Stephan Helmreich

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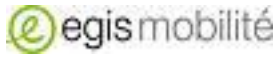
Freight Transport FORESIGHT 2050

FP7 Project for DG TREN
18 months (9/08-2/10)



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road

rail

long-distance

Inland navigation

GHG/CO2

Fossil Fuel Share

FORESIGHT

2050

shaping

sustainability

Congestion

Accidents

Transport policy

Action plan

Technology policy

Demonstration projects

2020-2035-2050

Vision

Targets

Project steps

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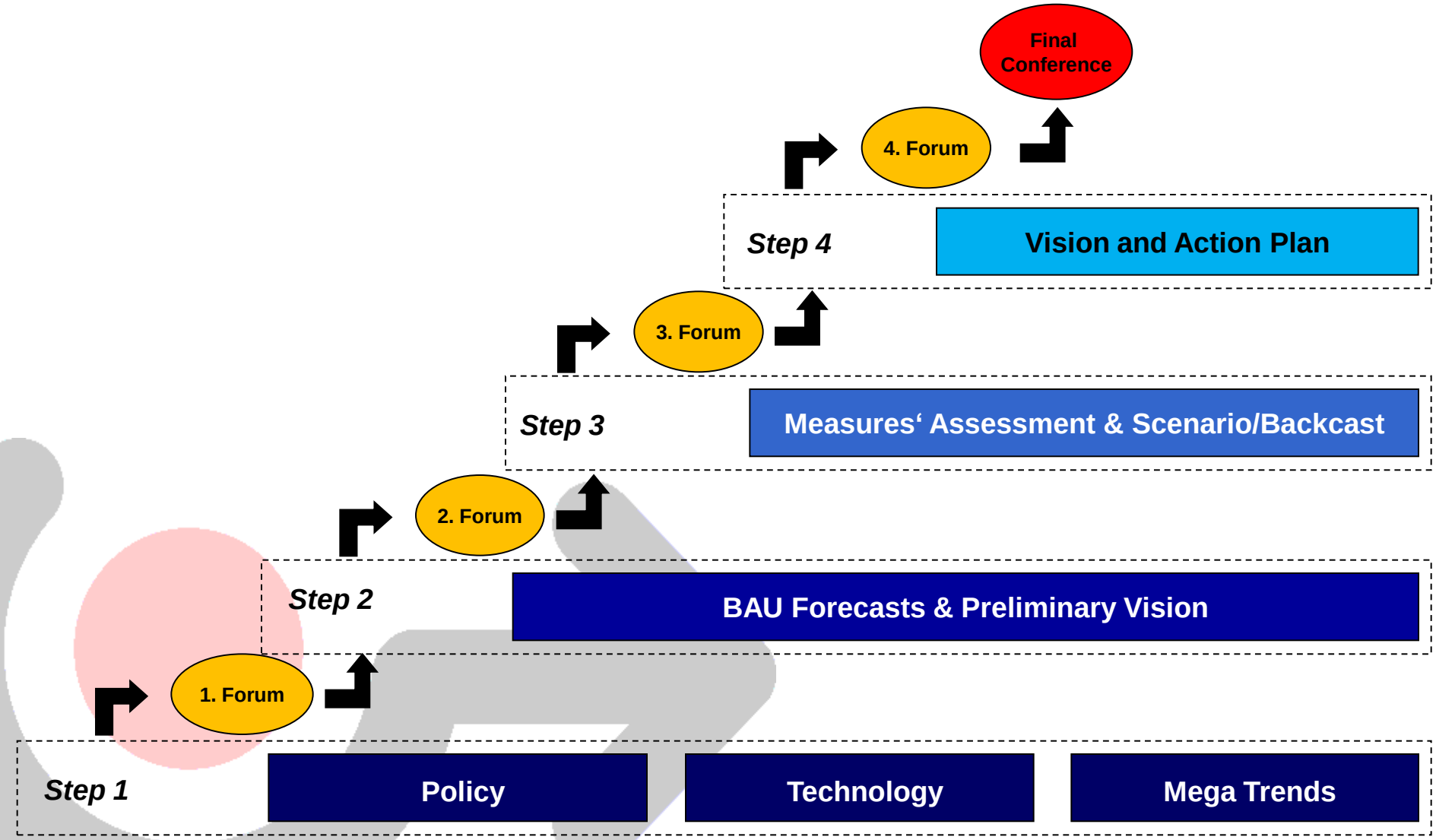

Policy , Technology & MegaTrends

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Propulsion Systems & Energy

Technology

ITS

Logistics Technologies

Demonstration Projects

Policy European Policy

National Policies

Freight Transport Demand

Logistics Trends

Mega-Trends

Energy

Emissions

BAU Forecast

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3 Business as usual forecasts:

- A trend forecast consisting of the most likely development
- A low forecast, which combines positive developments that result in easier mitigation (lower limit)
- A high forecast that describes a future, which is more difficult to mitigate than the other two (upper limit)

Preliminary Vision

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What progress will be socially and politically expected from long distance freight transport until 2020, 2035 and 2050?

	2020	2035	2050
Reduction of GHG emiss.	-20%	-70%	-80%
Fossil Fuel Share	80%	60%	40%
Reduction of accidents	-40%	-65%	-80%
Reduction of congestion	-17%	-33%	-50%

BAU Forecast & Prelimary Vision (1)

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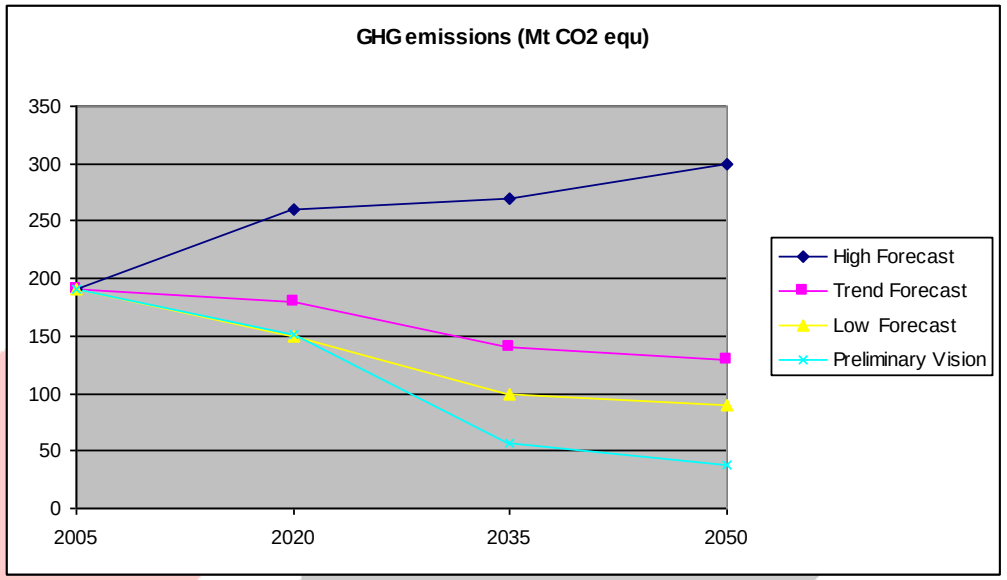
GHG – emissions

Total CO2 equivalents (in tonnes) that are caused by LDFT by road, rail and IWW within the EU27 (including upstream).



Input:

- Freight transport demand
- Modal split
- Average load
- Biofuels
- Non-convent. foss. Fuels
- Carbon capture and storage
- Electricity production

BAU Forecast & Prelimary Vision (2)

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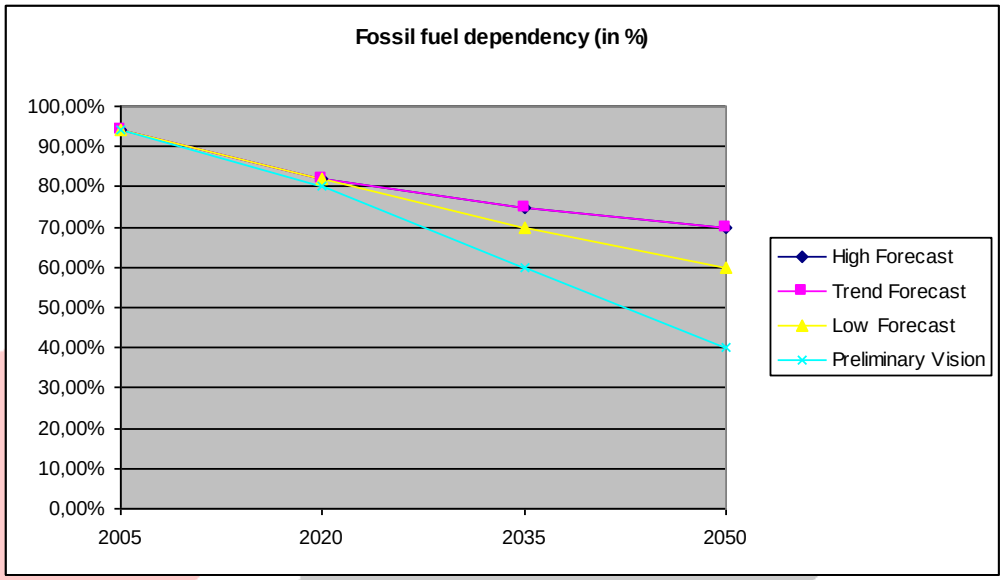
Fossil Fuel Share

Fossil fuel energy input (primary energy) for LDFT by road, rail and IWW within the EU27 divided by Total energy input (primary energy) for LDFT by road, rail and IWW within the EU27.



