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Accompanying the White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system

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Introduction

Transport is the foundation of any economy as it constitutes the heart of the supply chain. Without good transport networks, a proper functioning of the internal market is not possible. Transport infrastructure investments boost economic growth; create wealth; enhance trade, geographical accessibility and the mobility of people. They are a highly effective engine of job creation. As other world regions are launching huge, ambitious infrastructure investment programmes, it is crucial that Europe maintains its competitive position.

Transport is also a key ingredient for a high quality of life, making places accessible and bringing people together. Besides its role as a facilitator, the transport industry in itself represents an important part of the economy: in the EU it directly employs around 10 million people and accounts for about 5% of GDP; many European companies are world leaders in infrastructure, logistics, traffic management systems and manufacturing of transport equipment.

Market integration, economic growth and transport activity are strongly related. In the EU, efficient transport connections have facilitated the creation and deepening of the internal market. Each of the EU enlargements was accompanied by a strong growth of transport activity. Still, a lot needs to be done in order to effectively unite the transport systems of the eastern and western part of the Europe and make the enlargement a physical reality.

The link between internal market and transport was clearly recognised from the beginning of European integration. Transport policy was included, as one of the common policies, in the Treaty of Rome. A trans-European network policy was added by the Maastricht Treaty in 1992 to help achieve the EU internal market and cohesion objectives[1].

In that same year, 1992, the Commission published a White Paper on the common transport policy, which was essentially dedicated to market opening, in line with the priorities of the time. Almost ten years later, the 2001 White Paper emphasised the need for managing transport growth by achieving a more balanced use of all transport modes.

This White Paper takes again a global look at developments in the transport sector, at its future challenges and at the policy initiatives that need to be considered. Transport continues to be a core element of economic development, territorial and social cohesion, but has to meet new challenges:

- Since the last enlargement, European transport policy needs to cover almost the whole continent and 500 million citizens.

- The context is one of recovery from the deepest world economic crisis since the 1930s. The crisis had followed a sharp increase in the price of oil and of other commodities, which was a symptom of growing imbalances in the use of global resources.

- At the same time, the international community agrees on the need to drastically reduce world greenhouse gas emissions.

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[1] Presently, transport policy is governed by the provisions of Title VI, Articles 90 to 100, of the Treaty on the Functioning of the European Union (TFEU).

The challenge of establishing a more resource efficient economy is particularly demanding for the transport sector, which continues to rely almost entirely on oil, has emitted 34%[2] more greenhouse gases in 2008 than in 1990 and remains a major source of noise and local air pollution.

The present White Paper takes on the challenge of seeking a deep transformation of the transport system, promoting independence from oil, the creation of modern infrastructure and multimodal mobility assisted by smart management and information systems. It is put forward together with a Communication providing a roadmap to a low-carbon economy by 2050 and a new Energy Efficiency Plan 2011 and forms an integral part of the 'Resource Efficiency' initiative of the Commission.

The document is organised in three main parts:

- "*Part I – Current trends and future challenges: Growing out of Oil*" identifies the challenges that the transport system is likely to face in the future, based on an evaluation of developments in the recent past[3] and on an assessment of current trends[4]. It clarifies, in particular, the limits on greenhouse gas emissions that transport will have to respect in the context of the action against climate change.

- "*Part II – A vision for 2050: An integrated, sustainable and efficient mobility network*" It then tries to formulate a plausible and desirable way for the transport system to meet those challenges and to deliver better mobility services to citizens and businesses with a 2050 horizon. The vision is accompanied by goals intended to guide policy action in the next decade.

- "*Part III – Strategy: Policies to steer change*" is the operational part of the White Paper. It describes the initiatives that need to be taken into consideration in the next ten years to meet the goals set in Part I, put the transport sector on a sustainable path and bridge the gap between vision and reality.

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2 This figure includes emissions from international aviation and maritime transport.

3 A detailed analysis can be found in Annex 2: "Ex Post evaluation of Transport Policy 2001-2010" of the Impact Assessment on the White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system".

4 A description of how transport could evolve up to 2050 if new policies did not intervene to modify the trends (reference scenario) can be found in Annex 3: "Reference scenario (2010-2050)" of the Impact Assessment on the White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system".

I – Current trends and future challenges: Growing out of Oil

1. A LOOK AT THE RECENT PAST

1.1. More efficient, safe and secure transport…

1. The last decade was marked by an intense transport activity matched by an equally intense transport policy agenda. The EU enlargement and the ever increasing integration of global markets have boosted freight volumes. The mobility of Europeans has also grown despite the high level of congestion in many cities.

2. EU transport policy has helped transport become more efficient, safe and secure. **Market opening** has been particularly successful in road and, spectacularly, in aviation where liberalisation in the 1990s set off an unprecedented growth in both the number of passengers flown and the number of routes served inside the EU.

3. Transport has become a lot **safer**. The number of people killed in road accidents was about 40% lower in 2010 than in 2001, although progress was short of the 50% target. Maritime transport safety was also improved through successive legislation which, among others, outlawed the use of single hull oil tankers and created a pan-European system of traffic monitoring. New dedicated agencies in air, rail and maritime transport oversee the safety of EU transport operations.

4. People are at the centre of EU transport policy. To ensure high level of **service quality** and good **working conditions**, legal requirements make sure that neither passengers nor workers are unduly affected by increasing competitive pressure in the transport markets. The EU has established a set of passenger rights, first in air transport, later in rail and recently also in waterborne and coach transport.

5. **Security** has become a European transport policy issue after 11 September 2001. EU security rules in air and maritime transport have meanwhile been adopted covering regulatory standards and inspection regimes.

6. National infrastructure had previously partly ignored the needs of the EU internal market. This has led to the establishment of the **TEN-T policy**. After the EU enlargement in 2004, 30 projects were prioritised. Some of them have been completed, with very positive effects for the regions involved. The European high-speed rail network is developing and has shown remarkable success on certain connections. Many TEN-T projects are however facing planning complications and budgetary constraints. The leverage of EU financing is proving to be too weak.

7. **International ties** have been strengthened. A Common Aviation Area (CAA) is being created with neighbouring countries. Comprehensive air transport agreements have been signed with the USA in 2007 and with Canada in 2009. A Transport Community Treaty for South-Eastern Europe has been negotiated. The adoption of the Maritime Labour Convention at the International Labour Organization (ILO) in 2006 – the new 'Bill of Rights' for seafarers – has been actively supported by the

EU. Europe's representation in international institutions such as International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO) would be more effective if the EU spoke with one voice, but Member States are reluctant to accept such an approach.

1.2. …but no structural change to reduce oil dependency and CO_2 emissions

8. Transport continues to be nearly fully **dependent on fossil fuels** as energy source. It is the only sector where **greenhouse gas (GHG)** emissions have almost continuously grown over the last 20 years and are now about one third above their 1990 levels. Technical progress has delivered greater energy efficiency, but not enough to offset rising traffic volumes.

9. The successive tightening of vehicle emission standards ("Euro" classes) and improvements in fuel quality significantly reduced transport-related emissions of pollutants and particulates. Nonetheless, **pollution** still exceeds legal limits in many urban and other sensitive areas: further action is needed to improve air quality.

10. The poor environmental performance of the transport system is also linked to transport patterns presently dominated by road in both freight and passenger transport. The more efficient and cleaner rail and waterborne modes failed to exploit their potential in the medium to long distances, which represent two thirds of driven kilometres and of emissions. Some factors might explain the **low appeal of alternatives to road transport**:

- Investments to modernise the rail network and transhipment facilities have been insufficient to address the bottlenecks in multimodal transport. Modal networks are badly connected. TEN-T policy has lacked financial resources and a true continental multimodal perspective;

- At the beginning of the 21st century, the railways were the only transport mode in the EU that had not been opened up to competition. Legislation prescribing market opening in rail freight transport as of 2007 and in international rail passenger transport as of 2010 has been implemented slowly and incompletely in the large majority of Member States. Enforcement has been inadequate. National passenger markets, that represent the largest share of the business, are still largely closed. The lack of competition held back service quality and efficiency;

- Short sea shipping faces higher administrative burdens compared to the land-based modes. National borders continue to cause inefficiencies and additional costs in rail.

- Charges and taxes do not fully reflect the societal costs of transport. Attempts to internalise transport externalities and to remove tax distortions have so far been unsuccessful.

1.3. Encouraging recent developments

11. Some of the most effective measures to promote the sustainability of the transport system have taken the longest time to define and adopt. However a number of important decisions have now been taken:

– In 2009, in the context of the Climate and Energy package, the EU set itself the mandatory target of reaching a 10%-share of renewable energies used in transport[5] by 2020, and lowering the greenhouse gas intensity of fuels by 6% by 2020[6];

– In 2009, the EU adopted a Regulation on CO_2 standards for new passenger cars[7] and in December 2010 the European Parliament and the Council reached agreement on the final text of the vans Regulation. The impact will be significant, but will take some time to be fully evident since this is dependent on the existing fleet being replaced. The inclusion of aviation in the EU emission trading scheme (EU ETS) from 2012 onwards will also provide incentives to reduce CO2 emissions and will ensure that forecast growth in emissions is offset by equivalent reductions in other sectors;

– In 2008, the Commission proposed a strategy covering all transport modes for the internalisation of the most important external costs, namely those linked to: congestion, GHG emissions, local pollution and noise. For road freight transport, the Commission proposed amending the Directive on charging heavy goods vehicles – the so-called 'Eurovignette Directive' – to allow Member States to integrate in distance-based charges the cost of air and noise pollution. The European Parliament and the Council are now negotiating the final version;

– In October 2010, the EU was at the forefront in forging a global agreement in ICAO involving 190 countries to reduce the impact of aviation on the environment and introducing a framework for market based measures.

12. It is still too early to fully appreciate the impact of these measures, but they have set in motion a process of transformation in the sector that it is now vital to continue, deepen and extend to the 2050 horizon.

2. ASSESSING TRANSPORT TRENDS: BUSINESS AS USUAL IS NOT SUSTAINABLE

13. Some of the unresolved problems of the past are likely to be exacerbated by current trends. This is shown by the Commission's analysis of possible future

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5 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, OJ L 140, 5.6.2009, p. 16–62. The binding target is set only for land-based transport modes. However, the use of renewable energy sources in aviation and maritime transport can contribute voluntarily to the achievement of the 10% target.

6 Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC

7 Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles (23 April 2009).

developments given a scenario of unchanged policies (the 'Reference scenario' in the accompanying Impact Assessment[8]).

14. This scenario assumes that in 2010-2020 the economy will recover from the sluggish growth of the previous decade and revert to historical average growth rates (2.2% per year), thanks to the higher productivity growth assumed in Member States that are catching up. The GDP growth rate is however projected to slow down to 1.6% per year as of 2020 because of demographic ageing and the related reduction of the working-age population[9].

2.1. Increasing oil price and persistent oil dependency

15. Increasing demand and extraction costs will affect the level and volatility of oil price. Global oil demand is projected to grow from 84 million barrels per day (mb/d) in 2009 to about 100 mb/d in 2035, according to International Energy Agency (IEA)[10]. The transport sector accounts for almost 90% of the predicted increase in oil use and China alone would account for half of the global increase in oil use for transport. The Reference scenario assumes a relatively high oil price environment compared with previous projections[11] – 59 $/barrel in 2005 rising to 106 $/barrel in 2030 and 127 $/barrel in 2050 (in year 2008-dollars)[12].

16. In the EU, transport depends on oil and oil products for about 96%[13] of its energy needs[14]. In the Reference scenario oil products would still represent 90% of the EU transport sector needs in 2030 and 89% in 2050.

2.2. Growing congestion and poorer accessibility

17. Without policy change, total transport activity is expected to continue growing in line with economic activity. Freight transport activity is projected to increase, with respect to 2005, by around 40% in 2030 and by little over 80% by 2050[15]. Passenger traffic would grow slightly less than freight transport (34% by 2030 and 51% by 2050).

18. The various modes would in general keep their relative share in the absence of significant policy changes. Road transport would maintain its dominant role in both passenger and freight transport within the EU, with passenger cars still contributing more than two thirds to total passenger transport in 2050.

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8 For a more detailed description of the Reference scenario see Annex 3 of the Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

9 European Commission, DG Economic and Financial Affairs: 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060). EUROPEAN ECONOMY 2/2009, http://ec.europa.eu/economy_finance/publications/publication14992_en.pdf.

10 International Energy Agency (2010), World Energy Outlook 2010.

11 The oil price projections are the result of world energy modelling with the PROMETHEUS stochastic world energy model, developed by the National Technical University of Athens (E3MLab).

12 These projections are close to those of the IEA: in its publication "Energy Technology Perspectives 2010" the IEA assumes 115 $/barrel in 2008 prices for 2030 and 120 $/barrel for 2050.

13 The corresponding figure worldwide is very similar: 95%.

14 European Commission, EU Energy and Transport in Figures, 2010 http://ec.europa.eu/transport/publications/statistics/statistics_en.htm.

