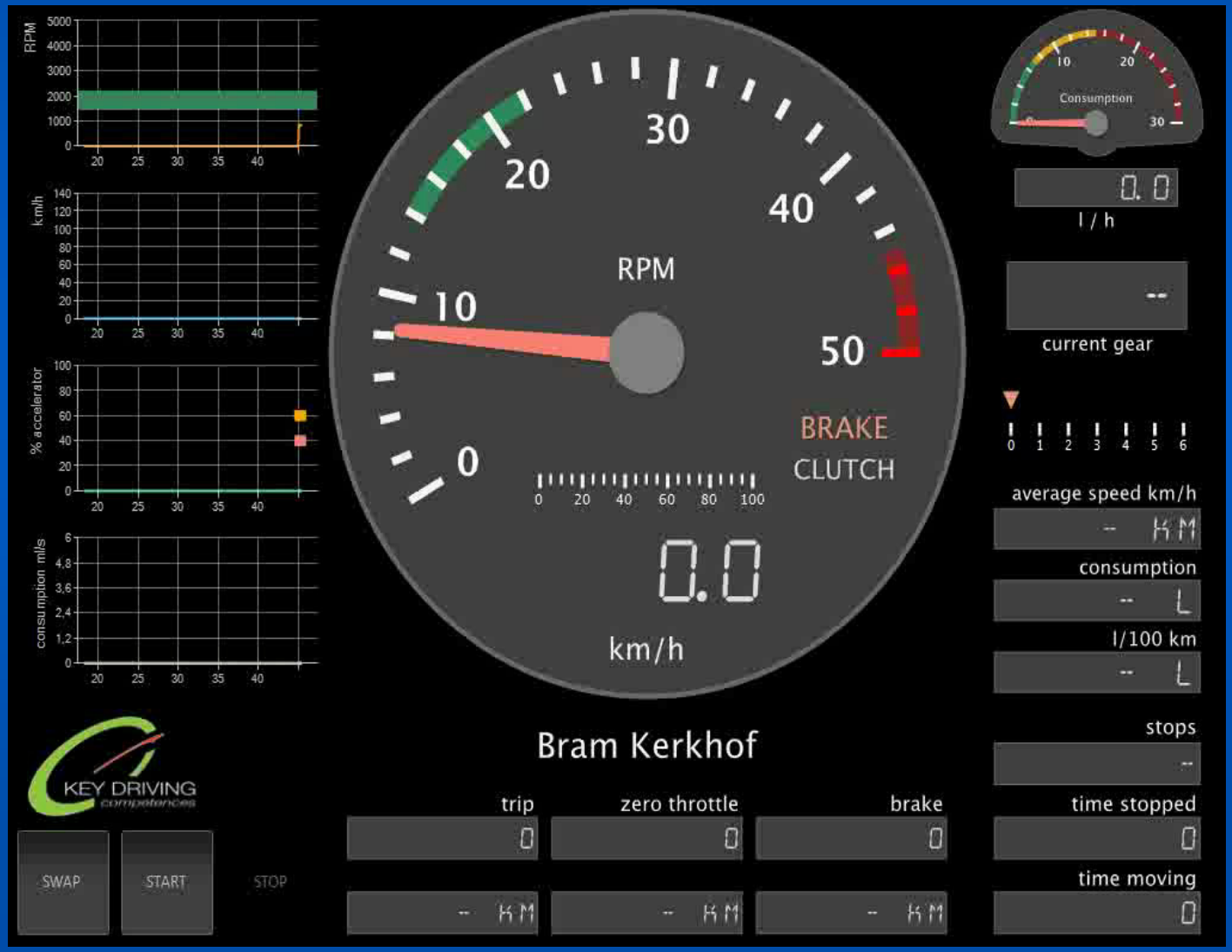
ECO-proactive driving style and sustainable mobility