Input (same as GHG):

- Freight transport demand
- Modal split
- Average load
- Biofuels
- Non-convent. foss. Fuels
- Carbon capture and storage
- Electricity production

BAU Forecast & Prelimary Vision (3)

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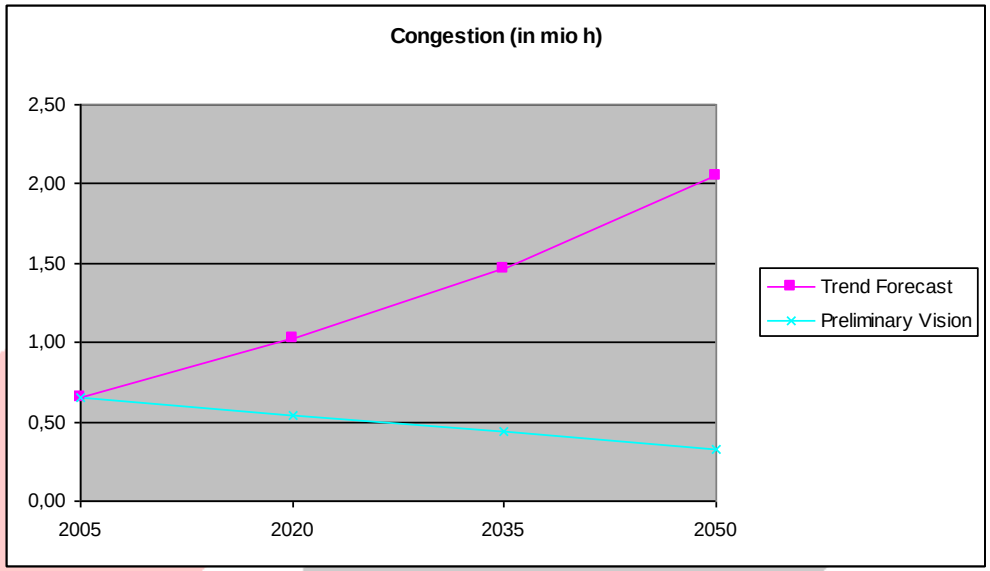
Congestion

Delay time measured as the difference between travel time in a loaded network and an unloaded network multiplied with the number of trucks affected for an average day.



Input:

- Transport demand
- Infrastructure
- Total cost/veh.km

BAU Forecast & Prelimary Vision (4)

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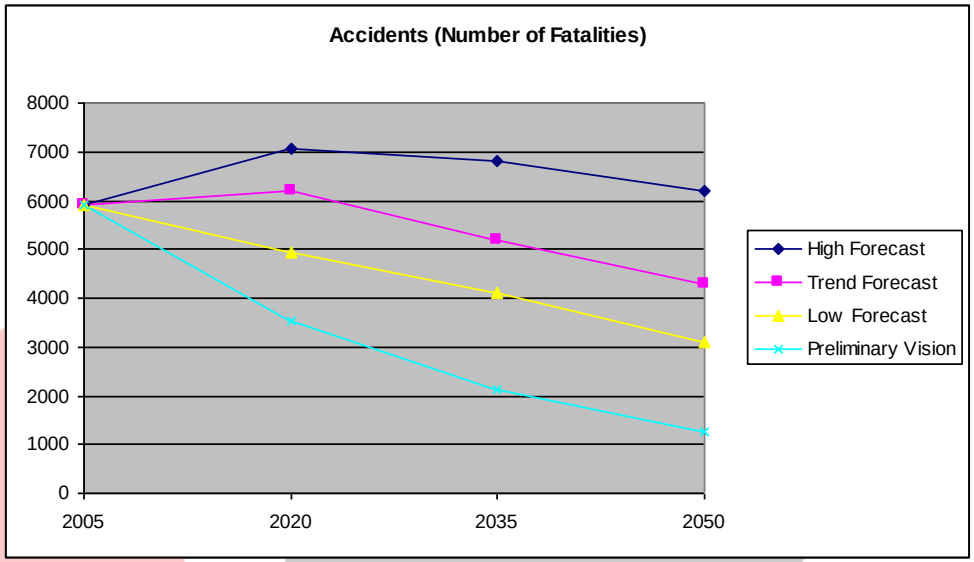
Accidents
The number of road fatalities within EU27 attributable to HGV.



Input:
•Deployment of techn. Develop.
•Veh.km

Measures' Assessment (1)

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- After the 2nd Forum 35 measures have been identified

- These 35 measures have been evaluated (desk research) by the project partners

Measures' Assessment (2)

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Road transport related measures:

- Investment in ITS
- Investment inTEN-network
- Internalisation of external costs
- HGV weights and dimensions
- Liberalisation of cabotage
- Progressive distance pricing
- Different picing type of freight
- Harmonised speed limits
- Congestion charge
- Enforcement of regulations

Rail transport related measures

- Investent in new railway lines
- Freight priorisation
- Funding for ERTMS/ETCS
- Electrification of rail corridors
- Longer trains
- Heavier trains

IWW & maritime transport related measures

- Investment in IWT infrastructure
- Develop new technologies in IWW
- Investment in maritime port infrastr.

Supply chain related measures

- Training for ecodriving
- Automated platooning
- Standardized Loading Units
- E-freight
- Network optimisation – cargo owner
- Network optimisation – log.serv.prov.
- CO2 labelling
- Intermodal transport
- Transport consolidation & cooperation
- Transport route planning & control

Energy suppliers related measures

- Taxation of fossil fuels
- Hydrogen Infrastructure
- Improved Batteries
- Vehicle Supplier related measures
- Including CO2 stand.into HGV regul.
- BAT vehicle certification for HGVs
- Clean vehicle technologies

Measures' Assessment (3) - Methodology

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Potential

GHG	+ +
Fossil Fuel Dependency	0
Accidents	+
Congestion	+

	Potential – Greenhouse gas emission reduction							ABC analysis
	- - -	- -	-	0	+	+ +	+ + +	
1. Investment in ITS								C
2. Investment in TEN network								C
3. Internalisation of external costs								A
4. HGV weights and dimensions								B?
5. Liberalisation of cabotage								B
6. Progressive distance pricing								C
7. Different pricing with regards to freight								C
8. Harmonised speed limits								C
9. Congestion charge								B
10. Enforcement of regulations								C
11. Investment in new railway lines								B

Pros

- Reduction of empty driving
- More efficient use of vehicles
- Less vehicle-km and hence less operating costs, emissions etc.
- Strengthening of competition
- Cheaper transport

Cons

- Lack of harmonisation
- Abuse by operators from cheap labour countries
- Abuses difficult to monitor; lack of law enforcement
- Peripherial countries are disadvantaged
- Possible market distortion

Recommended

Measures‘ Analysis (2)

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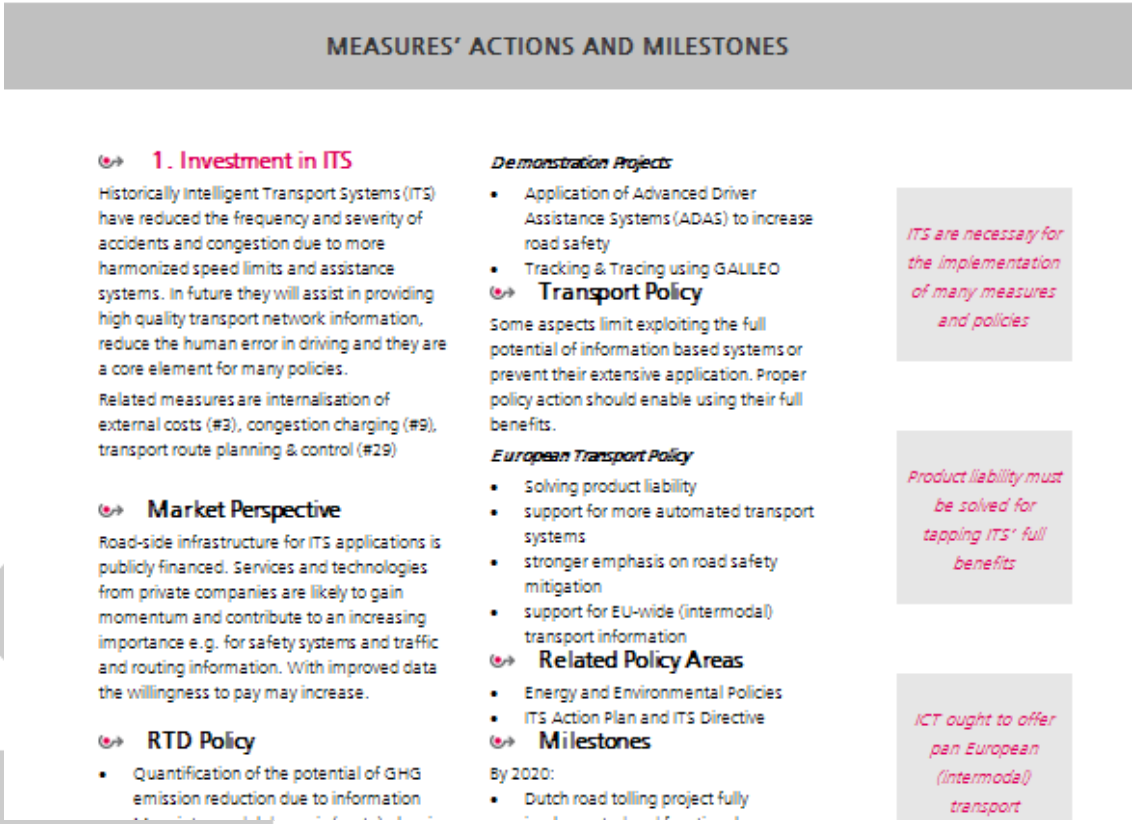
- Management Summary IV
- RTD, Transport Policy Actions
- Milestones



MEASURES' ACTIONS AND MILESTONES

1. Investment in ITS

Historically Intelligent Transport Systems (ITS) have reduced the frequency and severity of accidents and congestion due to more harmonized speed limits and assistance systems. In future they will assist in providing high quality transport network information, reduce the human error in driving and they are a core element for many policies.