15 Freight transport activity includes international maritime transport.

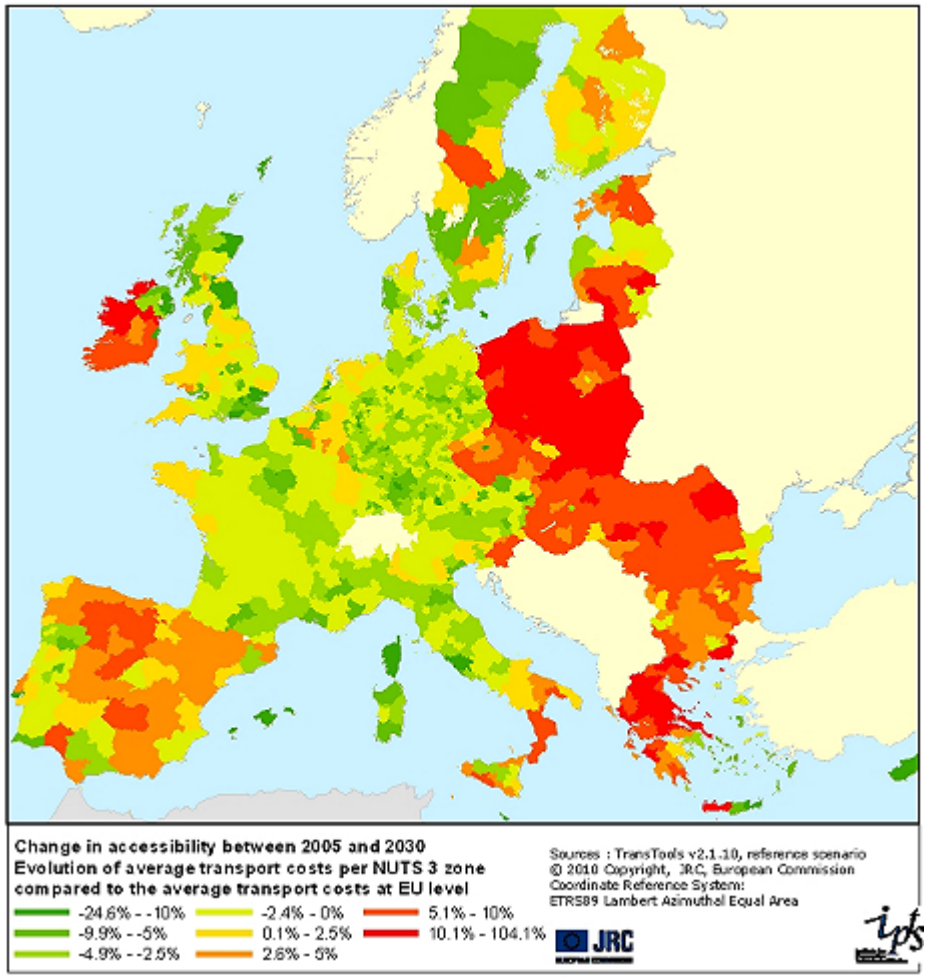
19. High congestion levels would seriously affect road transport in several Member States by 2030 without effective countervailing measures such as road pricing. While urban congestion will mainly depend on car ownership levels, the extent of urban sprawl and the degree of availability of public transport alternatives, congestion on the inter-urban network would be the result of growing freight transport activity along specific corridors, in particular where these corridors cross urban areas with heavy local traffic.

20. Congestion costs are projected to increase by about 50% by 2050, to nearly € 200 billion annually in the Reference scenario.

21. European skies and airports will be saturated. Aviation is expected to grow by over 50% for passengers and by 125% for freight until 2020.

22. The current situation in terms of accessibility[16] in the EU suggests that there is a marked division between central and peripheral areas as regards their transport connectivity and costs. Peripheral areas have higher average costs of transport, owing not only to the need for longer trips, but also to the more expensive or less efficient transport solutions that are available.

[16] Accessibility here is based on the concept of "potential accessibility", which assumes that the attraction of a destination increases with size, and declines with distance, travel time or cost. More specifically, accessibility is defined as the generalised transport costs from zone *i* to zone *j* for segment *r* (commodity group or trip purpose) in year *t*, weighed with the traffic volumes.



Source: TRANSTOOLS model

Figure 1: Change in accessibility between 2005 and 2030 in the Reference scenario

23. The likely increases in fuel costs and congestion levels noted above will lead to further divergences in accessibility. Many peripheral areas, particularly in the new Member States, will remain poorly connected to the European transport network. They will suffer disproportionately more from congestion and high fuel cost (Cf. Figure 1 below), given their high dependence on few low-capacity road axes and regional air connections. Indeed, in the new Member States there are currently only around 4.500 km of motorways and no high speed rail lines; the conventional railway lines are often in poor condition.

2.3. A deteriorating climate and local environment

24. In the Reference scenario, the share of CO_2 emissions from EU transport as a proportion of all EU emissions would continue increasing, to 38% by 2030 and almost 50% by 2050[17], due to the relatively lower decline of CO_2 emissions from transport compared to power generation and other sectors. Overall, CO_2 emissions from transport would still be 31% higher than their 1990 level by 2030 and 35% by

[17] The CO_2 emissions include international maritime and aviation but exclude combustion emissions from pipeline transportation, ground activities in airports and harbours, and off-road activities.

2050, owing to the fast rise in the transport emissions during the 1990s. Aviation and maritime transport would contribute an increasing share of emissions over time.

25. In the absence of new policies, renewable energy sources in transport would increase to just 13% by 2050[18] and electric propulsion in road transport would not make significant inroads[19].

26. External costs of transport would continue to increase. The rise in traffic would lead to roughly € 20 billion increase in noise related external costs (+40%) and € 60 billion in the external cost of accidents (+35%) by 2050.

27. NO_x emissions and particulate matter would drop by about 40% and 50%, respectively, by 2030 and roughly stabilise afterwards. As a result, external costs related to the emission of air pollutants would decrease by 60% by 2050.

3. FUTURE CHALLENGES AND CONSTRAINTS

3.1. Growing competition in world transport markets

28. European economic actors must confront a larger number of global competitors. The World is moving ahead in all fields and the profound changes proposed in this White Paper should not only be seen as an opportunity for increasing efficiency, but also as a necessary condition for maintaining the competitiveness of the European transport and logistics sector which needs to stay one of Europe's growth engines.

29. European transport equipment manufacturers have for a long time enjoyed a comfortable lead over the rest of the world, sharing world markets with few, mostly American and Japanese, competitors. This was possible thanks to their superiority in specific engineering technologies and continuous investment in infrastructure. Today, this lead is shrinking as other countries are heavily investing in research and development (R&D) and infrastructure. China's R&D spending has been growing for several years at double digit rate and this year China is expected to become the second largest R&D power in the world, well ahead of major EU Member States. Moreover, while China is making a concerted push in the most promising cutting-edge areas, European research efforts remain diffused.

30. The air transport system and its supply chain, including the high-tech aeronautical industry, are an important contributor to the European economy and to the competitiveness of Europe as a region[20]. European airlines and airports are among

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[18] The share of renewables in transport reported here follows the definition from the Directive 2009/28/EC.

[19] The Reference scenario, which was finalised in early 2010, does not take into account the re-launch (following Commission Decision 2010/C 280/08 of 14 October 2010) of the CARS 21 initiative (Competitive Automotive Regulatory System for the 21st century). This initiative may trigger a higher uptake of electric propulsion vehicles by 2050 than in the Reference scenario, where it is projected to be negligible.

[20] The vital importance of Aviation for the European economy and our societies was highlighted in 2010 during the Icelandic volcanic eruption in April. 5 days of European airspace closed, involving 100,000 flights cancelled, 2 million passengers stranded and billions of losses for the economy show to what extent Europe depends on an efficient and well functioning air transport sector.

the world leaders, as is the European aeronautical industry. It will be increasingly challenging to maintain this position on the global marketplace, owing to capacity constraints in Europe and massive investments in air transport infrastructure in other regions. Maintaining a competitive European air transport system and the key role of Europe as intercontinental air transport hub will have a wider importance for the European economy.

31. In high speed rail, the Chinese – so far relying on European, Canadian or Japanese technology – have developed their own trains. The EU needs to keep pace with global technological developments and maintain its competitive advantage in high value-added transport industries.

32. Although China is already the biggest car producer in the world, European companies are still among the world leaders in conventional cars, trucks and buses. They are also investing in the development of alternative fuel solutions and electric cars. In China, buyers of electric or plug-in hybrid vehicles receive considerable incentives. Such actions are expected to help China achieve its goal of producing one million electric vehicles per year starting from 2020. Without appropriate framework conditions to make innovative solutions economically viable, European manufacturers risk lagging behind global competitors.

33. In shipbuilding, Asian players have a dominant position in the production of cargo vessels. Europe is technology leader on passenger ships, special purpose vessels such as dredgers and in large parts of the global marine equipment industry. Shipyards and equipment suppliers are indispensable elements for maritime transport and logistics. At the same time they provide the technical solutions to the much needed reduction of GHG and other emissions from shipping. It is therefore important that Europe retains competence and at least a critical mass of shipbuilding.

34. European logistics companies – currently undisputed world leaders – also risk losing market shares. For years, they have benefited from the excellent infrastructure, a history of free trade, and little red tape at home. Today, European infrastructure is increasingly congested and alternatives appear elsewhere. By comparison, China already has the largest high speed rail network in the world, while North African ports – more flexible than their European counterparts – have taken over large shares of the transhipment business. Among the 20 biggest airports by passenger numbers and cargo volume, only six and four respectively are European. The centre of gravity of the world's transport infrastructure is gradually shifting towards Asia. Continuous investment in transport infrastructure and simplification of administrative procedures are needed to contain this erosion of the importance of the EU as the world's logistics platform, without which European logistics companies will lose their global leadership.

3.2. A tight carbon budget for the transport sector

35. In October 2009, the European Council supported the objective of reducing GHG emissions in the EU by 80 to 95% by 2050 compared to 1990 levels[21]. The Commission has analysed global scenarios[22] that would allow meeting the 2ºC objective in a cost efficient way. The results, in line with work of the IPCC, show that halving world emissions by 2050 compared to 1990 implies reducing EU domestic emissions[23] by around 80% by 2050 compared to 1990[24]. This target sets out the boundaries also for developments in the transport sector.

36. The modelling analysis has shown that the transport sector needs to prepare itself for a reduction of its emissions by around 60% below 1990 levels in 2050. This would correspond to emissions cuts of around 70% below today's levels.

EU Transport greenhouse gas emissions in 2008[25]

The contribution of the various modes to the GHG emissions of the transport sector was as follows in 2008[26]: 71.3% came from road, 13.5% from maritime, 12.8% from aviation, 1.8% from inland navigation and 0.7%[27] from rail transport.

While there is no fully reliable data on the split of total emissions into passenger and freight transport, research shows that passenger transport accounts for around 60% of the total[28]. Travel surveys show that the overwhelming majority of trips (97.5%) are 'short' distance (not longer than 100 km). The remaining 2.5% of trips account however for more than half (53%) of all passenger kilometres (pkm)[29]. Concerning the division between urban and non-urban transport, estimates point to around a quarter (23%) of transport emissions coming from urban areas[30,31].

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21 According to the Intergovernmental Panel on Climate Change (IPCC), developed economies will need to be nearly carbon-free by 2050 to avoid disastrous effects of GHG emissions on the climate: B. Metz et al. (eds), Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.

22 COM (2011)112. Roadmap towards a 2050 low-carbon economy and the accompanying impact assessment.

23 Adding up emissions from all sectors excluding international maritime and land use.

24 Such an objective would require that total EU emissions are reduced from about 5080 Mt CO_2 equivalent in 2008 (excluding international maritime bunkers and LULUCF) to around 1120 Mt CO_2 equiv. in 2050.

25 At global level, transport produced 22% of global CO_2 emissions in 2008 (6604.7 Mt of CO_2), being the second-largest sector after electricity and heat generation. CO_2 emissions from transport are dominated by road, with about 73% of emissions, followed by international maritime (9%) and aviation (7%). The rest (about 11%) originates from domestic navigation and aviation, rail and pipeline transport. Source: International Energy Agency (2010), CO_2 Emissions from Fuel Combustion 2010, OECD/IEA, Paris.

26 These figures include international aviation and maritime, but exclude combustion emissions from pipeline transportation, ground activities in airports and harbours, and off-road activities.

27 This figure only includes emissions from diesel use, but not from electricity use. Looking at final energy consumption by transport mode, electricity represents about 66% of the energy consumption by rail.

28 Source: PRIMES-TREMOVE and TREMOVE transport models.

29 Source: TRANSTOOLS model.

30 Total emissions include international bunker fuels.

31 Source: PRIMES-TREMOVE and TREMOVE transport models.

Roughly the following shares in GHG emissions can be identified[32]:

(1) Urban transport of people and freight: responsible for ~23% of emissions, is mostly performed by cars (16% of total transport emission), followed by buses (0.5%), motorcycles (0.5%) and freight vans (6%). Cycling and walking account for 13% of urban pkm with no emissions;

(2) Interurban and regional travel (up to 500 Km): responsible for ~33% of emissions, is mostly performed by cars (~29% of total transport emission), followed by planes (~2%) and motorcycles (~1%). Coaches and buses, rail and inland navigation provide all together around 1%;

(3) Intra-EU and regional freight transport (long and medium distances): responsible for ~23% of emissions, is mostly carried by road (about 19% of total transport emission), followed by maritime (~2.5%)[33], and inland navigation and rail which contribute together around 1.5%;

(4) Intercontinental and international travel (over 500 Km): responsible for over 10% of emissions, it is essentially performed by aviation;

(5) Intercontinental freight transport: responsible for ~11% of emissions, it is dominated by maritime transport.