Savings in fuel consumption

Improved ecological records

Increase in safety

Measuring Methodology-1

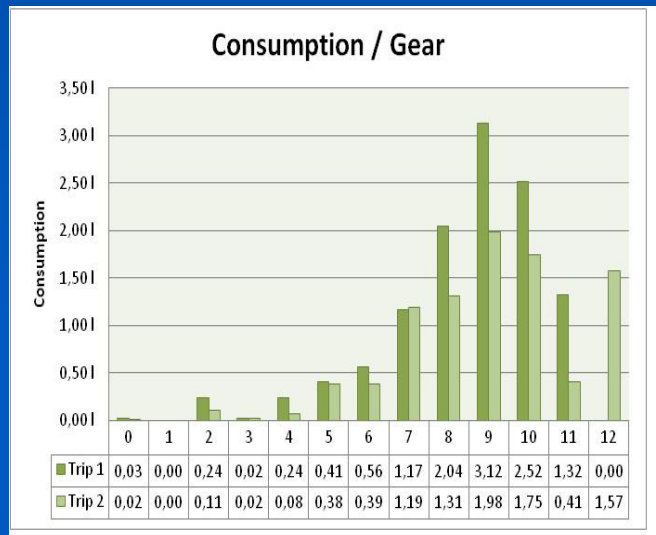


Measuring Methodology-2

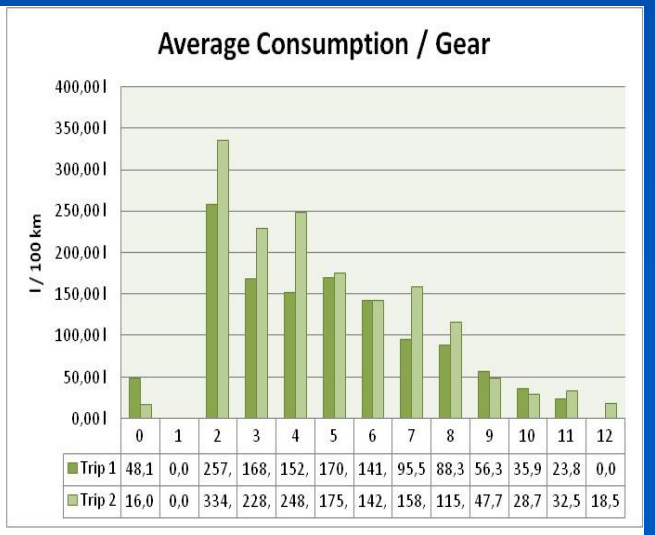
" and to communicate individual driving competences "

KEY DRIVING TRAINING SYSTEM					
Eco-Proactive Driving Behaviour "What You Can't Measure, You Cant' Manage"					
Driver	Date				
Gunther Geentjens	4/02/2009				
RESULTS					
		TRIP 1	TRIP 2	Différence	%
Elapsed Time	mm:ss	39:36	36:04	03:32	8,92%
Total Distance	km	22,60	22,56	-0,05	-0,20%
Average Speed	km/h	34,25	37,53	3,28	9,58%
Consumption standstill	l	0,03	0,01	-0,02	-55,85%
Consumption moving	l	11,63	9,19	-2,44	-21,00%
Total Fuel Consumption	l	11,67	9,21	-2,46	-21,09%
Average Consumption	l/100km	51,6	40,8	-10,8	-20,94%
Average CO2 Emission	kg/100km	137,3	108,6	-28,8	-20,94%
RESULT ANALYSIS					
Average Position Trottle	%	27%	28%	1%	3,27%
Maximum Position Throttle	%	100%	100%	0%	0,00%
Time vehicle in motion - Zero Throttle	mm:ss	08:42	10:24	01:42	19,54%
Time - Use of Breaks	mm:ss	06:12	03:18	02:53	46,65%
Total Distance - Zero Throttle	km	5,37	6,97	1,59	29,59%
Total Distance - Use of Breaks	km	2,60	1,34	-1,26	-48,54%
Number of Brakings	#	54	33	-21	-38,32%
Number of stops	#	6	2	-4	-66,67%
Time standstill	mm:ss	00:42	00:20	00:22	53,42%
Gear shifts	#	181	123	-58	-32,04%
Gear shifts(upshift)	#	116	72	-44	-37,93%
Total Number of Engine Revolutions	#	43236	35002	-8234,50	-19,05%
Average RPM	RPM	1092	971	-121	-11,11%