Related measures are internalisation of external costs (#3), congestion charging (#9), transport route planning & control (#29)

Market Perspective

Road-side infrastructure for ITS applications is publicly financed. Services and technologies from private companies are likely to gain momentum and contribute to an increasing importance e.g. for safety systems and traffic and routing information. With improved data the willingness to pay may increase.

RTD Policy

- Quantification of the potential of GHG emission reduction due to information

Demonstration Projects

- Application of Advanced Driver Assistance Systems (ADAS) to increase road safety
- Tracking & Tracing using GALILEO

Transport Policy

Some aspects limit exploiting the full potential of information based systems or prevent their extensive application. Proper policy action should enable using their full benefits.

European Transport Policy

- Solving product liability
- support for more automated transport systems
- stronger emphasis on road safety mitigation
- support for EU-wide (intermodal) transport information

Related Policy Areas

- Energy and Environmental Policies
- ITS Action Plan and ITS Directive

Milestones

By 2020:

- Dutch road tolling project fully

ITS are necessary for the implementation of many measures and policies

Product liability must be solved for tapping ITS' full benefits

ICT ought to offer pan European (intermodal) transport

Scenario/ Backcasting(1)

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- Goal: One realistic scenario where the preliminary vision is reached.

- What development of the models' input parameters is necessary and possible?

Scenario development

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Influence factors
- GHG Emissions
- Fossil Fuel Share
- Congestion
- Accidents

1. How do the models‘ influence factors have to develop, to reach the vision? (Which is the maximum reasonable amount of development of a certain input parameter?) -> determines the assumed development
2. How sensitive is the scenario on a certain influence factors -> determines the priority
3. Which are the most effective measures to improve a certain influence factor? -> determines the selected measures
4. Which actions and milestones of a measure are relevant for a specific influence factor (e.g. ITS is very broad; which ITS actions are relevant for a certain influence factor; therefore descriptions of measures can differ)

Scenario Development

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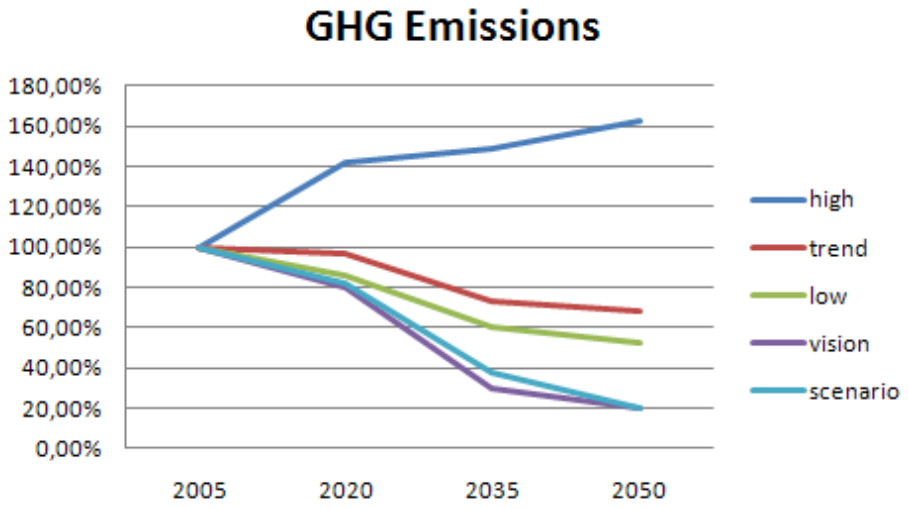

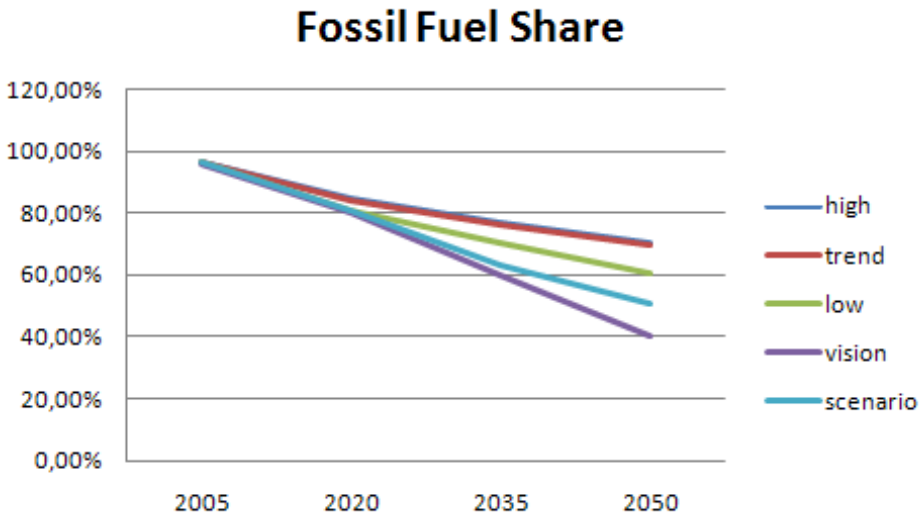

Scenario(2)

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GHG emissions and fossil fuel share – Influence factors:

	Influence Factors	Target for			Sensitivity	
		2020	2035	2050	GHG	FFS
I.	Stabilizing the increase of tkm	Max. +30%	Max. +43%	Max. +44%	n.a.	n.a.
II.	Decreasing vehicle energy demand	-20%	-40%	-50%	88%	~
III.	Reducing carbon emissions in electricity production	-37.5%	-61%	-88%	55%	22%
IV.	Electric engines in road transport	0%	10%	25%	41%	5%
V. A	Increased share of biofuels	8%	24%	33%	38%	30%
V. B	Biofuels upstream emissions	-35%	-83%	-83%		
VI.	Increased efficiency in usage of veh.	+8%	+30%	+50%	25%	~
VII.	Improved engine efficiency	+21%	+40%	+45%	21%	2%
VIII.	Higher modal share of rail and IWW	Road 75% Rail 19% IWW 6%	Road 70% Rail 22,5% IWW 7.5%	Road 65% Rail 25% IWW 10%	7%	~
IX.	Increased share of electric rail	66%	75%	80%	3%	~
X.	Usage of larger trucks	2%	8%	10%	2%	~

Scenario(3)

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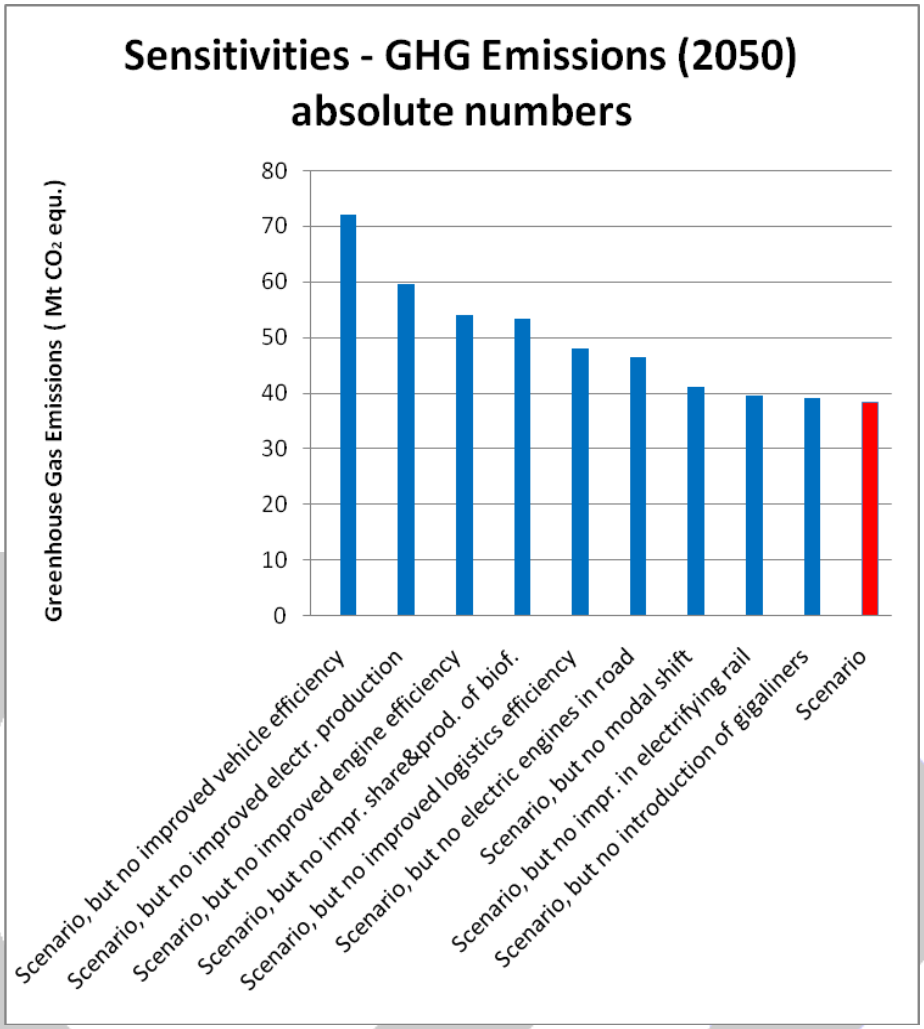