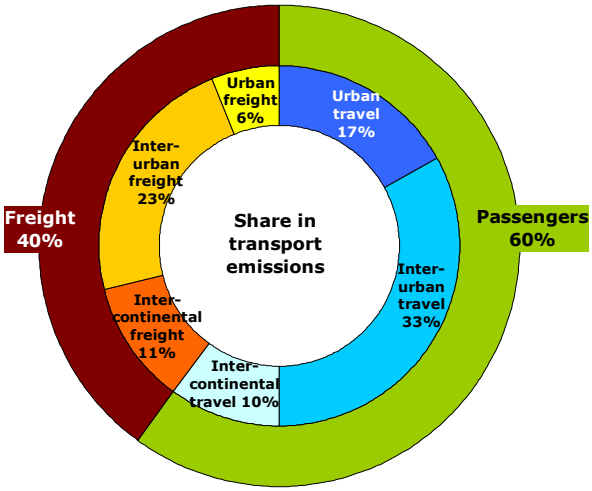

Figure 2: Shares in EU Transport greenhouse gas emissions in 2008 (estimates).

32 For the purpose of identifying opportunities for reducing GHG emissions from transport, the transport system has been broken down into five broad segments. The figures are rough estimates (~), since precise data are not always available for these categories.

33 Owing to lack of statistical data, the split of CO_2 emissions from maritime between intra-EU and extra-EU is a tentative estimation bound by a high degree of uncertainty. A recent review by CE Delft showed that intra-EU CO_2 emissions from maritime could represent between 22% and 54% of total maritime emissions. (Source: CE Delft (2009), Technical support for European action to reducing Greenhouse Gas Emissions from international maritime transport).

37. Analysis of transport emissions data shows that the largest source is passenger transport – in particular cars, which are responsible for approximately two-thirds of road transport emissions. However, while car emissions are declining, road freight emissions are still increasing. Another challenge – in a more forward-looking perspective – lies in air and maritime transport, which are foreseen to have the highest growth rates in emissions (150% and 110% over 1990 levels respectively by 2050, compared to 13% for road transport in the Reference scenario).

38. Transport emissions can be seen as the product of three broad components: transport activity levels, the energy intensity of transport activity and the greenhouse gas intensity of the energy used in transport. Deep cuts in emissions will require acting on all three factors as it is unlikely that technological improvement alone will allow for the 60% reduction by 2050.

39. Traffic volume has been the strongest driver of transport emissions. It is the other side of the coin of market integration and of a well functioning transport system. Traffic volumes can be curbed through demand management instruments, which should not become an impediment to economic efficiency, regional cohesion or freedom to travel, but rather a way of providing valuable alternatives to mobility.

40. The energy efficiency component can be improved by using the most efficient (combination of) modes and by improving the efficiency within each mode: this is the idea embedded in the concept of co-modality[34]. Improving the attractiveness (and thus modal share) of the most efficient modes, deepening modal integration and improving load factors would all reduce energy use and are at the focus of the initiatives for the achievement of a Single Transport Area described in Part III.

41. The third element requires action on the GHG intensity of the energy used in transport. The low-carbon fuel standard established in the Fuel Quality Directive aims to start this process. This can involve either adopting lower carbon fuels in existing engines or introducing new types of engine technologies that can use low-carbon energy. Decarbonisation can only be ultimately achieved if alternative, low-carbon fuels are widely used by ever more efficient vehicles together with appropriate infrastructure and systems.

3.3. Strong requirements for infrastructure investments

42. The cost of EU infrastructure that would be required to match the demand for transport is estimated at over € 1.5 trillion for 2010-2030. However, in the coming years and decades there will be an increasing difficulty in finding the means for investing in transport infrastructure:

– an ageing society implies that larger amount of resources will be absorbed by social security expenditure;

[34] The concept had been introduced in 2006 in the Commission document "Keep Europe moving – Sustainable mobility for our continent. Mid-term review of the European Commission's 2001 Transport White Paper". SEC(2006)768. Co-modality was defined as the efficient use of different modes on their own and in combination.

– the 2008-9 economic crisis has severely hit public budgets and private lending. It will leave a legacy of long consolidation processes;

– the introduction of vehicles powered by alternative fuels and the greater use of public transport will reduce revenues from excise duties on gasoline and diesel.

43. These developments will intensify the declining trend in transport infrastructure financing from government budget, which, before the financial crisis, was to some extent compensated by an increase in private sector financing. The financing gap needs to be filled through combined efforts by the governments, the EU, financial institutions and through new capital markets models and new pricing mechanisms, such as congestion pricing. The overall funding mechanism needs to turn more towards the 'user pays' principle.

44. Poor transport infrastructure is an impediment to the economy. Numerous studies confirm the relationship between geographical accessibility and economic growth. In particular, a recent study[35], based on an example from Germany, shows that connection to the high speed rail network significantly increases the economic growth rate of cities.

3.4. The need for a new approach on mobility

45. To conclude, business as usual is not a viable option: increasing transport costs for businesses will hamper economic growth, the tight carbon constraint on the EU economy will not be kept, and citizens will be restricted in their individual mobility and impoverished by more expensive access to goods and services.

[35] Ahlfeldt, Gabriel M. and Feddersen, Arne (2010) From periphery to core: economic adjustments to high speed rail. London School of Economics & University of Hamburg. (Unpublished), http://eprints.lse.ac.uk.

II – A vision for 2050: an integrated, sustainable and efficient mobility network

1. A GREAT OPPORTUNITY

46. The global economy is ever more characterised by the emergence of new powerful players. The future prosperity of our continent will depend on the ability of all of its regions to remain part of a fully integrated world economy. Efficient transport connections will be vital in making this happen. Curbing mobility is not an option.

47. Preserving mobility will only be possible by making it sustainable. The European transport system has developed in a context of generally cheap oil, expanding infrastructure, technological leadership and limited environmental constraints, but now has to adapt to different framework conditions. The projected growth of the emerging economies and of world population is bound to put pressure on natural resources. As discussed in Part I, if no action is taken, transport will remain almost completely dependent on oil and particularly vulnerable to two powerful drivers: the growing imbalance between global demand and supply of oil and the need to reduce greenhouse gas emissions.

48. Moving away from oil will be inevitable. This is not only a great challenge, but also an opportunity for rethinking the way mobility is organised in our society and for addressing a number of other serious and yet unresolved concerns: high levels of congestion, noise and air pollution in cities; thousands of deaths and millions of injuries on European roads. Equally Europe's security will be enhanced by diversifying away from a dependence on oil supplies increasingly from unstable parts of the world.

49. Moreover, technological challenge also provides a great opportunity. A deep transformation can bring about considerable progress in a transport system that is otherwise heading, at best, for only marginal improvements in efficiency. Service levels need not be compromised in the face of the new constraints. Structural changes in transport can improve the quality of life and of the environment while at the same time preserving people's freedom to travel and the competitiveness of EU industry.

50. Transforming transport and making it more efficient, cleaner, safer and more reliable will not be possible with just a small number of selected interventions. Transport is a complex system that is based on the interaction of infrastructure, vehicles, information technology, rules and behaviour. All these elements must be part of a common vision for change.

51. Solutions that are impracticable or have little impact if adopted by only few individuals and operators, can become effective if they are at the heart of a new system: mass production can lower the cost of clean technologies; the frequency and security of public transport will increase if there are more users; sufficient volumes can justify dedicated freight corridors ensuring more reliable transport;

more bicycles and fewer vehicles on the road make cycling more pleasant and less dangerous.

52. A transformation of transport is also a great opportunity for vehicle and equipment manufacturing industry and for logistic operators, since other regions of the world will face similar constraints on resources, while global demand for mobility keeps growing. The best technology will benefit from an expanding market for its commercialisation.

53. Personal mobility and, notably, road transport are a global issue. The IEA[36] projects the number of cars in the world to increase from around 750 million today to more than 2.2 billion by 2050. These cars would have to be much cleaner and more efficient than today. China is already the world largest car market, but also has a programme of massive investments in railways. Being capable of serving these international markets will be crucial for the EU industry. On the other hand, delayed action and timid introduction of new technologies could condemn the EU transport industry to irreversible decline.

54. More generally, the ability to minimise the use of previously abundant resources will be the key to future competitiveness. In line with the flagship initiative "*Resource efficient Europe*" set up in the Europe 2020 Strategy[37], the paramount goal of European transport policy is to help establish a system that offers high quality mobility services while using less resources. In practice, transport has to use less energy, cleaner energy and better exploit a modern infrastructure.

55. The following sections demonstrate how to meet those challenges while maintaining the balance between economic, social and environmental concerns. The vision inspires the strategy of European Transport Policy in the coming decades and provides the basis for concrete proposals for the immediate future. Naturally, it is based on today's available information and understanding of likely technological developments. There will be inevitable surprises, but we must make many choices in the immediate future – which infrastructure to build, which technology to invest in, what equipment to buy – which will have consequences for several decades to come and must be guided by a vision of the future: a 'wait and see' approach cannot be afforded. At the same time, given future uncertainties, it is important to ensure that policy is sufficiently flexible and robust to cope with unexpected developments.

2. AN INTEGRATED VISION FOR THE VARIOUS TRANSPORT SEGMENTS

2.1. Driving conventional cars and trucks out of the cities

56. The urban context poses the biggest challenges to the sustainability of transport. Cities currently suffer the most from congestion, poor air quality and noise exposure. Urban transport is an important source of transport emissions. 69% of

[36] International Energy Agency (2010), Energy Technology Perspectives 2010.

[37] COM (2010) 2020, EUROPE 2020 A strategy for smart, sustainable and inclusive growth.

road accidents occur in cities[38]. At the same time, the subsidiarity principle cautions for a careful approach at the European level.

57. The urban dimension will become even more important as the percentage of Europeans living in urban areas is projected to increase from 74% today to around 85% in 2050[39]. The design of sustainable cities is one of the greatest challenges of policy makers.

58. Fortunately, the urban environment offers many alternatives in terms of mobility. Switching to cleaner energy is facilitated by the lower requirements for the range of vehicles[40]. Public transport choices are more widely available, as well as the option of walking and cycling. Demand management and enlightened land-use planning can also contribute significantly to lower traffic volumes.

59. Today, in Europe, cars are the most popular passenger mode[41]. The success of cars can be traced back to their multi-functionality: they provide door-to-door, always available and weather-proof transport, with the additional benefits of privacy and capability of covering both short and long distances. However this multi-functionality has a significant drawback: the private car is rarely the optimal transport mode to use from an energy efficiency perspective. According to data from the UK[42], 60% of cars on the road have only one occupant. The percentage grows to approximately 85% for commuting and business trips.

60. In the coming decades, owing to lack of urban space and increasing costs of energy and infrastructure use, travel should not continue to be centred on multi-purpose vehicles that typically run under-utilized. Smaller, lighter and more specialised passenger vehicles are likely to become widespread. Large or long-range vehicles will increasingly be used only when these characteristics are needed.

61. In urban areas, walking and cycling, together with public transport, often provide better alternatives not only in terms of emissions, but also of speed[43]: they could readily substitute the large share of trips which cover less than 5km. In addition to lowering greenhouse gas emissions, they bring major benefits in terms of better health, lower air pollution and noise emissions, less need for road space and lower energy use. Accordingly, facilitating walking and cycling should become an integral part of urban mobility and infrastructure design.

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38 Source: European Road Safety Observatory – Care database – 2009 data.

39 United Nations, Department of Economic and Social Affairs/Population Division (2009), World urbanisation prospects – The 2009 revision, http://esa.un.org/unpd/wup/index.htm

40 Recent trial of electric vehicles in the UK revealed that the average daily mileage of users is 23 miles (37 km). http://www.cabled.org.uk/

41 Passenger cars carried out 82% of all passenger transport on land measured in pkm.

42 United Kingdom Department for Transport, 2008, Transport Trends: 2008 edition.

43 The recent feasibility study for a central London cycle hire scheme considered that cycling is time-competitive with all other modes over distances up to 8km. http://www.tfl.gov.uk/assets/downloads/businessandpartners/cycle-hire-scheme-feasibility-full-report-nov2008.pdf.
A web based quantitative study amongst both cyclists and non cyclists undertaken in 2006 also found that speed is perceived to be one of the main positive 'drivers' of cycling to work in Central London. Source: TfL, 2008, Cycling in London.

62. Public transport has to gain a higher share than today in the transport mix, become easily accessible for everyone and fully integrated with non-motorised modes. The use of integrated electronic tickets and smart cards can provide public transport operators and authorities with real time statistical data on users' behaviour. While respecting legislation on personal data protection, this information can be used both to optimise the planning of the service and to design marketing strategies aimed at increasing the use of public transportation.