Measuring Methodology- 4

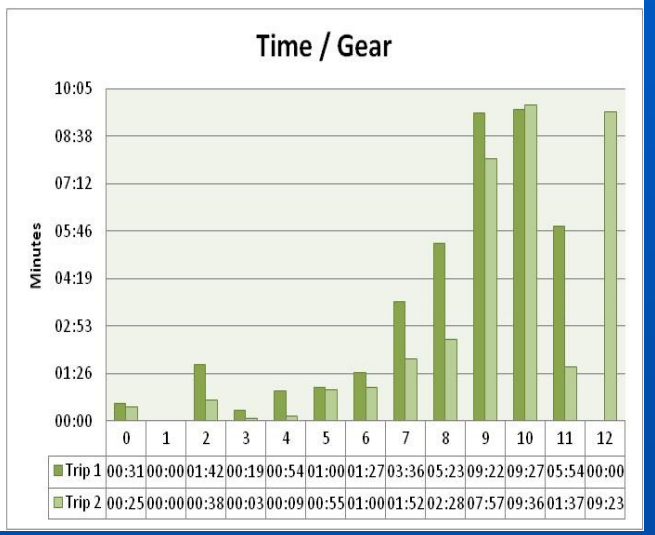


	0	1	2	3	4	5	6	7	8	9	10	11	12
Trip 1	0,03	0,00	0,24	0,02	0,24	0,41	0,56	1,17	2,04	3,12	2,52	1,32	0,00
Trip 2	0,02	0,00	0,11	0,02	0,08	0,38	0,39	1,19	1,31	1,98	1,75	0,41	1,57



	0	1	2	3	4	5	6	7	8	9	10	11	12
Trip 1	48,1	0,0	257,	168,	152,	170,	141,	95,5	88,3	56,3	35,9	23,8	0,0
Trip 2	16,0	0,0	334,	228,	248,	175,	142,	158,	115,	47,7	28,7	32,5	18,5

	0	1	2	3	4	5	6	7	8	9	10	11	12
Trip 1	0,05	0,00	0,09	0,01	0,16	0,24	0,40	1,22	2,31	5,54	7,01	5,57	0,00
Trip 2	0,10	0,00	0,03	0,01	0,03	0,22	0,27	0,75	1,13	4,15	6,09	1,26	8,51