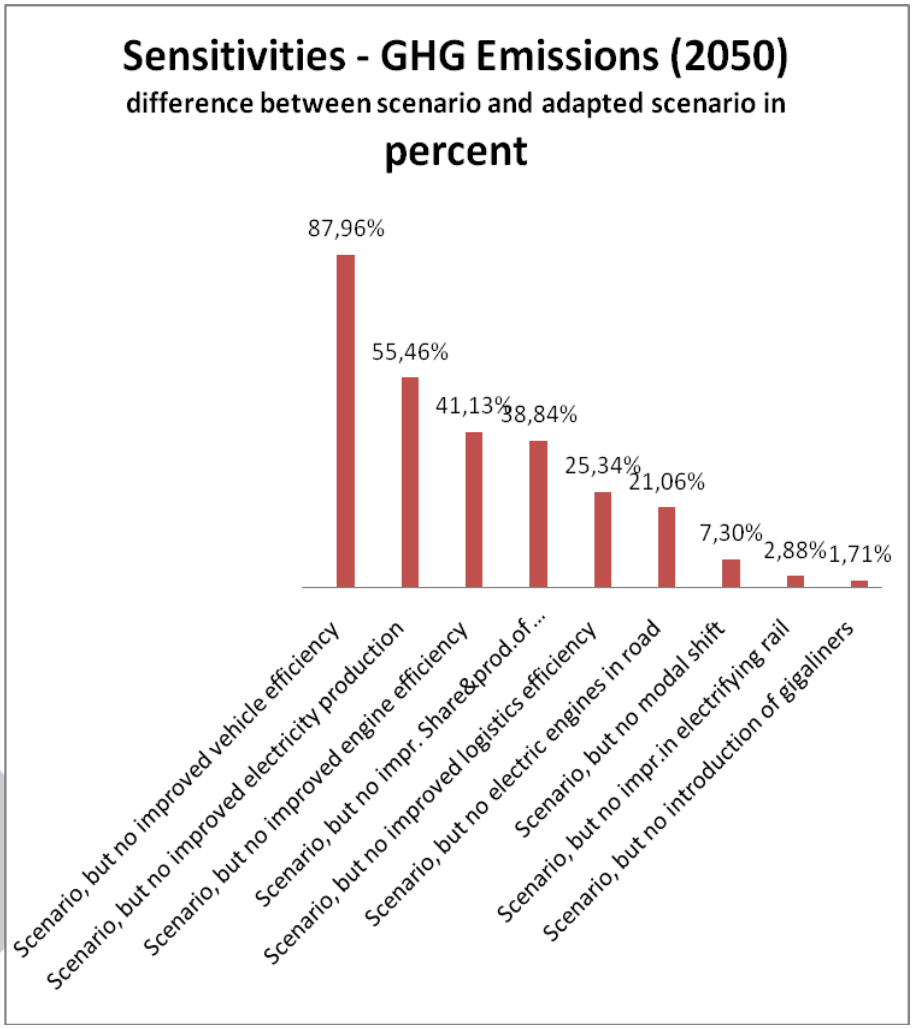

Scenario(4)

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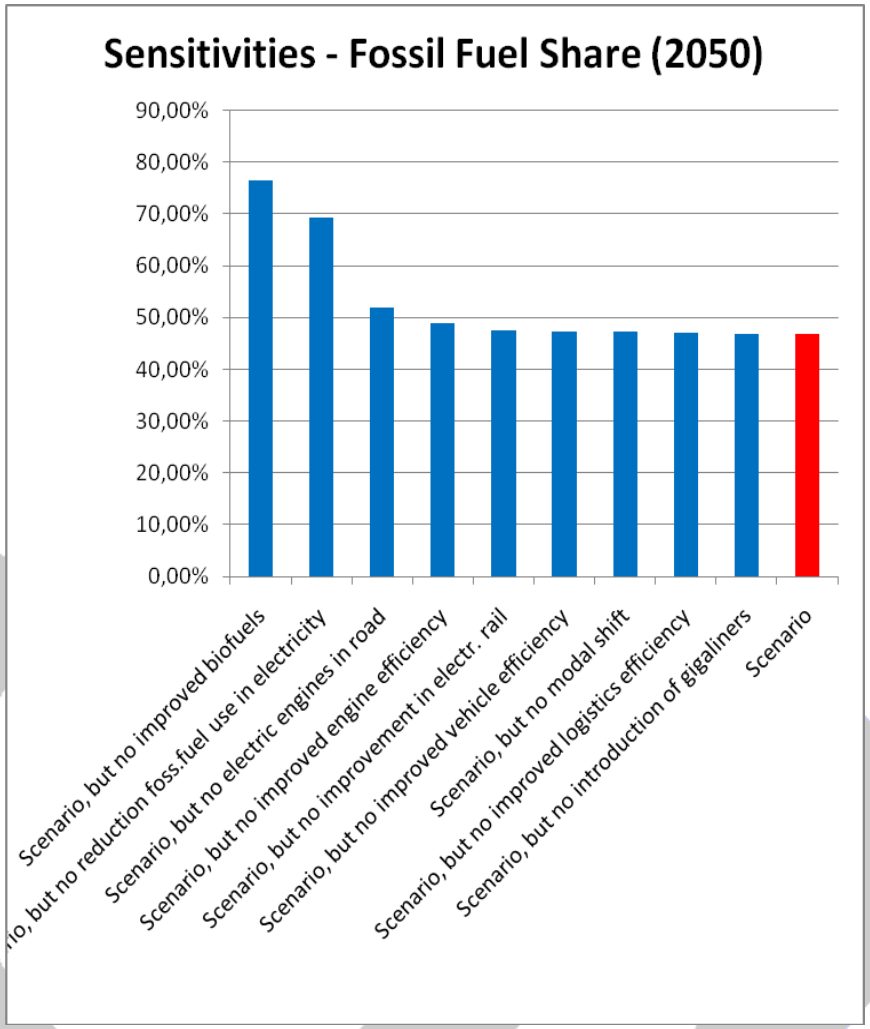

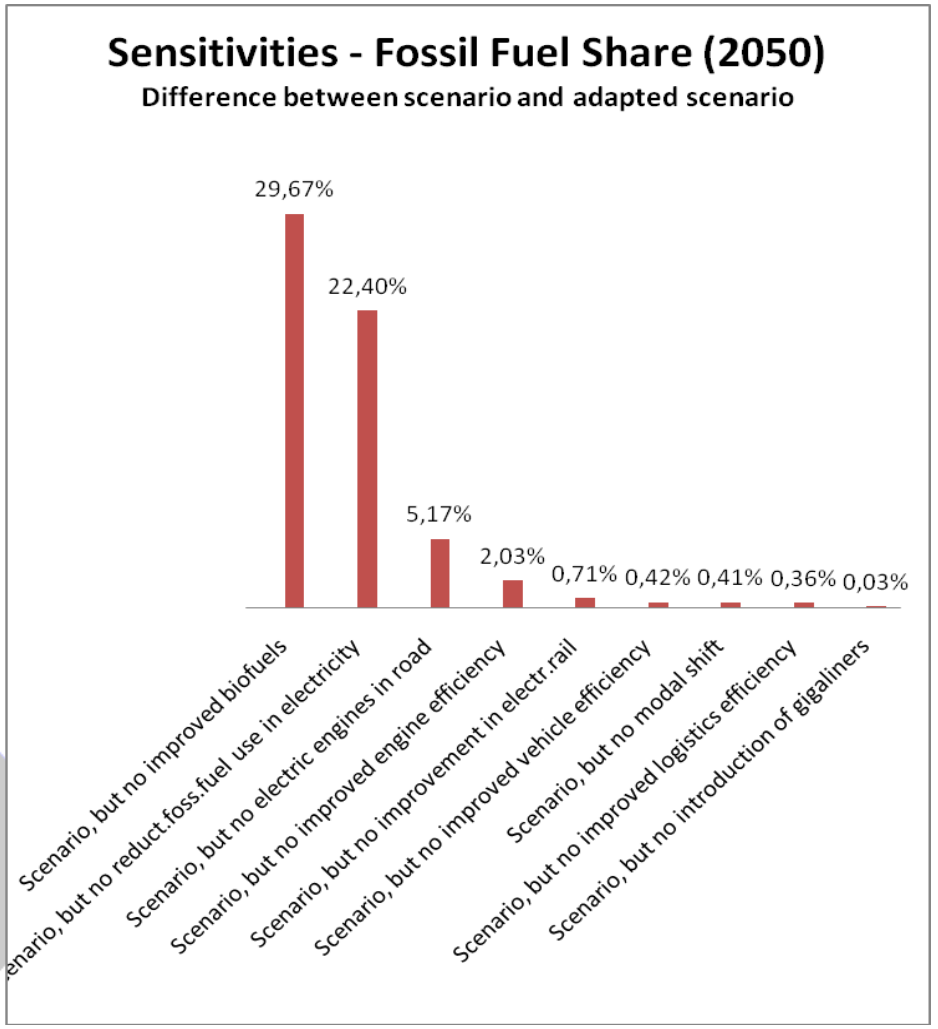

Scenario(5)