63. Public transport could also be boosted by a wider range of options, some based on existing concepts (trolleybuses) or on new ways of operating the service (Bus Rapid Transit[44]; use of smaller buses outside rush hours; 'transport-on-demand' through advance reservation systems). Information on the available choices and the ability to purchase tickets is being revolutionised through personal mobile communication devices. Perceived waiting times[45] can be drastically reduced, eliminating the uncertainty and frustration of not knowing when the next bus or train will arrive. The higher share of travel by collective transport can allow increasing the density and frequency of service and the reinforcement of urban-rural links, thereby generating a virtuous circle for collective transport modes.

64. In Europe, an important factor is the 'greying of the population', which will require transport services to be adapted to an increasingly ageing population. Elderly people, aged 65 or more, will account for 29% of the total population by 2050 as opposed to 17% today. Around one in six people in the EU has a disability[46,47]. Quality, reliability, security and accessibility, notably for persons with reduced mobility, safety of public transport will be essential to the greater uptake of public transport.

65. For many, personal transport will however remain the only alternative due to the complexity of their daily journey. Using more fuel-efficient vehicles will be a necessity. Reducing the weight and size of cars will be crucial for saving energy under stop/start city traffic conditions and for reasons of space – but lightweight downsized vehicles can introduce safety compatibility issues with large vehicles, so collision avoidance, guidance systems and partial segregation may be needed. These will also help elderly drivers.

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44 Bus Rapid Transit is public transport service operated by buses, typically on dedicated lanes with high frequency and longer stop spacing.

45 Research suggests that passengers perceive waiting times to be greater than actual waiting times at a bus stop, and therefore real-time passenger information systems could potentially reduce the perceived waiting time for buses when providing accurate information. Source: Mishalani et al. 2006. Passenger Wait Time Perceptions at Bus Stops, *Journal of Public Transportation*. Vol. 9, No. 2, 2006 pp.89-106.

46 European Commission, DG Economic and Financial Affairs: 2009 Ageing Report: Economic and budgetary projections for the EU-27 Member States (2008-2060). EUROPEAN ECONOMY 2|2009, http://ec.europa.eu/economy_finance/publications/publication14992_en.pdf. The "baseline" scenario of this report has been established by the DG Economic and Financial Affairs, the Economic Policy Committee, with the support of Member States experts, and has been endorsed by the ECOFIN Council.

47 European Commission, DG Employment: People with disabilities have equal rights – The European Disability Strategy 2010-2020, http://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=591&type=2&furtherPubs=no

66. New engines using cleaner energy sources should help to reduce GHG emissions while contributing to other goals. Everyday commuting or shopping trips do not require the extended range that some new technologies are still unable to offer, and captive fleets of urban buses, taxis and delivery vans are particularly suitable for the introduction of alternative propulsion systems and fuels. These could make a substantial contribution in reducing the carbon intensity of urban transport while providing a test bed for new technologies and opportunity for early market deployment.

67. Finally, town planning, access regulation including Low Emission Zones, stricter controls on parking, pricing policies and alternative forms of accessibility (eGovernment, tele-working, etc) could significantly influence mobility choice. Town planning and appropriate governance, at the level of functional urban areas, are crucial. They should aim at the creation of compact cities, favouring good coordination between transport planning, brown field regeneration and new settlements. The use of standard technologies (for example for electronic tolling) and of common criteria (for example on the type of vehicles that are admitted in Low Emission Zones) would help reduce production costs and facilitate users' compliance.

68. As regards freight transport, cities will have to better exploit the potential for optimising urban logistics. This can be achieved through a change in the planning and organisation of the urban transport system, the widespread deployment of alternative vehicles and propulsion systems and the full use of the potential of modern information technologies.

69. The interface between long distance and last mile transport could be organised more efficiently by the consolidation of freight at multimodal logistics centres located on the outskirts of cities, possibly coupled with distribution centres and collection points within the city. The aim is to limit individual deliveries, the most 'inefficient' part of the journey, to the shortest possible route. Companies may need to share their loads in an effort to reduce empty and inefficient runs. Information technology would assist similar practices with better cargo and travel planning and tracking and tracing capability.

70. The last mile delivery could be performed with smaller and cleaner trucks. The use of new engines and energy carriers – electric, hydrogen and hybrids – will necessarily be part of the strategy to reduce the carbon intensity of city logistics. New engines would also have the advantage of silent operation, allowing a greater portion of freight transport within the urban areas to take place at night time. This would ease the problem of road congestion during morning and afternoon peak hours.

71. Altogether, urban transport is where there is the largest scope for a different type of mobility and for abatement of emissions. Estimates suggest that emissions of urban passenger transport could be reduced by up to 88%[48] relative to a scenario at unchanged policies through a combination of measures related to fuel efficiency

[48] Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

standards (44% reduction), decarbonising energy supply (42% reduction), spatial planning and shift to slow modes and to public transport (2% reduction).

72. Whereas each city would have its own preferred strategy for the substitution of conventional petrol and diesel vehicles – with different emphasis on soft modes, public transport and clean vehicles – their gradual phase out and eventual elimination from the urban environment is the necessary ingredient of any strategy aiming at a significant reduction of oil dependence and greenhouse gas emissions. Interoperable technologies and technical standards would be needed to avoid fragmentation and loss of scale economies, whilst respecting the subsidiarity principle. Action by Member States and at local level is crucial.

2.2. Multimodal interurban travel

73. Approximately 63% of car emissions relate to travel on non-urban roads and motorways, representing 73% of total car travel on passenger-kilometre basis[49]. Non-urban road travel is also the responsible for the most fatalities, i.e. 61% of the total[50]. This is also a major segment of activity for railways (both conventional and high-speed) and coaches, which provide a safer and cleaner way of moving over medium and long distances.

74. In the future, more efficient vehicles, new engines and a wider use of renewable energy in power generation will enhance the performance of all modes. Aviation can improve through greater recourse to new generation medium-sized aircraft for regional flights, better air traffic management and possibly biofuels.

75. There is also scope to improve the efficiency of rail locomotives. Further electrification of railway lines would have to be considered. At present, 50% of the EU rail network and 80% of passenger traffic is electrified[51]. Where further electrification is not economically viable, more efficient locomotives and other alternatives to diesel traction (e.g. biofuels, hydrogen) may offer routes to reducing air pollutant and GHG emissions.

76. For road vehicles, range issues mean that the ability for some new technologies to play a role in this segment is more limited. Nevertheless, it is estimated that up to 30% reduction in CO_2 emissions for passenger cars could be achieved with current technology, and there is more potential from further technological development including greater electrification of propulsion systems. Downsizing of cars can also play an important role in ensuring the same level of mobility in this segment with lower energy consumption and GHG emissions. Finally, better traffic management can also contribute to better energy use.

77. Technological improvements across modes can be expected to save energy and to cut emissions per passenger-kilometre by up to 90% in 2050 in interurban and

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49 Source: PRIMES-TREMOVE and TREMOVE transport models.

50 Source: European Road Safety Observatory – Care database – 2009 data.

51 Community of European Railway and Infrastructure Companies (2010), A closer look at the railways: Annual Report 2009-2010; http://www.cer.be/media/2011_CER_2009-2010_Annual_Report.pdf

regional travel (up to 500 km)[52]. However, this will not solve the problem of congestion, which would worsen with the growth in travel volumes, notwithstanding the introduction of advanced traffic management technologies.

78. More sustainable and efficient interurban travel also requires a systematic choice in favour of the most efficient mode among the public and private transport means. Despite progress in all modes, their relative position in terms of energy efficiency is unlikely to change, owing to their intrinsic characteristics[53], so in order to achieve further energy savings and emission reductions in interurban passenger transport, coaches and railways will need to take a greater share in traffic, partly substituting cars and planes. The creation of the Single European Railway Area is essential to this purpose.

79. Regional aviation would remain a sensible option for peripheral areas that do not have high traffic volumes or alternative connections, but in other cases rail could offer a better alternative for journeys of up to 3-4 hours. Increasing use of high speed lines mean rail should be competitive over much greater distances. High Speed Rail could undertake some 176 billion more passenger kilometres by 2050, relative to 2005, outpacing the increase in aviation (some 67 billion passenger kilometres) for journeys below 1,000 km[54]. But high load factors are essential: the environmental performance of an empty train is very poor.

80. Promoting better modal choices will require greater integration of the modal networks: airports, ports, railway, metro and bus stations, car hire spots and parking areas, should increasingly be merged and conceived as multimodal connection platforms for passengers.

81. Better modal choices will also have to be guided by prices that reflect all costs associated to transport. This is a necessary development also in view of the funding needs of transport. Road users would need to become accustomed to paying for the infrastructure they use and the negative externalities they generate. An interoperable system for electronic tolling – associated with or relying on a single open in-vehicle platform for all applications – should ideally become available in all vehicles.

82. Preparing ahead of a journey should become easier, and travelling simpler. Online travel planners can provide passengers with complete door-to-door information in a concise and easy-to-understand manner. Passenger online information and booking systems including electronic payment and, possibly, integrated ticket or payment systems for all means of transport will facilitate journeys comprising different modes. Real time information could be instantly provided in case of delays or disruptions expected to occur on the remaining legs of the journey.

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52 Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

53 Airplanes have to spend extra energy to keep airborne. Cars have a larger frontal area per person than coaches, which matters over long distances where most energy is used to win air resistance. Trains have an even smaller frontal area per person and the additional advantage of low rolling resistance.

54 Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

83. An aged society will demand transport services that are safe, secure, comfortable and user-friendly. In the transport system of the future, it would the possible to limit the occurrence of accidents to close to zero. This can be achieved by the universal application of Intelligent Transport Systems that will enable ubiquitous communication between infrastructure and vehicles, and among the vehicles. Automatic collision avoidance systems on-board vehicles can minimize the probability of collision also with pedestrians, cyclists or objects.

84. When travelling across the EU, citizens should be able to take advantage of common general principles of passenger rights applied in all transport modes. In the occurrences of major delays or trip cancellations, they should benefit from protection of their rights including appropriate compensations. Better and more integrated modal choices and Intelligent Transport Systems are likely to facilitate the transfer, exchange and sharing of the personal information relating to passengers. As a consequence, it will be necessary to ensure data protection and transparency in relation to all such processing of personal data.

85. In conclusion, there is ample margin for organising intra-EU travel in a safer and cleaner way (83% CO_2 emissions reduction relative to a scenario at unchanged policies by 2050), mostly through decarbonising energy supply (45%) and energy saving technologies (35%).

2.3. A green and efficient freight core network

86. Intra-EU freight transport is mostly carried by trucks (47.3%), followed by seagoing ships (37.8%), rail (11.2%) and inland waterways (3.7%)[55]. Trucks dominate inland EU freight transport with a 76.1% share of the tonne-kilometres and about 94% of the CO_2 emissions. Air cargo has, by comparison, a marginal share of volumes, although it carries a significant share of value[56].

87. One of the great challenges for transport is to reduce the environmental impact of intra-EU freight transport without sacrificing its efficiency. The key to efficient transport is the consolidation of large volumes for transfer over long distances, in between the so-called first and last miles. Waterborne and rail transport are particularly suited for this, as is seen elsewhere in the world. While encouraging the use of the most efficient solution in all distances, it is above some 300 km that a significant rebalancing should take place, with 30% of road freight shifting to multimodal solutions by 2030, and more than 50% by 2050.

88. These long-hauls could use specially developed freight corridors optimised in terms of energy use and emissions, but also attractive to operators for their reliability, limited congestion and low operating and administrative costs.

89. These corridors would represent the freight part of a ‘core network’ or backbone of the EU transport system. They would link major urban centres and ports, and integrate regular services on sea, on rail freight lines and on inland waterways, plus

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55 For air and sea: only domestic and intra-EU-27 transport is included (Source: European Commission (2010), EU Energy and Transport in Figures).

56 Data on the value of goods carried by air exist only for exchanges with third countries, where aviation accounts for 0.6% of the total volume, but for 22% of the total value.

road transport assisted by traffic management tools, capability for alternative fuels and multi-modal hubs. Such corridors would need to offer simplification of administrative procedures, optimisation of schedules to cargo tracking and tracing. The administrative burden linked to multimodal freight transport should, accordingly, be considerably reduced. Formalities related to the transport of goods could be performed only once – independent of the number of transhipments – and electronically.

90. An efficient management of intra-EU freight flows cannot be fully achieved without the removal of obstacles of administrative or regulatory nature. Full market opening would have to be accompanied by uniform enforcement of common safety, security, environmental and social legislation. The systematic exchange of information between national supervisory authorities would allow a smooth follow-up after the detection of an infringement, ensuring an effective, non discriminatory and dissuasive enforcement policy across the whole EU territory.

91. Removing barriers to market entry and modal integration would strengthen the role of multinational and multimodal logistic operators. Users would have a wider choice among transport services and their providers.

92. Multimodal transport would have a greater role in long distance freight transport (over some 300 km), but the large part of the shipments that take place over short and medium distances[57] would mostly remain on trucks. In view of this, it is important to improve their efficiency, for example through enabling better aerodynamic performance, and to encourage development and the uptake of new engines and cleaner fuels.

93. The use of sustainable biofuels would reduce the emissions from road freight transport. By 2050, biofuels could represent around 40% of energy consumption in long distance road freight, where electrification has a lower potential. However producing these biofuels so as to achieve significant levels of GHG savings remains challenging. Road infrastructure may in the future be equipped with automatic guidance systems. This technique would save energy as well as minimise congestion and accidents.