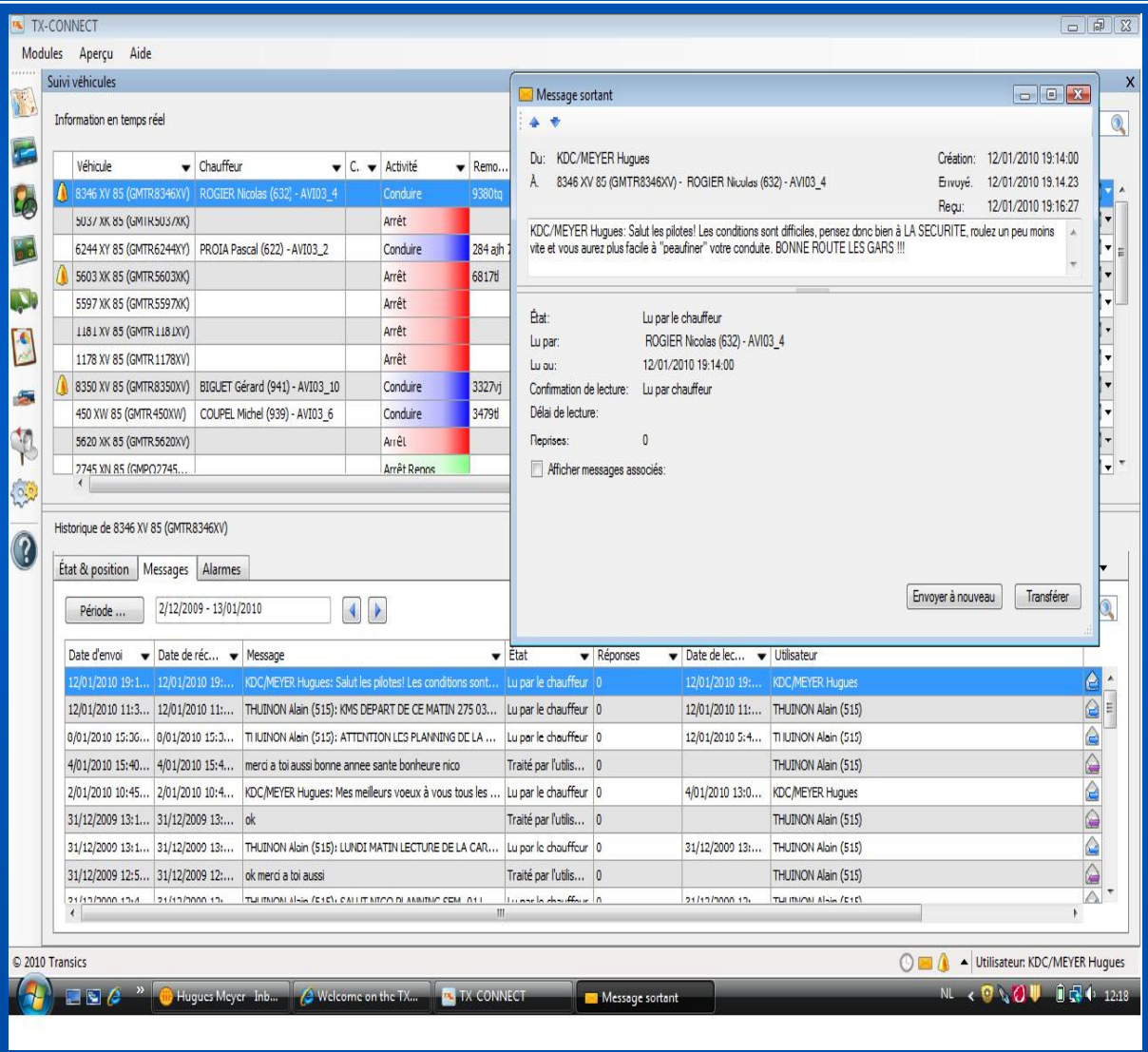


	0	1	2	3	4	5	6	7	8	9	10	11	12
Trip 1	00:31	00:00	01:42	00:19	00:54	01:00	01:27	03:36	05:23	09:22	09:27	05:54	00:00
Trip 2	00:25	00:00	00:38	00:03	00:09	00:55	01:00	01:52	02:28	07:57	09:36	01:37	09:23

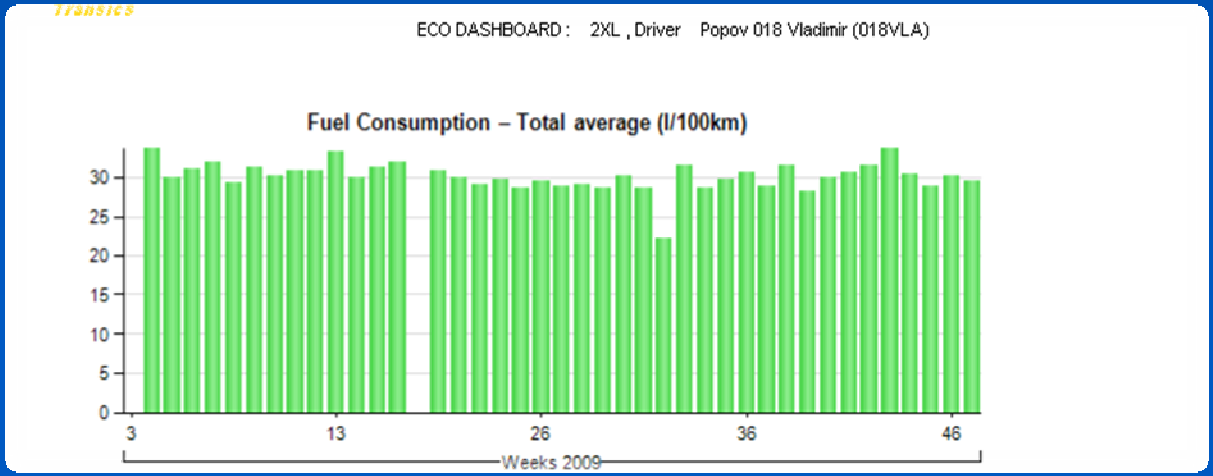
TX-Eco module-
coaching

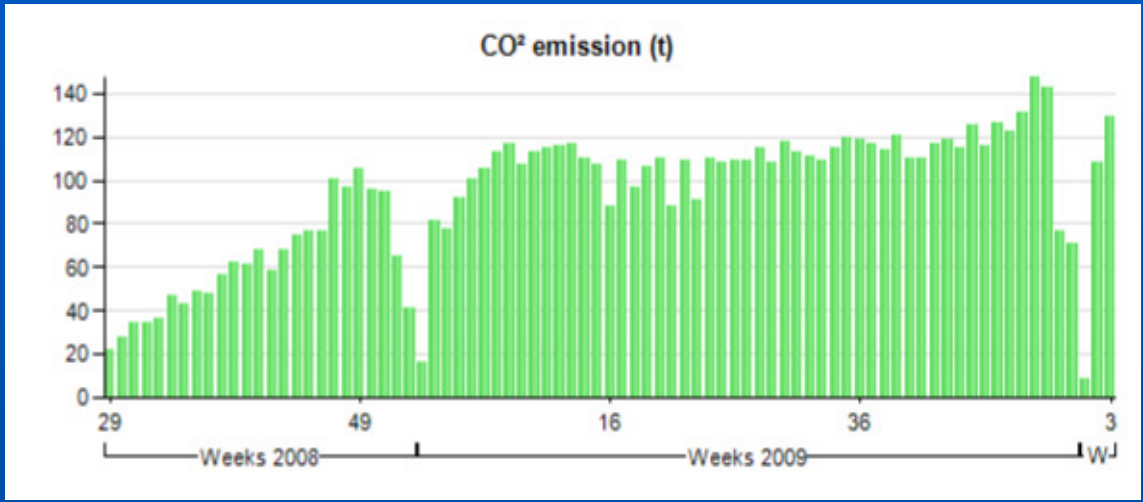
Ongoing coaching process:

•Instructor supporting the drivers/trainees by explaining their personal results and giving them feedback to improve



TX-Eco module-
Reporting

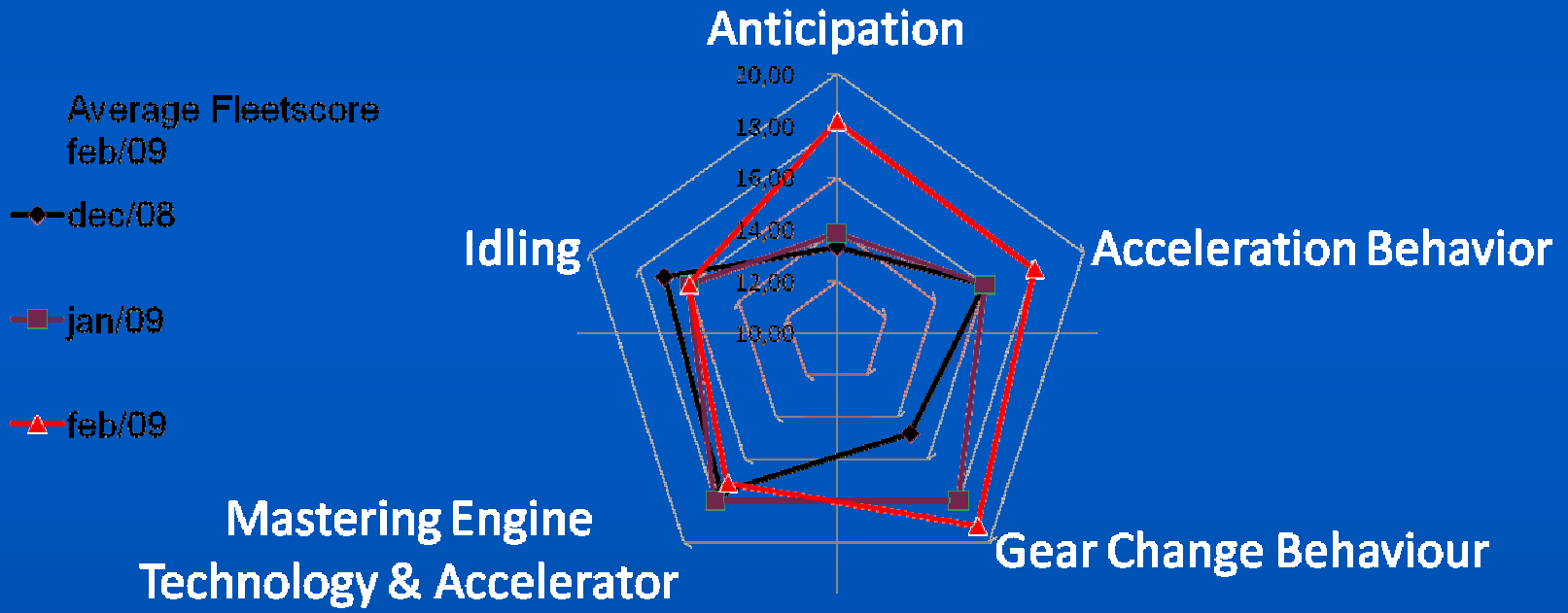




TX-Eco module

- in detail

Evaluation on multiple criteria



ECO SCORE : Jack Daniels
February 2009 : 88.5/100
January 2009 : 82/100

Focus on successful solutions

	Traditional	Integrated approach
Assessment	Based on instructors' experience	Based on objective measurement Can bus data
Training	Instructor impact Quantitative data	Real-time coaching tool Qualitative data
Monitoring	Declarative, based on drivers' feedback Less reporting of personalized results Source for discussion Instructor needed Instantly	Objective measurement & analysis Clarifies personalized training needs Easy to understand Tool for self-assessment Ongoing, continuous process

Conclusion

New learning approaches provide :

- A genuine tool for managing Human resources (drivers) on the road
- Platform for communicating and improving driving competences
- Leading to:
  - ✓ Increased driver safety
  - ✓ Savings (5 to 10% on annual basis)
  - ✓ Lower ecological impact (CO_2 emissions)

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THANK YOU!

2010 Driver Competence Seminar, Brussels, Belgium