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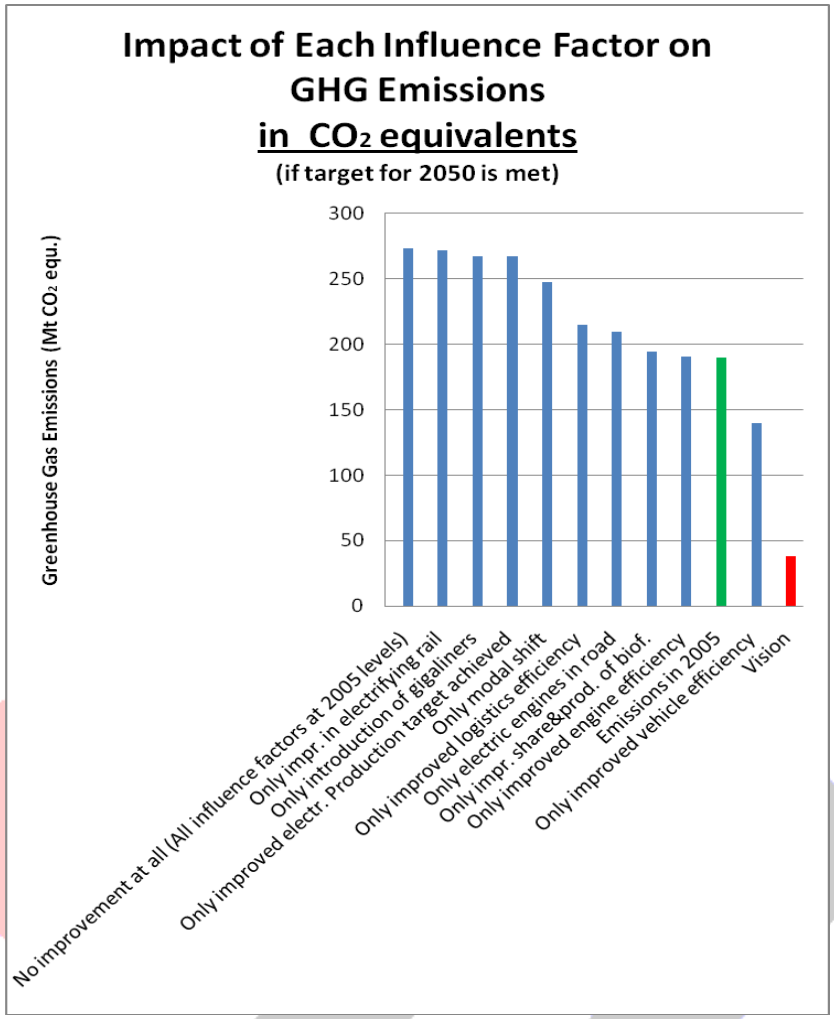

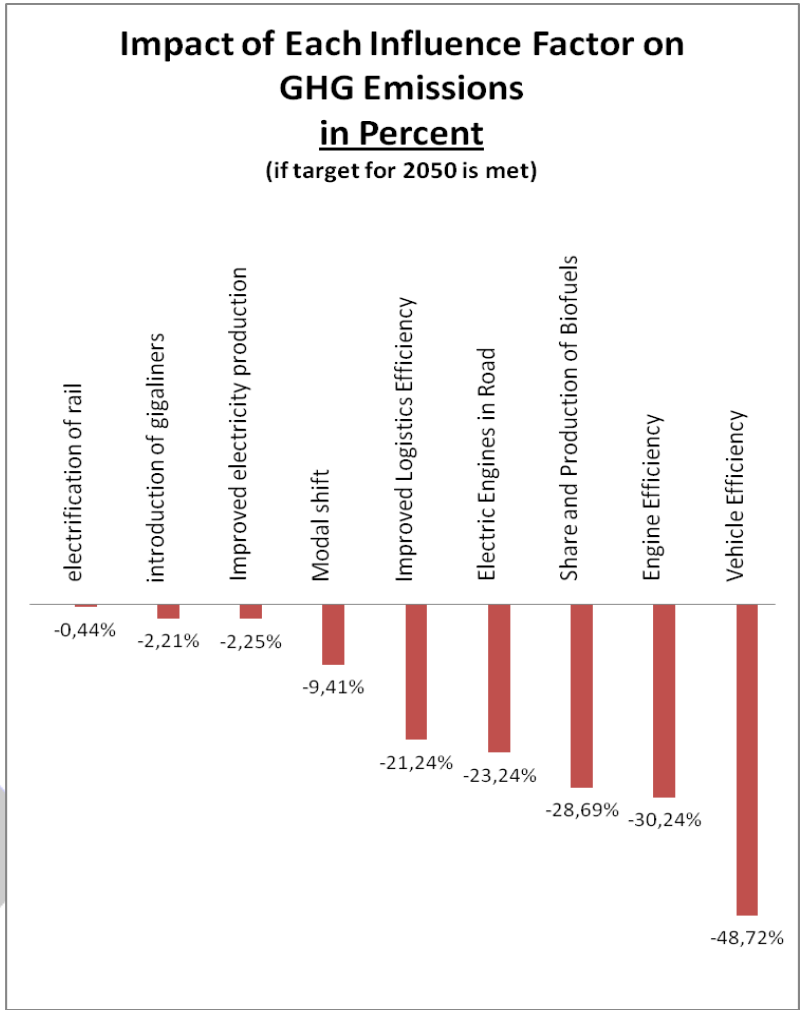

Scenario(6)

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	2005			Scenario 1 all growth in road			Scenario 2 no modal split change		
	btkm	m.split	Tkm growth	btkm	m.split	tkm growth	btkm	m.split	tkm growth
road	1635	75,00%	0,00%	2594,2	82,64%	58,67%	2354,4	75,00%	44,00%
rail	414,2	19,00%	0,00%	414,2	13,19%	0,00%	596,4	19,00%	44,00%
iww	130,8	6,00%	0,00%	130,8	4,17%	0,00%	188,4	6,00%	44,00%
	2180			3139,2			3139,2		

	Scenario 3 FREIGHTVISION Scenario			Scenario 4 strong rail growth, weak road & IWW			Scenario 5 strong rail & IWW growth, no road growth in road tr.		
	btkm	m.split	tkm growth	btkm	m.split	tkm growth	btkm	m.split	tkm growth
road	2040,48	65,00%	24,80%	2035,00	64,83%	24,46%	1635	52,08%	0,00%
rail	784,8	25,00%	89,47%	942,20	30,01%	127,47%	1150	36,63%	177,64%
iww	313,92	10,00%	140,00%	162,00	5,16%	23,85%	354,2	11,28%	170,80%
	3139,2			3139,2			3139,2		

Scenario(7)

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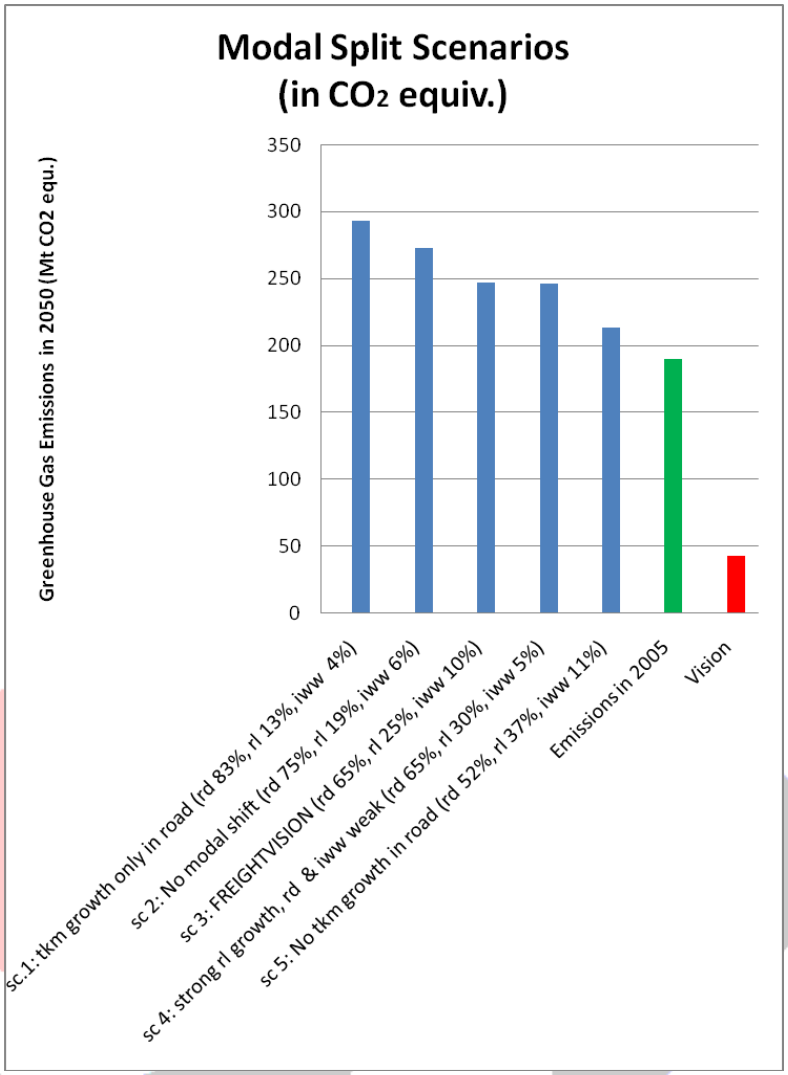