94. Some containerised freight transport could be shifted to inland waterways and short sea shipping where there is still spare capacity. The energy efficiency of the vessels would be improved. Switching to alternative fuels such as liquefied natural gas offers some GHG reduction potential as well as air pollution benefits.

95. Considerable investment would be needed to expand the capacity of the rail network. Rail freight may grow by an additional 360 billion tonne-kilometres by 2050, that is, an 87% increase relative to 2005[58]. Rather than building new lines, much can be achieved with an upgrade of the existing network by increasing speed (in particular in the eastern part of the EU), deploying ERTMS, creating city bypasses, establishing sidings and terminals allowing for 1,000 m trains, and

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[57] More than half of all goods (in terms of weight) in road transport are moved over distances below 50 km and more than three quarters over distances below 150 km.

[58] Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

widening the loading gauge on main corridors. New rolling stock with silent brakes and automatic couplings should gradually be introduced.

2.4. Improving the door-to-door experience in long-distance travel

96. Air transport is the only transport mode that is capable of competitive intercontinental passenger transport. At the moment, there are no practical alternatives in sight for these long distances.

97. Currently, European airlines carry about 30% of worldwide air passengers. The geographic position of Europe allows the European air transport system not only to connect Europe's citizens and businesses with the rest of the world, but also to be an air transport hub for the traffic between other regions of the world.

98. In the future, the importance of air transport will continue to grow. EU air transport activity would more than double between 2005 and 2050 (some 120% increase). For medium distance travel (below 1,000 km) High Speed Rail would increasingly compete with aviation (though for low traffic inter-regional routes small aircraft may retain an advantage), so almost all the increase (90% by 2050) in the air transport activity would originate from journeys above 1,000 km[59].

99. In aviation, the growth of transport can be reconciled with ambitious environmental objectives through the inclusion of aviation in the EU ETS, the Single European Sky, SESAR and the Clean Sky project.

100. In order to face rising competition and to maintain its position as a global platform for passenger and cargo transport, Europe will need to invest in airport and other infrastructure capacity. Modern air traffic control technologies are foreseen to increase flight capacity and safety. Existing intercontinental hubs should be provided with the necessary infrastructure and technology upgrades to absorb volumes much higher than today. All major airports should be linked to the railway network, preferably high speed. Efficient connection to closest urban centres must be ensured with adequate rail and bus services. By reinforcing and developing the safety record of European aviation, flying to, from and via Europe will continue to be an attractive component of global airline travel.

101. Travel time optimisation should also take into consideration pre- and post-flight time in an effort to improve the overall door-to-door travel experience. With the use of modern and passenger friendly technologies the hassle associated with personal security screening should be reduced to the minimum. Integrated travel information will allow passengers to check at any time and place the status of their flight and adapt travel arrangements.

102. In this vision, long haul air transport continues to grow substantially. The impact of planes on the climate will have to be reduced in line with EU CO_2 reduction goals. Fuel burned per seat in today's new aircrafts is 70% less than that of early jets[60].

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[59] Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

[60] Intergovernmental Panel on Climate Change. 1999. Special Report on Aviation and the Global Atmosphere. Section 9.2.2

Recent reports indicate that technology innovation could lead to fuel efficiency improvements compared to today of the order 35-45% by 2025 and 60% by 2050. More efficient air traffic management (ATM) and operations could contribute an additional reduction of between 6 and 13% per flight by 2020[61]. The remaining energy needs of future aircrafts will be covered with renewable energy such as second and third generation biofuels.

2.5. A global level-playing field for intercontinental freight

103. In intercontinental freight transport, the vast majority of goods by volume is carried by sea. This is unlikely to change in the coming decades: intercontinental trade will continue to rely almost exclusively on maritime transport, which will continue to be a global business. The challenge for Europe is two-fold: reduce negative impacts of transport by promoting quality shipping while maintaining and possibly extending market shares of EU operators. Progressing towards these goals requires first of all a global level-playing field with common rules and high standards that are universally applied and enforced on a flag neutral basis.

104. Maritime standards are developed and agreed through international organisations and bilateral or multilateral negotiations with international partners. EU-level action will focus on proposing new ideas, developing common EU positions and voicing these positions in a uniform way.

105. By 2050, the entry points into European markets will multiply. Certain ports will develop or become major intercontinental hubs along the northern and southern coastlines, avoiding at the same time unnecessary traffic crossing Europe. A possible melting of the sea-ice in parts of the Arctic Sea may open up new and shorter shipping routes to the Pacific. As a consequence, Arctic ports in Norway and possibly Russia may become new gateways into continental Europe.

106. The role of international hubs has to be seen also in a context of increased use of Short Sea Shipping for intra-EU freight transport. Ports have a major role as logistics centres and require efficient multimodal connections.

107. Although maritime is on average the best performing mode in terms of GHG emissions per tonne-km, the increasing volumes of emissions cannot be neglected: by 2050, the activity level is projected to double, and intra and extra-EU maritime taken together would represent about 24% of all transport emissions.

108. There is substantial scope to improve the environmental record of shipping through both technology and better operation. A report[62] commissioned by the International Maritime Organisation assessed the potential reduction of CO_2 by using known technologies and practices – excluding the use of low-carbon fuels – in the range of 58% to 75% by 2050, depending on the ship type. A recent report by IEA deems

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http://www.grida.no/publications/other/ipcc_sr/?src=/Climate/ipcc/aviation/index.htm

[61] For the European airspace, total savings due to improved en-route design and flight planning represented approximately 36,000 tonnes of fuel in 2009, corresponding to 120,000 tonnes of CO2. Eurocontrol (2009), Performance Review Report.

[62] Buhaug, Ø. et al. 2009. Second IMO GHG study 2009; International Maritime Organization (IMO) London, UK. http://www.ce.nl/publicatie/second_imo_ghg_study_2009/941

feasible to reduce CO_2 emissions in shipping by up to 40% per tonne-km by 2030 and by up to 60% per tonne km in 2050[63].

109. The use of low GHG biofuels, projected at some 40% of the maritime bunker fuels[64], can add to the energy efficiency gains. Overall, the emissions from maritime bunker fuels could be cut by 40% by 2050 compared to 2005 levels.

110. Apart from CO_2 emissions, maritime transport will also have to address problems linked to air pollution. LNG and biogas have the potential for replace bunker fuels as major energy source, in particular for short sea shipping. Renewable energy (wind and solar) or fuel cells could be used for propulsion and for running onboard equipment.

3. PUTTING IT ALL TOGETHER: FEATURES AND ADVANTAGES OF A NEW MOBILITY CONCEPT

111. The well-being of people and the competitiveness of businesses in Europe will continue to depend on the ability to access opportunities using an efficient transport system. Surveys on business investments consistently indicate good transport connections as one of the most relevant criteria in the decision over the localisation of an economic activity. Similarly, a well performing transport system features prominently among the characteristics of cities that are ranked high in the surveys on quality of life.

112. Clean engines and alternative fuels will constitute a decisive factor in making mobility less polluting and less dependant on oil, contributing at least half of overall GHG emission cuts in transport. The technological race for clean vehicles is a global one and remaining a frontrunner is vital for the EU manufacturing industry.

113. Clean fuels would not address all challenges and their use will have to be reconciled with resource efficiency constraints. Vehicles must also become more energy efficient: using *less* energy will be equally important as using *cleaner* energy.

114. It will be necessary to optimise each journey with respect to energy use through a generalised increase of load factors, a systematic utilisation of the most efficient mode and more integrated approaches to land-use and transport planning.

115. The modal mix has to be better adapted to the particular needs of each journey and, in the case of passengers, to the overall travel experience. This will only be possible in a system that is highly integrated, and that is based on a continuous and ubiquitous exchange of information. The use of information technology to optimise

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63 The emission reductions result from a combination of: improved new build vessel designs (30%); improved maintenance and technical retrofit (20%); and operational improvements (40%). IEA, 2009, Transport, Energy and CO_2. Moving Toward Sustainability. Chapter 8. http://www.iea.org/w/bookshop/add.aspx?id=365

64 Source: Impact Assessment on the White Paper on Transport "A Roadmap to a Single European Transport Area".

all aspects of personal travel and freight transport is likely to become one of the most distinctive traits of future transport systems.

116. Consolidation of volumes entails greater use of buses, rail and air transport for people and wider recourse to waterborne and rail transport for freight. In both cases, speed might be traded in exchange for reliability and lower costs. For passengers, the use of high quality collective transport might also represent an opportunity to better exploit travel time.

117. Private cars will still represent a popular way of getting around, but would be used more moderately and account for a lower percentage of journeys. With appropriate pricing of infrastructure and of externalities, driving a car would cost more, but drivers would get a better service in terms of non-congested roads, easier parking and safer travel. For urban transport, innovative solutions such as Personal Rapid Transit and ultra-compact autonomous electric networked vehicles may provide cost-effective, emissions-free individual transport – especially for urban journeys that on public transport would require several changes.

118. The problem of congestion will not disappear through the introduction of cleaner engines and fuels alone. A better integration of all modes of transport in a truly multimodal vision, together with more extensive use of information and communication technologies will not only allow greater energy efficiency, but will also be the key to a more efficient exploitation of the transport network. The transport system is likely to evolve towards the model of the telecommunication sector, where multinational operators provide their services over a network that integrates seamlessly different technologies (Fibre optics, Satellite, ADSL, WiFi…) adapted to different circumstances, while ensuring guaranteed service level and notably guaranteed availability.

119. An integrated transport system where logistic operators provide a wide spectrum of services and seek skilled professionals would also create favourable opportunities for workers. Convergence in social conditions will allow to base competition on service quality and resource efficiency rather than on the minimisation of labour costs.

120. Modal integration will call for more investment in infrastructure and for integrated management of cross-border and multi-modal infrastructure. This development can already be observed along certain freight corridors. Infrastructure managers would have to increasingly consider their business in the context of a multimodal network that has to serve multiple service providers. Greater separation between infrastructure managers and service providers could contribute to more efficient network exploitation, but appropriate incentives for investment need to be ensured.

121. In parallel, an increasing separation between passenger and freight traffic can be expected, which would facilitate the optimisation of traffic flows with different needs and characteristics.

122. Greater efficiency can offset growing congestion costs. Less private traffic on the roads would particularly benefit freight. Personal mobility would also be enhanced by greater quality and availability of public transport. This would also reduce accidents, noise and improve air quality.

123. To develop consistently with this vision, the transport system will have to reach certain goals in terms of deployment of sustainable fuels and propulsion systems, in terms of optimisation of logistic chains and modal choices and in terms of efficient exploitation of the network. The box below presents ten such goals, which should be interpreted as benchmarks, guiding policy action and helping assess progress towards a competitive and resource efficient transport system.

Developing and deploying new and sustainable fuels and propulsion systems

(1) Halve the use of 'conventionally-fuelled[65]' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics in major urban centres by 2030[66].

(2) Low-carbon sustainable fuels in aviation to reach 40% by 2050; also by 2050 reduce EU CO_2 emissions from maritime bunker fuels by 40% (if feasible 50%[67]).

Optimising the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes

(3) 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed.

(4) By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail.

(5) A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services.

(6) By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.

Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives

(7) Deployment of the modernised air traffic management infrastructure (SESAR[68]) in Europe by 2020 and completion of the European Common Aviation Area. Deployment of equivalent land and waterborne transport management systems

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65 The term 'conventionally fuelled' refers to vehicles using non-hybrid, internal combustion engines (ICE).

66 This would also substantially reduce other harmful emissions.

67 Cf. Commission Communication "A Roadmap for moving to a competitive low carbon economy in 2050", COM (2011)112.

68 In accordance with the European ATM Master plan: http://ec.europa.eu/transport/air/sesar/deployment_en.htm

	(ERTMS[69], ITS[70], SSN and LRIT[71], RIS[72]). Deployment of the European Global Navigation Satellite System (Galileo).
(8)	By 2020, establish the framework for a European multimodal transport information, management and payment system.
(9)	By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport.
(10)	Move towards full application of "user pays" and "polluter pays" principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments.

124. The following *"Part III – Strategy: Policies to steer change"* of the White Paper identifies the initiatives that could facilitate the achievement of these goals and the transition towards the new type of transport and mobility broadly outlined in the previous paragraphs. The various actions and measures indicated in this strategy will be further elaborated. The Commission will prepare appropriate legislative proposals and implement the necessary policy measures. Each of its proposals will be preceded by a thorough impact assessment, considering EU added value and subsidiarity aspects.

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69 In accordance with the European Deployment plan for ERTMS: cf. Commission Decision C(2009)561.

70 In accordance with the EasyWay 2 Implementation Plan: cf. Commission Decision C(2010) 9675.

71 Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system (OJ L 208 of 5.8.2002), as amended by Directive 2009/17/EC (OJ L 131 of 28.5.2009).

72 Cf. Directive 2005/44/EC.

III – Strategy: policies to steer change

1. AN EFFICIENT AND INTEGRATED MOBILITY SYSTEM

125. The EU has opened to competition most of its transport markets since the 90's, but barriers to a smooth functioning of the internal market persist. The objective for the next decade is to create a genuine *Single European Transport Area* by eliminating all the residual barriers between modes and national systems, easing the process of integration and the emergence of multinational and multimodal operators.