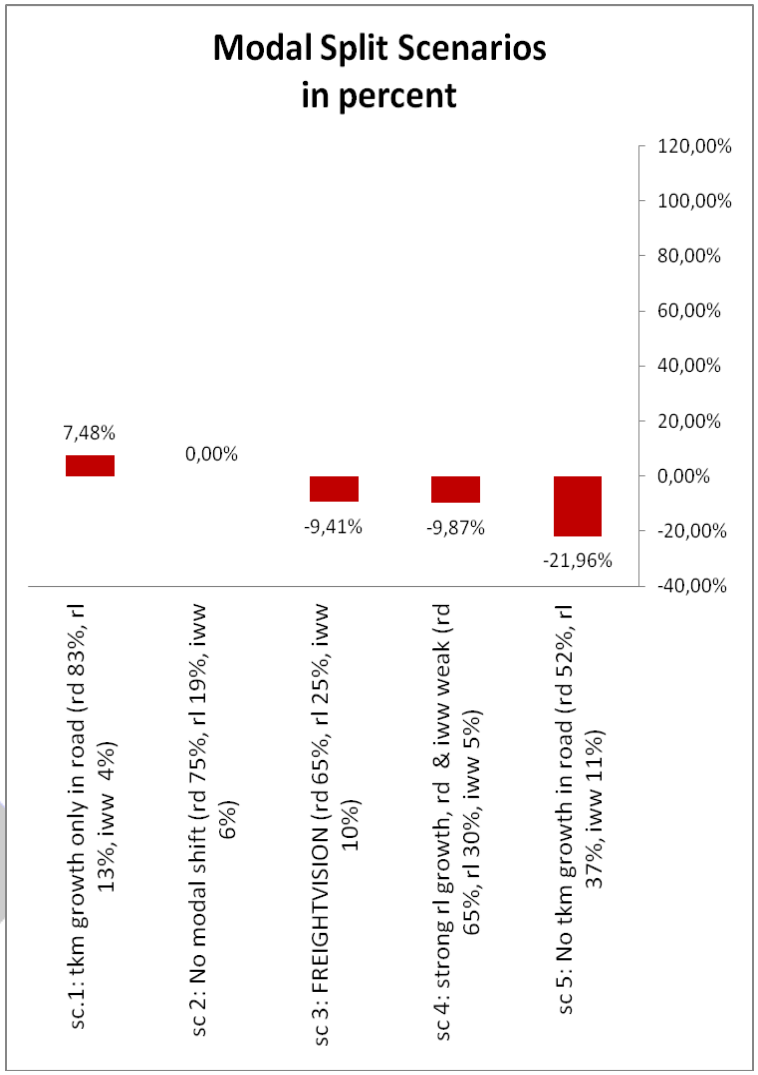

Action Plan Concept

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- Based on the scenario development (models)
- Focussing on most relevant measures:
- Focus on the influence factors and not measures (Not everything possible to do, should be done)
- Measures described with regards to an influence factor (e.g. ITS has many aspects, but we are interested only in the specific aspect of a certain influence factor)
- RTD and Transport policy
- Milestones defined for each measure

Action Plan (1)

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- Management Summary IV

Limiting the increase of tkm				
	Priority of this impact factor: A			Goal for maxim.
				2020: 30%
	Measure	ETD Policy	Transport Policy	Milestones 2020
	Network optimisation - cargo owner		No direct transport policy, but many other measures have an indirect impact (Intern. of extern. costs, CO_2 labelling)	
	Network optimisation - logistics service provider		Same as above	
	Transport and traffic management and control	Improving software solutions in order to display available real time data on problem links. Integration of planning and control software to influence transport planning.	Integration of regional traffic info into an Europe-wide data-base with the help of ITS, TMC, ... opening up to public.	The integration of planning and control software should be finished until 2020. The availability of the needed data on congestion highly depends on the development of ITS.

Measure – Influence Matrix (1)

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	tkm	vehicle energy demand	emissions in electricity production	electric engines in trucks	Biofuels	efficiency in usage of vehicles	engine efficiency	Higher modal share of rail and IWW	Increased share of electric rail	Larger trucks	Increased infrastructure capacity	Pricing signals	Reduced accidents per veh-km
1. Investment in ITS						■					■		■
2. Investment in TEN – road				■		▒					■		
3. Internalisation of external costs	▒	▒	▒	▒	▒		▒	■				■	
4. Weights & Dimensions										■			
5. Liberalisation of cabotage						■							
8. Speed Limits													■
9. Congestion charge						▒						■	
10. Enforcement of regulations													
13. Funding for ERTMS / ETCS								■					
14. Electrification of rail corridors									■				
20. Training for ecodriving						■							■
24. Network optimisation – Cargo owner	■					▒							
25. Network optimisation – log. Serv. Prov.	■					▒		▒					
26. CO2 labels	▒	▒	■		■				■				
27. Intermodal Transport	▒	▒	▒					■					
29. Transport route planning and control	■	▒	▒			▒							
30. Taxation of fossil fuels	▒	▒	■	■	■	▒	▒		■			▒	
32. Improved batteries (energy storage)	▒	▒		■									
33. Including CO2 -> EURO standards	▒	▒					■						
34. BAT vehicle certification	▒	■		▒			■						
35. Clean veh. Techn. I – (Aerodyn,Roll. Res.)	▒	■		▒									
36. Clean vehicle techn II (Altern. Eng., Biofuels)	▒	▒		▒	■								

Measures – Influence Factor Matrix (2)

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	tkm	vehicle energy demand	emissions in electricity production	electric engines in trucks	Biofuels	efficiency in usage of vehicles	engine efficiency	Higher modal share of rail and IWW	Increased share of electric rail	Larger trucks	Increased infrastructure capacity	Pricing signals	Reduced accidents per veh-km
11. Investment in new railway lines													
12. Freight priorisation													
15. Longer trains													
16. Heavier Trains													
17. Investments in IWT infrastructure													
18. Develop new technologies in IWW													
19. Investment in maritime port infrastructure													
21. Automated platooning													
23. E-freight													
28. Transport consolidation & cooperation													
31. Hydrogen infrastructure													

Action plan (1) tkm

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STABIILIZING THE INCREASE OF TKM					
			Target: Max. increase of transport performance (tkm) compared to		
			2020: max. +30%	*2035: max. +43%*	*2050: max. +44%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
24. Network optimisation – cargo owner and 25. Network optimisation – logistics service		No direct transport policy, but many other measures have an indirect impact (Intern. of extern. costs, CO_2 labelling)			
23. E-freight	Development and deployment of an e-freight platform, serving as a multi-modal communication system for freight forwarders, service providers and infrastructure providers.	Development of a roadmap for adaptation of e-freight and supporting standarisation of services.	E-freight fully operational, making multi-modal solutions more transparent, minimising paperwork and consequently offering transport alternatives resulting in higher efficiency.	e-freight platform updated	e-freight platform updated
29. Transport route planning and control	Improving software solutions in order to display available real-time data on problem links. Integration of planning and control software to influence transport planning.	Integration of regional traffic info into an Europe-wide data-base with the help of ITS, TMC, ... opening up to public.	The integration of planning and control software should be finished until 2020. The availability of the needed data on congestion highly depends on the development of ITS.	As this process should be finished until 2035, the implementation of the demonstration projects should also be finished until 2035.	

tkm

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Target: max +44%

This number is taken from the of transport performance forecasts developed in WP 5 (see Management Summary II), which are based on ProgTrans' transport demand forecast developed in WP4 (see Management Summary I). In WP5 3 BAU transport demand forecasts were developed**: "low-forecast" (+44%), "trend-forecast" (+58%), "high-forecast" (+76%)** to give a range of future development. For the backcasting exercise the "low-forecast" was taken for the following reasons:

- There is a political common understanding that **Transport policy should not hinder trade and thus transport demand**.
- Policy should be prepared to cope with a future transport demand growth.

The assumed growth (max. +44%) has been criticised by rail stakeholders as being too high.

Action plan (2) vehicle energy demand

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REDUCING SPECIFIC ENERGY CONSUMPTION OF HGV DUE TO TECHNICAL IMPROVEMENTS (e.g. aerodynamics, rolling resistance, excluding engine efficiency)					
			Target: Improvement of fleet in use (compared to 2005) In the year		
			2020: -20%	*2035: -40%*	*2050: -50%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
35. Clean vehicle technologies I aerodynamics and rolling resistance	Emphasis on research in new materials, aerodynamic design and rolling resistance.	Requirement of maximum aerodynamics and rolling resistance levels for trucks on certain corridors; adaption of weight and dimension directive to allow for new aerodynamics applications.	Market availability of trucks with 30% improvements compared to the top performers from 2005 with regards to rolling resistance and aerodynamics.	Market availability of trucks with 50% improvements compared to top performers from 2005 with regards to rolling resistance and aerodynamics.	Market availability of trucks with 60% improvements compared to top performers from 2005 with regards to rolling resistance and aerodynamics.
34. Best available technologies	A testing and certifying body is needed for technology assessment and for updating the best available technology.	Enforcement of compliance to the certificates has to be integrated into traffic monitoring.	A testing protocol for new vehicles in place: the best available level determined for freight transport; All vehicles are required to meet the BAT level	BAT standards have been revised several times; All operated trucks meet the certificates.	Possible replacement of policy if technological progress has slowed down.

Vehicle energy demand

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Target: -50% compared to 2005

This was based on the targets of the 21st century truck consortium. As stakeholders (Forum 3) and project members felt that the targets of the consortium were set too low compared for example to the results obtained already in pilot-trucks (Mercedes Benz), the reduction of energy consumption was increased to -50%. This could technically be obtained by improving rolling resistance in tires, designing trucks for aerodynamics, improving transmission and electrifying auxiliary loads.

This figure has been criticized by rail stakeholders. Environmental NGOs considered this too conservative for 2050 as such reductions have already been obtained in pilot-tests.

Action plan (3) electricity production

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REDUCING CARBON EMISSIONS IN THE ELECTRICITY PRODUCTION (used for transport)					
			Target: Improvement (compared to 2005) in the year		
			2020: -37,5%	*2035: -61%*	*2050: -88%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
26. CO_2 labelling	The methodology to calculate a product's carbon footprint has to be standardized (EU-wide or even global level (eg.:ISO Standard) and implemented in integrated information systems.		Until 2020 the demonstration projects and the standardization process should be finished. Additionally, the legal obligation should also be set until 2020.		
30. Taxation of fossil fuels	Research on the effects of carbon tax and new truck market, modal split and CO_2 emissions of truck fleets.	EU transport policy will have to adopt to (1) EU climate policy targets and (2) measures adopted under a quantitative agreement of CO_2 emissions	Set a price for CO_2 and decide who trades CO_2; determine emissions allocation among EU-27 nations.	Further tighten a CO_2 emissions cap for LDFT and compensate the losers of the fuel tax and CO_2 tax.	

Electricity production

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Target: -88% compared to 2005

This is based on the assumption that climate change will be mitigated in all sectors. With carbon intensive electricity, mitigation in transport would be useless in mitigation of the climate change.

Nobody has criticised this assumption.