126. Addressing inefficiencies within individual modes is important from a transport system perspective, since a poorly performing mode or interface is not only harmful in the absence of alternatives, but can also act as the weak link that compromises the functionality of a multimodal chain.

127. The achievement of a fully integrated transport system is delayed today by a number of remaining regulatory and market failures. Regulatory barriers to market entry, technical incompatibilities between modes, burdensome administrative procedures or indeed imperfect and outdated legislation are the biggest problems.

128. Open transport markets and a more competitive environment can create tensions if the prevailing employment and working conditions as well as safety and security standards are too dissimilar at national level. A higher degree of harmonisation and enforcement of social rules as well as measures to enhance minimum standards of service and of users' rights must be an integral part of the strategy for the Single European Transport Area.

129. In the following sections, proposals are formulated which address some of these issues. They are grouped in five broad categories:

(1) Removal of regulatory, administrative and technical barriers

(2) Measures related to the quality of jobs

(3) Security aspects

(4) Safety aspects

(5) Measures related to the quality of services

1.1. A Single European Transport Area

130. A crucial condition for meeting the goals presented in Section II.3 – particularly with respect to the development of multimodal transport for passengers and freight – is the removal of all obstacles of administrative or regulatory nature that still hold back each transport mode.

131. In certain segments of the transport industry – notably rail domestic passenger services, road cabotage and port services – markets are still not fully open to competition. In other segments such as rail freight transport, the poor implementation of existing rules and other barriers keep deterring market entry.

Different technical specifications and lack of interoperability hinder the development of multimodal intelligent transport systems and the operation of cross-border services, particularly in rail and in air traffic management. Different administrative requirements – such as different liability regimes and multiple transport documents – increase the cost of international and multimodal operations and have an impact on the commercial speed of freight flows. There is still considerable scope for improving the efficiency of the transport system through the removal of regulatory, administrative and technical barriers.

1.1.1. A true internal market for rail services

132. A necessary condition for establishing a Single European Transport Area is the creation of Single European *Railway* Area, by completing the market opening process, including the award of public service contracts, strengthening the role of the European Rail Agency, enhancing the separation between infrastructure managers and service providers, and developing an integrated approach to freight corridor management.

Completing the market opening process

133. Although the Commission considers that modal shift towards environmentally friendlier modes, notably rail, will be necessary to meet emissions and fuel security targets, this should be achieved by ensuring a level playing field across modes and by making rail services efficient and attractive. The lack of competition to incumbent operators, which often enjoy a *de facto* monopoly situation on the national market, is one of the reasons explaining the low quality and efficiency of services. Evidence from countries where the opening of the rail market is most advanced shows that improved and innovative services have led to a rising market share of rail.

134. Whereas markets for rail freight services have been fully opened to competition since January 2007[73] and those for international passenger transport services as of 1 January 2010[74], domestic passenger transport remains largely closed to competition.

135. The Commission has recently published a study on the regulatory options available for domestic passenger market opening[75]. The study concludes that genuine market opening will have considerable positive impacts on the rail sectors throughout the EU. The evidence supports the Commission view that market opening will lead to innovation and improved quality, so generating increased passenger levels. In a growing market, employment levels can be maintained alongside efficiency gains.

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[73] As provided for in Directive 2004/51/EC, amending Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways. In practice, however, many barriers still exist including those stemming from the incomplete and incorrect implementation of Community law by Member States.

[74] Council Directive 91/440/EEC of 29 July 1991 on the development of the Community's railways, as amended *inter alia* by Directive 2007/58/EC.

[75] Everis, Study on Regulatory Options on Further Market Opening in Rail Passenger Transport, Final Report, 09/09/2010.

Based on the findings of this study and other input, the Commission will put forward a new initiative on domestic passenger transport market opening in 2012[76].

Open procedures for public service obligations (PSO)

136. The rules on the provision of services in the framework of public service obligations are laid down in specific pieces of legislation for air services[77], inland transport[78] and maritime transport[79]. For inland transport, Regulation 1370/2007 excludes the rail sector from the obligation to award public service obligation contracts through an open tendering procedure. Thus, most local and regional services, as well as a potentially significant share of long-distance services, are operated under PSO but attributed to operators through direct award. The introduction of open procedures to award the service – the so-called competition *for the market* instead of competition *in the market* – could lead to more attractive and innovative services at lower cost.

137. Regulation 1370/2007 requires Member States to provide the Commission with a progress report with regard to the award of public contracts by June 2015[80]. On the basis of these reports and other studies and lessons from the air and maritime sectors, the Commission will propose an initiative for the introduction of competitive tendering for public service contracts, aimed at ensuring the efficient provision of high quality services.

Governance and enforcement: a stronger role for the European Rail Agency, unbundling and infrastructure managers

138. Prior to market opening, competition regulation was very limited in the rail sector, and safety regulation often undertaken by incumbent rail operators. To make market opening effective, but at the same time ensure that safety levels were maintained and improved, specialised national institutions were created by EU legislation. This system includes the National Safety Authorities (NSAs) and the Regulatory Bodies. The Commission receives frequent complaints that this decentralised system, while justified to cater for the still remaining technical differences between national rail systems, is not adequate to ensure the creation of a real European market for rail services.

139. For example, the NSAs are responsible for the certification of the railway undertakings and the authorisation to place vehicles and subsystems into service.

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76 Communication from the Commission concerning the development of a Single European Railway Area, COM(2010) 474.

77 Articles 16-18 of Regulation (EC) No 1008/2008 of the European Parliament and the Council of 24 September 2008 on common rules for the operation of air services in the Community (Recast), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:293:0003:0020:EN:PDF.

78 Regulation (EC) No 1370/2007 of the European Parliament and the Council of 23 October 2007 on public passenger transport service by rail and by road and repealing Council Regulations (EEC) Nos 1191/69 and 1107/70, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:315:0001:0013:EN:PDF.

79 Article 4 of Council Regulation (EEC) No 3577/92 of 7 December 1992 applying the principle of freedom to provide services to maritime transport within Member States (maritime cabotage), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992R3577:EN:HTML.

80 Cf. Article 8(2) of the Regulation.

The approach to safety certification and authorisation is based on the principle of mutual recognition and should, in principle, allow the free provision of rail services and circulation of trains across the EU. However, the current legislative framework allows NSAs to make further checks before accepting certificates and authorisations granted by other NSAs. This leads to considerable delays and substantial cost burdens for rail operators. The Commission is considering how to address this problem: it appears it will be necessary to strengthen the role of the European Railway Agency, and review the share-out of responsibilities between NSAs and the European Agency.

140. The task of the Regulatory Bodies is to ensure fair and non-discriminatory access to the rail network and to rail-related services and to check whether charging and capacity allocation principles are properly applied. However, the Member States' regulatory bodies encounter difficulties in carrying out their supervision duties over infrastructure managers, often owing to a lack of staff and other resources. Difficulties are compounded in cases where the regulatory body does not have sufficient independence from the infrastructure managers, incumbent rail undertaking or the ministry which exerts ownership rights over the incumbent operator. The recent proposal for a recast of the first railway package[81] provides for the extension and reinforcement of their powers as a first step to addressing this issue. However, further action is necessary, perhaps creating a network of national regulatory authorities.

141. In some Member States, close structural integration of infrastructure management and rail service operation by the historical or incumbent operator persists. This may result in operational decisions being taken to protect incumbents against newcomers and in income from track access charges being diverted to support service operators. The Commission considers much of this is contrary to existing rail legislation and is pursuing a number of infringement cases as a result. The first rail package recast also includes provisions to address key problems. Nevertheless, the Commission believes that further action will be required to ensure fair and non-discriminatory access to the rail infrastructure and to rail-related services. On the basis of further evaluation, it will make a proposal to ensure an effective structural separation between infrastructure management and rail service provision.

142. The Commission recognises that while the current regulatory approach should be successful in creating competition between train operators, infrastructure management remains a natural monopoly. While this is inevitable on a local scale (it would not be cost effective to build competing infrastructure) the Commission, in coordination with regulatory bodies, will keep infrastructure management under close scrutiny, to ensure it is efficient and that pricing and investment decisions are consistent with the goal of fostering railway development and effective competition in the provision of rail transport services.

143. In the long term, the Commission considers there may be a case to establish pan-European infrastructure managers, ensuring co-ordinated development along key corridors, but allowing competition or benchmarking between different route managers.

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81 Proposal for a Directive establishing a single European railway area (recast), COM(2010)475.

Integrated approach to freight corridor management

144. Rail freight should be most competitive vis-à-vis road over long distances, where the costs of transhipment for first and last-mile delivery are relative small compared to total shipping costs. But this is not the EU experience: instead, the operational and technical barriers to inter-state traffic (particularly the establishment of new freight flows), and a tendency to prioritize passenger services, often leads to rail freight being seen as expensive and unreliable.

145. Technical barriers are being addressed through Commission legislation based on the basic interoperability and safety directives. To overcome some of the operational barriers, Regulation 913/2010 – which entered into force on 9 November 2010 – establishes a European rail network for freight based on international freight corridors.

146. The Regulation foresees the coordination between all parties and countries involved, namely on the allocation of cross-border capacity, on the timing of investment, on infrastructure standards and on the determination of track access charges. The Commission will have to monitor progress and ensure that the integrated management of corridors functions well in practice. The reasons for developing freight dedicated rail corridors and the advantages of such an approach are discussed more in detail in Section 3 below.

1. A true internal market for rail services

- Open the domestic rail passengers market to competition, including mandatory award of public service contracts under competitive tendering.
- Achieve a single vehicle type authorisation and a single railway undertaking safety certification by reinforcing the role of the European Railway Agency (ERA).
- Develop an integrated approach to freight corridor management, including track access charges.
- Ensure effective and non-discriminatory access to rail infrastructure, including rail-related services, in particular through structural separation between infrastructure management and service provision[82].

1.1.2. Completing the European aviation sector

Seamless air travel through a Single European Sky

147. The European aviation sector is one of the best performing parts of the European economy. Creating a single market, extending this to our immediate neighbours, allowing for competition, negotiating balanced open skies agreements with other parts of the world, furthering technological advances and enforcing high standards in terms of quality, equity and environmental performance have contributed to strengthening the sector. But global competition is increasing and much can be lost.

[82] The preferred options for unbundling should ensure the development of competition, continued investment and efficiency in the cost of service provision.

148. Recent events, such as the volcanic ash crisis[83], but also the overall growth perspective[84] prove how urgent it is to move towards an even better integrated EU airspace. The Single European Sky (SES) legislation, since the adoption of the first package in 2004[85] and the revision and extension of the legislation in 2009, has broken with the tradition of a national, fragmented approach in air traffic management (ATM) and of intergovernmental coordination shifting towards a truly genuine European framework, with effective cooperation between Member States, the European institutions and agencies, Eurocontrol and stakeholders and with an efficient social dialogue. Recognising that the performance of the European aviation system is dictated by its weakest links, the emphasis is placed increasingly on the performance of the network at European level.

149. The SES initiatives aims at tripling capacity, reducing ATM costs per flight by half, improving safety by a factor of 10 and reducing the environmental impact of each flight by 10%[86]. A key enabler for accelerating the full implementation of the SES is the deployment of new ATM technologies and procedures (SESAR).

150. The SES *acquis* include:

– The creation of a Network manager function to manage scarce resources (airspace design, transponder code allocations, radio frequencies) from a pan-European perspective;

– The establishment of Functional Airspace Blocks to optimise provision of air navigation services (ANS) at the level of air navigation service providers, regardless of state boundaries;

– The introduction of a Performance Scheme aiming at increasing the performance of ANS in four key performance areas: safety, environmental targets, cost efficiency and flight efficiency.

151. The Performance Scheme needs to be implemented from 2012 to 2014; the Single Network Manager function will be created in 2011; and the Functional Airspace Blocks should be established by 2012. Delivering the SES within the agreed milestones is of the utmost importance for the future of European aviation[87].

152. In the context of the creation of a single Network Manager function, the relationship between the European Union and Eurocontrol[88] needs to be redefined to establish the legal and financial framework for the latter organisation to support the Single European Sky policy. The current voluntary scheme of Eurocontrol for

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83 Information note to the Commission on the impact of the volcanic ash cloud crisis on the air transport industry, SEC(2010)533 of 27.04.2010.

84 See above para 98.

85 Regulations (EC) 549/2004, 550/2004, 551/2004, 552/2004, OJ L96, 31.03.2004, p.1-26, as amended by Regulation (EC) 1070/2009 of 21.10.2009, OJ L300, 14.11.2009, p. 34

86 Routes for intra-European flights are some 15% less efficient than domestic flight routes; on average, aircraft fly 49 km longer than strictly necessary due to airspace fragmentation.

87 Declaration from the High level Conference on the Roadmap towards implementing the SES, Madrid 25-26.02.2010.

88 The European Organisation for the Safety of Air Navigation (Eurocontrol) is the intergovernmental organisation responsible for coordinating and planning air traffic control in Europe.

the implementation of the SES should be consolidated through an inter-institutional framework in line with the Single Sky regulation.