Action plan (4) electric engines

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Freight Transport FORESIGHT 2050

USAGE OF ELECTRIC ENGINES IN TRUCKS FOR LONG DISTANCE ROAD TRANSPORT					
			Target: Share of electric energy used in LDFT by trucks		
			2020: 0%	***2035: 20%***	***2050: 25%***
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
32. Improved batteries	Gradual electrification beginning with auxiliary power and continuing with the lengthening of battery powered operation distance when new battery materials become commercially feasible	Funding for electric infrastructure; Synergy with the electrification of passenger transport	The first electric truck lanes in operation. Battery powered operation demonstrated during loading and offloading.	Development of technology and equipment enabling a day's operation (ca. 600 km) without recharging.	Several transnational electric truck lanes in operation. Electricity powered operation carries the most heavy goods (for energy efficiency) and delivery within cities (for low noise and zero emissions).
30. Taxation of fossil fuels	Research on the effects of carbon tax on new truck markets, modal split and CO_2 emissions of truck fleets.	EU transport policy will have to adopt to (1) EU climate policy targets and (2) measures adopted under a quantitative	Set a price for CO_2 and decide who (vehicle maker or freight com.) trades CO_2.	Further tighten a CO_2 emissions cap for LDFT and compensate the losers of the fuel tax and CO_2 tax.	
2. Investment in road infrastructure	RTD on integration of energy and transport network; Demonstration Project on "Electrified Green Corridor"	TEN funding primarily for "greening" the TEN Network	Demonstration project on electric corridor set up and running.	Electric supply infrastructure on certain TEN corridors.	Fully expanded net of electric supply infrastructure on central parts of the TEN road network.

Electric engines

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Freight Transport FORESIGHT 2050

Target: 25% in 2050

Although current mass produced batteries are not suitable for long distance freight transport, new batteries based on improved surfaces, nanotechnology and ultracapacitors are being scaled up. Extension of electric vehicles in passenger transport will fuel battery development. The IEA hybrid and electric vehicle workgroup has assessed, that 10% of new vehicles would be hybrids in 2015 and slightly less would be all-electric. Based on that forecast, the backcast of 25% of electric vehicles for long-distance freight transport seemed plausible. In addition it is expected that electric energy will be used in urban areas and these trucks will also be used at shorter inter-urban distances (up to 100-200km).

This figure has been criticized by fuel cell lobbyists.

Action plan (5) biofuels

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INCREASED SHARE OF BIOFUELS AND REDUCED GHG EMISSIONS FOR BIOFUEL PRODUCTION					
			Target: ***A: Share of Biodiesel (Blending)*** ***B: Decrease of Biodiesel's carbon footprint as compared to fossil***		
			2020: A: 8% B: -35%	***2035: A: 24% B: -83%***	***2050: A 33%B: -83%***
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
36. Clean vehicle technologies II - biofuels	Impact assessment, footprint analysis and establishment of new biofuels, for LDFT	Setting standards for upstream emissions	8% biofuel share is the FREIGHTVISION target The official EU target 10% for energy from renewable sources in transport Directive 2009/28/EC	15% biofuel share target established	
30. Taxation of fossil fuels	Research on the effects of carbon tax on new truck markets, modal split and CO_2 emissions of truck fleets	EU transport policy will have to adapt to (1) EU climate policy targets and (2) measures adopted there that EU-Governments will have to follow.	Set a price for CO_2 and decide who trades CO_2; determine emission allocation among EU-27 nations.	Further tighten a CO_2 emission cap for LDFT and compensate the losers of the fuel tax and CO_2 tax.	

Biofuels - share

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Target: 33% in 2050

We agree that the 13% share was potentially too high for the year 2020 in the light of knowledge on the sustainability of current biofuels. Therefore, the share of biofuels in 2020 has been reduced to 8%, which is 2%-units lower than the official EU target for renewable energy in the transport sector. However, we consider that in 2035 and 2050 a significantly higher relative share of biofuels is possible because next generation of biofuels are assumed to be available, which will be more sustainable. The absolute volume of biofuels in 2035 and 2050 does not, however, exceed the total primary energy demand by biofuels in 2020, because of the assumed significant reduction in total fuel and energy consumption.

This has been criticized by rail lobbyists and environmental specialists, but on the other hand justified by automobile manufacturers.

Biofuels - upstream

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Target: -83% compared to 2005

We acknowledge that current biofuels are not sustainable, but there is a clear political consensus to shift to biofuels fulfilling sustainability criteria with significantly lower carbon footprint and other environmental impacts. We assume that these will be in use in 2035 and 2050, and no other biofuels are acceptable in society.

Has been criticized by rail lobbyists and NGOs.

Action plan (6) efficiency veh-usage

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INCREASED EFFICIENCY OF VEHICLE USAGE (continues driving, increased loading factors, or other non-technical improvements)					
			Target: Increased efficiency of vehicle usage		
			2020: +8%	*2035: +30%*	*2050: +50%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
28. Transport Consolidation and Cooperation	Improvements in order to provide data-security for competing companies which merge their transports have to be achieved.	Charging empty runs or even not fully loaded trucks favours the implementation of Transport Consolidation & Cooperation.			
20. Training for eco-driving	Technology for improving eco-driving, e.g. eco-meters Defensive driving Driving technique Incentive schemes for drivers	Coordination and harmonisation of the implementation by EU. A directive including defensive driving should be developed & implemented.	The eco-driving and defensive driving should be fully implemented and the effect will be seen.	Other modes of freight transport should have implemented EU an directive on training in eco-driving	
5. Liberalisation of cabotage			Cabotage will be fully liberalised within the European Union.		

Efficient usage of vehicles

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Target: +50% compared to 2005

The value is based on all efficiency improvements which are not directly related to vehicle or engine technologies. It includes e.g. reducing empty drives, increasing loading factors, continues driving, congestion avoidance, consolidation and cooperation, platooning, eco-driving;

No clear criticism presented on this parameter.

Action plan (7) engine efficiency

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IMPROVED ENGINE EFFICIENCY (includes improvements due to hybrid propulsion systems and new fuel types)					
			Target: Increased engine efficiency of the trucks used in LDFT		
			2020: +21%	***2035: +40%***	***2050: +45%***
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
33. Including CO_2 standards into HGV regulations	Support on technological development (especially engine efficiency, aerodynamics, rolling resistance) is needed	Financial support (e.g. lower taxes or congestion charges) to promote technological development and to support acquisition of advanced vehicles	Development of, and agreement on, test cycles for CO_2 in diesel engines Technological development on heavy duty engine efficiency, rolling resistance, aerodynamics	Continuous improvement of technologies and vehicles Updates of the emission limits and the legislation	Assessment of the feasibility of the measure; is it still relevant or are other measurements more powerful in emission reduction?
34. Best available technologies	A testing and certifying body is needed for technology assessment and for updating the best available technology.	The enforcement of compliance with the certificates has to be integrated into traffic monitoring.	A testing protocol for new vehicles in place: the best available level determined for freight transport; All vehicles are required to meet the BAT level	BAT standards have been revised several times; All operated trucks meet the certificates.	Possible replacement of policy if technological progress has slowed down.

Engine efficiency

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Target: +45% compared to 2005 (i.e. 61% energy efficiency in 2050)

The engine efficiency of 60% is close to the highest currently achieved level in diesel power plants and ships, where the heat of exhaust is converted to mechanical power (heat recovery). Truck manufacturers of the 21st century truck consortium have set targets of 55% demonstration in 2012. In effect we are assuming that manufacturing technology will make it possible to fit a power station into a truck by 2050 and to get a 5% improvement in diesel engine within the next 38 years. This influence factor includes also improvements due to new fuel types and using hybrid technologies.

Action plan (8) modal shift

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HIGHER MODAL SHARE OF RAIL AND IWW					
			Target: Modal split in		
			2020: road: 75%; rail: 19%; IWW: 6%	***2035: road: 70%; rail: 22,5%; IWW: 7,5%***	***2050: road: 65%; rail: 25%; IWW: 10%***
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
13. ERTMS			By 2020 ERTMS implementation at main lines and equipment (about 4000 locos)	By 2035 main lines and secondary lines are equipped with ERTMS (equipment and tracks)	By 2050 full coverage of ERTMS (equipment and tracks)
27. Intermodal transport	Research on IT interfaces/links as well as the automation of transhipments.	Strengthening of the Marco Polo and the TEN programmes.	50% of sea container transport over 500 km will be by rail or IWW.	75% of sea container transport over 500 km will be by rail or IWW.	90% of sea container transport over 500 km will be by rail or IWW.
3. Internalisation of external cost	Research on new technologies that may reduce the costs of the measure's implementation including the use of satellite positioning and real-time measurement of the relevant external effects.	Harmonization of policies in all modes of transport using the same criteria (with a particular focus on the measurement of external effects and a common system of determining the costs attributed to them).	Basic field research for identifying regions where there is high level of external costs and for reducing the high implementation costs as well as harmonization of national schemes	Full coverage of the whole TEN-T network followed by research on mapping of external effects	Relevant technologies and the common framework should be deployable throughout the entire networks of EU member states, where applicable, and all external costs should be internalized at all modes.

Modal shift

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Freight Transport FORESIGHT 2050

Target: Road 65%, Rail 25%, IWW 10%

These targets assume an increase of transport performance in road by +25%, rail by +90% and IWW by +130%. In absolute numbers it means that the tkm growth of road and rail is about the same (about 400 btkm).