2. Completion of the Single European Sky

- Achieve a truly seamless Single European Sky and deploy the future air traffic management system (SESAR) in the agreed timeframe.
- Establish the appropriate legal and financial framework to support the Single European Sky policy, consolidate the relationship between the European Union and Eurocontrol.

More efficient use of airport capacity

153. Airports play a capital role in the aviation chain. Their well-functioning and efficiency is a key economic parameter for their airline clients and for businesses that work in close coordination with them – such as independent groundhandlers. They are central for the successful delivery of the Single European Sky reform.

154. The lasting success of the European Aviation market is also dependent on the ability to tackle the capacity challenge, and its negative impacts on the economy, passenger experience and delays. Despite the impact of the financial and economic crisis on the aviation industry and on traffic levels, long-term trends point to capacity constraints on the ground and in the sky. In its survey of 138 airports in 2008, Eurocontrol has highlighted that, despite a 41% increase in airport capacity between 2007 and 2030, 11% of demand will not be accommodated in the most favourable scenario and 25% in the most challenging one. 19 airports will function at full capacity 8 hours/day in the former case; 39 airports in the latter[89].

155. Whilst for certain airports there is a need for additional infrastructure, some congestion problems can be tackled by a better system of slot allocation. Currently, airport slots are allocated on an administrative basis as prescribed by Regulation 95/93[90]. This Regulation, which aimed at ensuring that access to congested airports was organized through a system of fair, non-discriminatory and transparent rules for the allocation of landing and take-off slots, has been amended in 2004[91]. The amendment contained a number of technical improvements – such as provisions with regard to enforcement, clearer definitions, better monitoring tools and stricter sanctions against abuse or non-compliance with the allocation rules.

156. Nevertheless, problems remain: the ability of new entrants and of growing carriers to compete with established carriers is impeded due to a lack of available slots from the pool. At those airports where demand consistently exceeds capacity, pool slots tend only to be available at unattractive times or are not available as series. This impedes the optimal use of airport capacity. There is, moreover, a lack of certainty regarding the legal framework of the secondary trading and there are concerns over the degree of independence of slot coordinators. A study on the implementation of

89 Source: EUROCONTROL Long-Term Forecast: IFR Flight Movements 2008-2030.

90 Council Regulation 95/93 of 18 January 1993 on common rules for the allocation of slots at Community airports, as amended by subsequent legal acts, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1993R0095:20090630:EN:PDF

91 By Regulation (EC) No 793/2004.

the Slot Regulation including mechanisms for primary slot allocation is underway and is expected to bring recommendations for a change in the policy to be proposed by the Commission.

157. Apart from better use of airport capacity, we need to deal with the foreseen increase in the demand for air transport. Part of the answer can be high speed trains which provide a suitable alternative to short haul- and feeding flights, freeing up capacity for longer flights. This will however require a much more effective integration between the two modes. Rail-air infrastructural nodes will have to be developed to ensure seamless transition of passengers from the train to the plane. More importantly, the great challenge will be to allow access, integration and efficient use of data by all actors to support bi-modal air-rail travel. The Commission will study possible options and propose initiatives aiming at these goals. At the same time, the Commission will continue to work on other approaches to deal with capacity problems in the context of the Community Observatory on Airport Capacity.

Ground-handling activities in airports

158. Ground-handling services contribute to the efficiency of air transport. The market for ground-handling services has been gradually opened by Directive 96/67/EC[92]. The Directive stipulates that in the larger EU airports access to the market for suppliers of ground-handling services is open and that for certain categories of services, in the case where the number of suppliers is limited; this number of suppliers may be no fewer than two for each category of service.

159. According to studies carried out by the Commission so far[93], main objectives of the legislation were achieved: the number of providers has increased, prices have tended to fall, while, according to the airlines, the average quality of services improved.

160. However, negative aspects persist: it remains difficult for new providers to enter the market where the airport manager or the dominant carriers offer their services. In addition, certain provisions of the Directive are sometimes subject to different interpretations. The Directive is also questioned by some stakeholders as regards its social, safety and security aspects. Finally, the recent experiences with difficult winter weather conditions have also demonstrated that airports are part of a system where certain quality standards and emergency plans need to be developed including all actors. The Commission will make a proposal to clarify and improve the conditions for market entry also with the aim of ensuring that all airports meet minimum quality standards.

3. Capacity and quality of airports

- Revise the Slot Regulation to favour more efficient use of airport capacity.

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92 Council Directive 96/67/EC of 15 October 1996 on access to the groundhandling market at Community airports, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1996L0067:20031120:EN:PDF.

93 Both studies are available at: http://ec.europa.eu/transport/air/studies/airports_en.htm.

- Clarify and improve conditions to enter and provide quality services, including groundhandling: ensure that all actors in an airport system meet minimum quality standards.

- Airport Capacity – develop an approach to deal with future capacity problems including better integration with the railway network.

1.1.3. A maritime "Blue Belt" and a suitable framework for inland navigation

161. Maritime transport accounts for more than a third of all intra-EU freight transport activity. In contrast to other transport modes, transport by sea between EU ports is often still considered as going beyond the external borders of the Internal Market, thus requiring extensive administrative procedures (e.g. customs, veterinary and plant protection controls, port formalities).

A "Blue Belt" for short sea shipping

162. Following the Commission's Action Plan to establish a European maritime transport space without barriers[94], customs procedures will be facilitated for certain companies as of 1 January 2012[95], and port formalities as of 19 May 2012[96]. The objective is to facilitate intra-EU maritime transport in a "Blue Belt", the sea area surrounding the European Union. In this Blue Belt, intra-EU maritime transport can be operated with as little administrative burden as possible, and "Blue Lanes" (i.e. fast-track procedures) will be created in ports for Community goods to ensure their speedy transit. Monitoring technologies, notably those developed by the European Maritime Safety Agency based in Lisbon (EMSA), will be used to control vessel movements and integrate them in seamless logistics chains originating and terminating in EU territory[97].

163. As part of the effort to simplify the procedures in maritime transport, the Commission will shortly examine the possibility to exempt experienced captains, under certain conditions and in certain ports, from the obligation of using pilot services when manoeuvring in the port (Pilot Exemption Certificates).

Reducing administrative costs through eMaritime

164. Many ports use advanced information systems, but there is almost no interoperability between these port information systems. Often, the same data have to be provided (manually) at each port call, resulting in waste of time and data errors. The e-Maritime initiative will promote interoperability between the systems of all maritime transport stakeholders, including shippers, logistics operators and ports' and inland waterways' administrative authorities.

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94 COM(2009) 10 final of 21.1.2009.

95 Commission Regulation (EU) No 177/2010 amending Regulation (EEC) No 2454/93 laying down provisions for the implementation of Council Regulation (EEC) No 2913/92 establishing the Community Customs Code. OJ L 52 of 3.3.2010.

96 Directive 2010/65/EU of the European Parliament and of the Council on reporting formalities for ships arriving in and/or departing from ports of the Member States, O.J. L 283 of 29.10.2010.

97 In a further step, facilitation for Community Goods transported on ships navigating between EU ports but calling during the journey at a non-European port will be addressed.

165. The e-Maritime initiative will also build on relevant EU directives – such as the Directive establishing an EU Vessel Traffic Monitoring and Information System (SafeSeaNet)[98] – and be aligned with the advanced electronic means of managing and exchanging transport related information such as e-Customs and e-Freight; it would need open links to other modal systems in the spirit of an integrated intermodal transport system.

Market access to ports

166. While many ports operate in a competitive environment, technical-nautical and cargo-handling services are often restricted to monopolies or to a few established operators. The Commission's attempts to open market access to port services[99] were rejected by the European Parliament. In line with stakeholders' requests, the Commission has not put forward any further legislative proposal[100]. It is currently applying and enforcing the basic rules of the Treaty in the port sector, and closely monitoring the market development. Should this situation reveal to be insufficient or generate uncertainty, legislative proposals might be considered again[101].

167. Competition between ports can be significant and calls for a level-playing field. Information on funds that public authorities make available to any port should be transparent. Under Directive 2006/111/EC[102], the obligation to maintain separate accounts – between the activities that receive public financing and those which do not – already exists for ports with an annual turnover above € 40 million. Since a large number of ports – some of which very relevant to the European transport system – have a smaller turnover, the Commission will evaluate the need to lower this threshold. Furthermore, as existing administrative structures in ports differ widely, it is necessary to introduce some common reporting and accounting principles. Concession holders play also a fundamental role regarding efficiency of ports. In this context, it is important to ensure that the conditions under which Port authorities select concession holders are fully transparent and competitive.

4. A maritime "Blue Belt" and market access to ports

The European Maritime Transport Space without Barriers should be further developed into a "Blue Belt" of free maritime movement in and around Europe, and waterborne transport should be used to its full potential.

- Integrate the use of monitoring tools by all relevant authorities, ensure the full interoperability between ICT systems in the waterborne sectors, guarantee the monitoring of vessels and freight (Blue Belt) and set up appropriate port facilities ("Blue Lanes").

98 Directive 2002/59/EC.

99 E.g the proposal for a Directive of the European Parliament and of the Council on market access to port services, COM(2004) 654 final.

100 Cf. Communication on a European Ports Policy, COM(2007) 616 final.

101 Commission staff working document: Impact Assessment on the Communication on a European Ports Policy, SEC(2007) 1339, 18.10.2007.

102 Commission Directive 2006/111/EC of 16 November 2006 on the transparency of financial relations between Member States and public undertakings as well as on financial transparency within certain undertakings, OJ L 318, 17.11.2006, p. 17–25.

- Establish a framework for the granting of Pilot Exemption Certificates in EU ports.
- Review restrictions on provision for port services.
- Enhance the transparency on ports' financing, clarifying the destination of public funding to the different port activities, with a view to avoid any distortion of competition.

Further removing the hurdles to fully using the potential of inland waterway transport

168. The inland waterway transport market is fully liberalised since the 1990s. Due to the fact that the European inland waterway network cannot be considered complete without the participation of third countries (in particular for the Danube and the Rhine), the overall regulatory framework is fragmented, and some barriers to the internal market remain or have emerged.

169. The institutional framework in Europe is dispersed among various actors: the EU, its Member States, third countries, Intergovernmental River Commissions based on international agreements (e.g. for the Rhine and for the Danube), the UN-ECE. This structure sometimes leads to overlapping activities and creates inefficiencies.

170. The comprehensive action programme for the promotion of inland waterway transport NAIADES, launched by the Commission in 2006, is recognised for having created a momentum for a common European policy, based on legislative, coordination and support measures. The Commission will ensure the continuity of the implementing measures and address new challenges through a comprehensive approach involving all relevant actors and providing support where needed: e.g. strengthen the market position of inland waterway transport by integrating it in multimodal logistics, improve its environmental performance, and deploy new technologies including River Information Services (RIS)[103].

5. A suitable framework for inland navigation

- Establish an appropriate framework to optimise the Internal Market for Inland waterway transport, and to remove barriers that prevent its increased use. Assess and define the necessary tasks and mechanisms for their execution, also with a view to the wider European context.

1.1.4. Further integrating the road freight market

171. Road transport dominates the commercial transport market, but at the same time it is a fragile and highly fragmented sector composed of a vast majority of very small undertakings whose profit margins are directly dependant on labour costs and on the fluctuation of oil prices. To reap the full benefits of open markets and ensure its social acceptance, it is necessary to work towards establishing a level playing field concerning rules on social standards, safety, and road use charging – and their enforcement.

[103] Cf. section 2.1.3 below.

Harmonised enforcement of rules for professional road transport

172. Road transport undertakings face unequal treatment in different Member States owing to divergences in the control and sanction systems. This creates unnecessary administrative burdens and uneven conditions of competition, as well as raising safety concerns. To address these problems, the Commission will propose to harmonise and enhance the enforcement policies so that in the Single European Transport Area operators are treated on an equal footing when facing checks and when infringing the social, technical, safety and market rules established at EU level.

173. The checks of social rules should be made more cost-effective. While rules on driving time and rest periods are of paramount importance to prevent accidents due to driver fatigue and to safeguard drivers working conditions, firms that do not comply with these rules can gain a sizeable undue competitive advantage. The basis of the controls carrying out by national enforcement or police officers during checks are the data recorded by the tachographs. The tamper-proof digital tachograph fitted since 2006 on all new vehicles generate more trustworthy data. Cases of manipulation and frauds have however been found. While the administrative burden for undertakings which comply with the rules should be reduced, the EU should make sure that the controls become fully effective in preventing and detecting manipulation or misuse of the tachographs.

174. The current regulations on access to the market and admission to the profession[104] already foresee the creation of a European register of road transport undertakings. The necessary measures to put it in operation through the interconnection of national registers have to be taken before the end of 2012.[105] The European register will allow exchange of information on infringements committed by non resident undertakings.

175. As a first step, this register will focus on exchange of information on the serious infringements as prescribed by the legislation, but subsequently, the Commission intends to make a proposal for the information contained in the register also to be used to target checks and in real time during roadside checks (e.g. control of the validity of the licence). As a result, checks will become quicker, more targeted and the overall administrative burden on those undertakings which properly comply with the rules will considerably diminish.