This target has been criticized by rail lobbyists as being too low and by car manufacturers as being too high. Rail lobbyists claim that a rail modal share above 35% should be possible. Comments:

- A modal split of road 51%, rail 36%, IWW 11% corresponds to the following transport performance increases between 2005 and 2050: road 0%, rail +170%, iww +177%
- Our numbers cover all inter-urban transport. (also transport below 300km)
- Please also consider modal share targets of the FERRMED study (17% of all inland freight, 24% (more than 500 km), 28% (more than 1,000km) of all long distance transport by 2025)
- Also consider modal shift issues, e.g. source/origin, transport affinity of cargo type, volume to fill trains, density of the rail network, transport distances below 500km;

Action plan (9) electric engines/rail

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Freight Transport FORESIGHT 2050

HIGHER PERCENRAGE OF RAIL TKM TRANSPORTED WITH ELECTRIC ENGINES					
			Target: Percentage of rail tkm with electric traction		
			2020: 66%	*2035: 75%*	*2050: 80%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
14. Electrification of rail corridors	Research has to be done concerning uniform electrification systems and / or multisystem locomotives.				A full coverage of electrification on European main corridors should be achieved by 2050
26. CO2 labelling	The methodology to calculate a product's carbon footprint has to be standardized (EU-wide or even global level (eg.:ISO Standard) and implemented in integrated information systems.		Until 2020 the demonstration projects and the standardization process should be finished. Additionally, the legal obligation should also be set until 2020.		
30. Taxation of fossil fuels	Research on the effects of carbon tax on electrification of rail corridors.	EU transport policy will have to adapt to (1) EU climate policy targets and (2) measures adopted there that EU-Governments will have to follow.	Set a price for CO_2 and decide who trades CO_2; determine emissions allocation among EU-27 nations.	Further tighten a CO_2 emissions cap for LDFT and compensate the losers of the fuel tax and CO_2 tax.	

Electric rail

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Freight Transport FORESIGHT 2050

Target: 80% in 2050

The trend is to increase the share of electric energy supply for rail freight. A 100% share was considered impossible due to high costs of electrification of all railway lines. Sustainable biodiesel is assumed to be used in similar proportions in diesel rail as in road.

Rail stakeholders claim that a higher share should be possible.

Action plan (10) Larger Trucks

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Freight Transport FORESIGHT 2050

LARGER TRUCKS					
			Target: Tkm transported by Gigaliners in %		
			2020: 2%	*2035: 8%*	*2050: 10%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
5. Modifying the rules for HGV weights and dimensions	On the side of the vehicles, no new technology is necessary. Additional safety requirements may be imposed.	National governments can decide to permit longer and heavier vehicles (LHVs) within the boundaries of their jurisdiction. Cross-border operations require EU regulation.	Regulations for the EMS are expected to be in place, unless disagreements between Member States prevent the system from becoming operational.		
2. Investment in road infrastructure	Research in reduction and elimination of different bottlenecks, e.g. by introducing ITS. Research in better usage of existing transport infrastructure	Co-ordination and prioritization in eliminating bottlenecks. Revise TEN projects. New investments should focus on reducing GHG-emissions.	Finalise decided road infrastructure projects Green Corridor demonstration projects Needed investments for EMS in certain corridors	Core network for EMS established	

Larger Trucks

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Target: 10% (of road transport performance is transported) in 2050

Larger trucks are already used in some EU countries and in the US with success. The transport costs and fuel consumption are lower than with smaller trucks, therefore there is an economic incentive to increase their share in freight transport.

Criticised by some vehicle suppliers. They argue that a 10% share in 2050 is a too conservative estimate.

Action plan (11) tkm

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INCREASED ROAD INFRASTRUCTURE CAPACITY AS WELL AS ROAD AVAILABILITY AND RELIABILITY					
			Target: Increase of road capacity on scarce infrastructure		
			2020: +10%	*2035: +20%*	*2050: +30%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
1. Investment in ITS	Research is necessary on the detection dysfunctional vehicles (e.g. very reliable night time video detection comprehensive reliability data research and integration of all modes is required.	Providing funding and applying temporary hard shoulder usage near and at bottlenecks provision of information to users of transport	Temporary hard shoulder runnings should be implemented at all relevant bottlenecks throughout Europe, Video detection functional in all conditions Comprehensive transport information available		
2. Investment in road infrastructure	Research in reduction and elimination of different bottlenecks, e.g. by introducing ITS. Research in better usage of existing transport infrastructure	Co-ordination and prioritization in eliminating bottlenecks. Revise TEN projects. New investments should focus on reducing GHG-emissions.	Finalise decided road infrastructure projects Green Corridor demonstration projects	Bottlenecks in the TEN road network relieved	

Action plan (12) pricing signals

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DEMAND AND SUPPLY ORIENTED PRICING SIGNALS TO IMPROVE INFRASTRUCTURE CAPACITY MANAGEMENT ON THE ROAD NETWORK					
			Target: Increase of transport costs per veh-km on scarce infrastructure		
			2020: +25%	*2035: +50%*	*2050: +50%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
3. Internalisation of external cost	Research on new technologies that may reduce the costs of the measure's implementation including the use of satellite positioning and real times measurement of relevant external effects	Harmonization of policies in all modes of transport using the same criteria (with a particular focus on the measurement of external effects and a common system of determining the costs attributed to them.)	Basic field research for identifying regions where there is high level of external costs and for reducing the high implementation costs as well as harmonization of national schemes	Full coverage of the whole TEN-T network followed by research on mapping of external effects	Relevant technologies and the common framework should be deployable throughout the entire networks of EU member states, where applicable, and all external costs should be internalized at all modes.
9. Congestion charge	Research on improved technologies that may reduce the costs of the measure's implementation (Real time measurement of traffic flow and real time charging.) and on the clarification of the definition of external costs and congestion. A demonstration project in non-urban regions should provide a useful test of the measure.	Congestion Charging Scheme would be introduced based on a local assessment of the level of congestion. The main task is to develop and establish a rational concept to avoid congestion, i.e. aim at a distribution of traffic that keeps users of infrastructure moving.	Basic field research should be carried out to ease its implementation and for clarifying its definition and It should be applicable where there is high level of congestion.	Full coverage of the TEN-T network (without ignoring the possible risks to European competitiveness and regional cohesion)	The measure should be operational in all EU countries where relevant

Action plan (13) accidents/veh-km

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REDUCED FATAL ACCIDENTS PER VEH-KM					
			Target: Reduction of number of accidents per truck veh-km		
			2020: 15%	*2035: 35%*	*2050: 60%*
Measure	**RTD Policy**	**Transport Policy**	**Milestones 2020**	**Milestones 2035**	**Milestones 2050**
1. Investment in ITS	Research in innovative cooperative assistance systems and their widespread application	Solving product liability which would permit a higher degree of automatization, legal requirement for some safety systems on HGV	All new HGV are equipped with active braking systems The majority of vehicles is equipped with cooperative safety systems	Comprehensive application of co-operative safety systems; Begin of fully autonomous Driving;	
8. Harmonised speed limits	No development of new technologies needed, the focus should be on demonstration projects, to get experience with applying the measure.	On national level an action plan for implementing the harmonization of speed limits on critical roads is needed.	The Demonstration Projects and The legislation should be finalized.	The concept introduced on critical roads should be implemented.	
20. Training for eco-driving	Technology for improving eco-driving, e.g. eco-meters Defensive driving Driving technique Incentive schemes for drivers	Coordination and harmonisation of the implementation by EU. A directive including defensive driving should be developed & implemented.	The eco-driving and defensive driving should be fully implemented and the effect will be seen.		
10. Enforcement of regulations	New technology and more automatic control systems, e.g. speed, rest time, weight and weight distribution.	Co-ordination of the enforcement focuses areas to ensure traffic safety.	Co-ordinated enforcement. in all member states All drivers and hauliers should comply with all regulations.	Continuous development of technology makes the control less costly and easier, while keeping compliance at 100%	

Conclusions/Results

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1. We developed a list of influence factors with
   - targets to be met by 2020, 2035 and 2050.
   - If targets are met, vision should be reached.
   - Thinking in influence factors is more difficult than in measures.
   - Thinking in measures instead of influence factors is not effective.
   - Measures from different areas are needed to meet the targets of each influence factor (cross-modal/area thinking)
   - The influence factors are priotirised by the sensitivity and impact analysis.

Criticism

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1. Rail lobbyists: Technical Improvements in Road overestimated and Targets for Modal shift should be set higher (35-40% rail)
   - Maybe true -> please give studies/arguments
2. Rail lobbyists: Stakeholder mix biased (no NGOs, no IWW, mainly road stakeholders)
   - Look on our website
3. No economic analysis (CBA)
   - Not in the scope of the project; the goal of the project was to discuss with stakeholder possible future developments and give indications for future developments based on modelling and stakeholder know-how
4. Not scientific/methodology
   - FORESIGHT, GHG/FFS model, TRANSTOOLS

Conclusions/Results

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2. Vision for 2050 is reachable

- It should be possible to reduce ghg emissions by 80% in long-distance freight transport
- It should be possible to reduce Fossil Fuel Share to 40%.
- It should be possible to reduce Congestion by 50%
- It should be possible to reduce Accidents by 80%

Conclusions/Results

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3. Vision is very challenging

- At the beginning of the process some stakeholders thought we are „hippies“ as we defined these high targets.
- At the end it was not very much discussion about it

Conclusions/Results

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4. Modal shift and gigaliners have limited impact
   - Especially modal shift was a surprise for me.
   - Depends very much on the targets defined (but which targets are reasonable?)
   - Heavily criticised from rail lobbyists

Conclusions/Results

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5. Problem comes from road transport and has to be solved mainly there
   - Rail-lobbyists claim that improvements on road are overestimated and will fail. Does this argument help in the current situation?
   - There seems to be no other option than focussing on emission reduction in road transport. (other options would be defining a not so ambitious vision or hindering transport)

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FREIGHTVISION

Final Conference: 24th Feb. 2010, Brussels

www.freightvision.eu

LOGMAN – Logistics & Manufact. Carbon Footprint

www.logman-footprint.eu

Thanks for your attention!

Stephan Helmreich

Head of Unit Future of Transport

AustriaTech – Federal Agency of Technological Measures