176. Enforcement of EU legislation requires that sanctions in case of infringement are proportionate, non discriminatory and effective. A recent report[106] showed the existence of substantial differences in the Member States in terms of type of penalties, categorisation of infringements and fines applied in the field of social road transport legislation. For the same infringement, a road transport undertaking can receive a fine up to 10 times higher in one country than in another. The

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104 Regulation (EC) No 1071/2009 of the European Parliament and of the Council of 21 October 2009 establishing common rules concerning the conditions to be complied with to pursue the occupation of road transport operator and repealing Council Directive 96/26/EC.

105 Art. 16 (5) of Regulation (EC) No 1071/2009.

106 Report from the Commission analysing the penalties for serious infringements against the social rules in road transport, as provided for in the legislation of the Member States (COM(2009)225).

Commission will propose to harmonise these sanctions. The European Parliament[107] has already asked the Commission to make use of the provisions of the Treaty on the Functioning of the EU, which allow establishing minimum rules with regard to the definition of criminal offences and sanctions, where the approximation of criminal laws and regulations proves essential to ensure the effective implementation of a Union policy.

177. The work of the enforcement bodies in the Member States plays an essential part in the application of the legislation. Many different authorities are involved depending on the institutional set up of each Member State; these include police forces, ministries of transport and of labour, and dedicated enforcement agencies. A harmonised approach on the minimum training of enforcement officers would lead to a more homogeneous application of the EU legislation. It would also favour the exchange of information, for example on techniques to detect manipulations of tachographs, and to disseminate more systematically the information on regulatory progress at European level. The Commission will therefore make a proposal aiming at the harmonisation of the training of enforcement officers.

Road cabotage for freight

178. Road cabotage is the possibility for an operator to carry goods within a Member State other than the one in which it is established. It is a way for operators to reduce their empty returns after an international trip and seek business opportunities particularly in cross-border areas. However, given the differences still existing across the European Union, particularly on taxation and social rules, it is feared that a full opening of cabotage could result in a significant shift in jobs between countries and generate additional traffic.

179. The rules on access to market adopted by the legislator in 2009[108] strike a balance between these two considerations. Hauliers willing to perform national transport operations in another Member States on a systematic basis can do so by creating a subsidiary in this Member State, so that they are submitted to the same rules as their competitors. Those who prefer not taking this step are allowed up to three cabotage operations within a limit of seven days after an international transport[109]. These rules offer more flexibility than the previous ones adopted in 1993[110], but they still restrict hauliers in their choice of contracts for optimal routing.

180. The Commission considers that, given the pressing needs to ensure market efficiency and the proposed steps to harmonise enforcement of rules, further opening of the market should be pursued.

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107 Report on penalties for serious infringements against the social rules in road transport, INI/2009/2154 (Ranner report).

108 Regulation (EC) N° 1072/2009

109 The three cabotage operations can either all take place in the country of unloading of the international operation, or as a maximum of one operation per country in other Member States.

110 Member States could prevent an undertaking from performing cabotage during one year after one month of cabotage operations.

Maximum weights and dimensions of road vehicles

181. The maximum size and weight of road vehicles are governed by Directive 96/53/EC[111]. The Directive – which sets minimum standards and maximum sizes and weights that vehicles must respect to have access to the road networks of all the Member States – was conceived in the 1990's to accompany the opening of the international road transport market.

182. The evolution of containerisation, the need to ensure the economic and environmental efficiency of transport and the development of aerodynamics devices to improve the energy efficiency of vehicles call for a fresh look at this legislation.

183. Some in the road industry argue that significantly heavier and longer trucks would bring efficiency gains, and could be used without jeopardising safety or damaging infrastructure. Further independent work is currently being undertaken for the Commission to assess the issue and determine conditions for progress.

184. It does in any case appear to the Commission that there would be a good case for limited change to the current dimensions, to allow fitting (or retrofitting) vehicles with aerodynamic devices that could reduce fuel consumption[112]. Limited changes may also be necessary to accommodate new standards of intermodal vehicles and to deal with electric vehicles.

6. Road freight

- Review the market situation of road freight transport as well as the degree of convergence on, among others, road user charges, social and safety legislation, transposition and enforcement of legislation in the Member States, with a view to further opening road transport markets. In particular, the elimination of remaining restrictions on cabotage should be pursued.

- Review the rules on the tachograph to make it more cost-effective, give access to the EU register on road transport undertakings to police and enforcement officers when they carry out roadside checks; harmonise sanctions for infringement to EU rules on professional transport; harmonise training of enforcement officers.

- Adapt the legislation on weight and dimension to new circumstances, technologies and needs (e.g. weight of batteries, better aerodynamic performance), and to make sure it facilitates intermodal transport and the reduction of overall energy consumption and emissions.

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111 COUNCIL DIRECTIVE 96/53/EC of 25 July 1996 laying down for certain road vehicles circulating within the Community the maximum authorized dimensions in national and international traffic and the maximum authorized weights in international traffic, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0053:EN:HTML.

112 Loosening current stringent restrictions on vehicle length would allow more aerodynamic design of the trucks, and the retrofitting of devices such as boat tails that can produce a drag reduction of 12%. This would bring about fuel savings of about 6%. Sharpe, R.B.A. (2009) *Technical options for fossil fuel based road transport* Paper produced as part of contract ENV.C.3/SER/2008/0053 between European Commission Directorate-General Environment and AEA Technology plc; http://eutransportghg2050.eu/cms/assets/EU-Transport-GHG-2050-Paper-1-Technical-options-for-f-fuel-road-transport-11-02-10.pdf.

1.1.5. Multimodal transport of goods: the development of e-Freight

185. The simplification of freight and transport information exchange could substantially reduce the cost of multimodal transport. This concerns in particular the possibility for economic operators to provide information only once – in electronic form – ('single window') and to have the goods and vehicles controlled only once and at the same place ('one stop administrative shop')[113]. Such development will require connecting and completing the networks for the exchange of information between administrations and for facilitating the access to this information by businesses.

186. This vision of a paper-free, electronic flow of information associating the physical flow of goods with a paperless trail built by ICT includes the ability to track and trace freight along its journey across transport modes and, in line with the EU competition rules, to automate the exchange of content-related data for regulatory or commercial purposes. This will be made more practical and affordable by emerging technologies such as radio frequency identification (RFID) and the use of global satellite navigation systems such as Galileo.

187. Freight should be identifiable and locatable regardless of the mode it is transported on. A necessary condition for this is that standard interfaces within the various transport modes are put in place and their interoperability across modes is assured. The Commission will create the appropriate legislative framework for the deployment of tracking and tracing technologies and other technological components contributing to the e-Freight concept, while ensuring the appropriate technical security for the protection of personal data and the compliance with data protection legislation.

188. Currently, different modes of transport use different transport documents (CMR for road, Bill of Lading for maritime, etc…), a situation which creates administrative costs for multimodal transport and puts it in an unfavourable position in comparison to single mode transport. To promote multimodal transport, it is therefore essential to create a single transport document for the carriage of goods in any mode. Within the overall framework of e-Freight[114], the single transport document will be digital. As transport documents are to a large extent a reflection of the applicable legal regime to the contract for carriage of the goods, these two actions are dealt with together. In order for a single transport document to be established, the underlying liability regime needs to be created.

189. There current weaknesses and gaps in liability regimes are both within sectors and across sectors. The absence of a European liability regime for relations between railway undertakings and infrastructure managers represents a barrier to the entry on the rail market by operators of other Member States. Rules on liability have typically developed along modal lines, and this creates friction costs at the nodes, between two or more transport modes since this is where one modal liability system comes into contact with another. The recently adopted 'Rotterdam Rules' UN

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[113] Communication from the Commission of 18 October 2007: Freight transport Logistics Action Plan, COM(2007) 607 final, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0607:FIN:EN:PDF.

[114] Idem., p.3.

Convention[115] deals with multimodal transport involving a sea leg. It has been signed by a limited number of EU Member States. Any comprehensive multimodal proposal of the Commission will have to take the global convention into account.

7. Multimodal transport of goods: e-Freight

Create the appropriate framework to allow tracing goods in real time, ensure intermodal liability and promote clean freight transport:

- Put in practice the concepts of 'single window' and 'one-stop administrative shop'; by creating and deploying a single transport document in electronic form (electronic waybill), and creating the appropriate framework for the deployment of tracking and tracing technologies, RFID etc.).
- Ensure that liability regimes promote rail, waterborne and intermodal transport.

1.2. Promoting quality jobs and better working conditions

190. The transport sector employs 10 million people which amount to 4.5% to the total employment in the EU. The human factor is a crucial component of any high quality transport system. The efficient functioning of the transport system would not be possible without well trained and highly motivated workers who are satisfied with their jobs.

191. In an ageing society where the labour force will soon start shrinking, transport labour force is ageing more than the average of the economy (26% aged over 50, versus 22%). There is consensus that labour and skill shortages will become a serious concern for transport in the future. Skills on new technologies (IT, green energies), on sustainable ways of transport, or on customer care cannot be taken for granted and obtained easily. Education and training will be essential. Even before the recent economic crisis, the sector had suffered from skill shortages and a tight labour supply.

192. Today's share of female workers in the transport sector is lower than the average in the economy (21% vs. 35%). An analysis of the reasons of this imbalance will be undertaken and, on this basis, specific measures to render the sector more attractive to female workers will be proposed.

193. The underlying objective of the whole set of EU social rules in the transport sector is the protection of transport workers against adverse effects on their health and safety caused by inadequate working conditions. High standards of working conditions and good career prospects across modes and countries are necessary to preserve the human capital in the sector. However, diverging social standards at national level hamper the harmonized social development of European transport. Such a variety of rules increases the vulnerability of mobile workers, encumbers transport operators with heavy bureaucracy, distorts competition and renders some pieces of EU law difficult to enforce. Convergence in this field would be essential.

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[115] United Nations Convention on Contracts for the international carriage of goods wholly or partly by see, http://www.rotterdamrules2009.com/cms/uploads/pdf/Ch_XI_D_8.pdf.

194. Equally, poor industrial relations in parts of the EU transport industry, and the resulting strikes and other disruptions, have a very significant economic cost, as well as disrupting the lives of individual passengers and undermining the competitiveness of the modes most affected. Improved but realistic social dialogue is vital. It will be important to align the competitiveness and the social agenda in order to prevent social conflicts, which have proved to cause significant economic losses to the sectors concerned.

195. The transport system has to cope with globalisation. Since labour costs represent at least one third of the overall cost of transport operations, employers reduce these costs in particular by redirecting recruitment towards third countries or other Member States where work is less expensive. In this respect, unfair competition should be avoided through action aimed at raising minimum standards both in the EU and internationally.

1.2.1. A social code for mobile road transport workers

196. To fully exploit the Internal Market and to contribute to the wider policy objectives of sustainable transport in terms of road safety, fair competition and good working conditions of mobile workers, it is crucial to ensure a harmonised set of transparent social, security and competition standards (social code) in road transport evenly applicable throughout Member States.

197. Such a common social code would not only improve the social situation of around 5 million road transport workers, but would contribute to the further integration of the market. The thorough application of adequate social standards would directly contribute to creating a sustainable transport system and would eliminate an important obstacle to the liberalisation of cabotage.

198. A social code should be specifically addressed to mobile workers and employers to make them liable or co-liable – as appropriate – for compliance with common minimum working standards. It should cover such issues as: terms and conditions of employment, health insurance and care, a better organisation of work and resting periods of drivers to enable the reconciliation of their work and family life, as well as gender equality.

199. The social code should also address the problem of disguised self employment, which creates legal uncertainty and vulnerability of certain groups of workers not covered by any social protection rules. Member States, with participation of social partners, shall be encouraged to exchange practices and experiences on how to identify and counter disguised self-employment.

200. For the sake of simplification and better efficacy, the social code should be established by means of a social dialogue agreement in the road transport sector with the possibility of it being transposed into a Council decision. This would also guarantee that standards are tailored to the real needs and capabilities of all sides of industry.

8. Social code for mobile road transport workers

- Encourage and support the dialogue between social partners in view of an agreement on a social code for mobile road transport workers, addressing also the problem of disguised self-employment.

1.2.2. A Social Agenda for waterborne transport

201. The growing shortages of seafarers have become an issue of global concern in light of the recent rapid growth of the maritime industry. This situation affects also many countries in the EU, and in a similar way the inland waterway transport sector. The ensuing declining maritime know-how in EU may also affect the efficiency of maritime clusters that depend on seafaring expertise.

202. Urgent action is therefore necessary. The Commission will present a set of proposals within a "Social Agenda for the Maritime Transport" aimed at reinforcing the attractiveness of the maritime profession in the EU, promoting the employment of European seafarers in order to preserve the know-how in Europe, and increasing maritime safety.

203. In global competition, flags applying low labour and safety standards have an unfair competitive advantage. This can only be counteracted with the development and enforcement of a good international framework. A decisive step in this direction was the adoption of the ILO Maritime Labour Convention (MLC) in 2006. An agreement of the European social partners laying down the MLC's standards related to minimum requirements for seafarers to work on board a ship has been integrated into EU law, thereby complementing existing EU legislation on employment and social matters[116]. With a view to a harmonised enforcement, further reflection is needed to define and implement the respective responsibilities of the Flag state, the Port state as well as the labour supplying state in order to be able to control the working and living conditions on board ships calling at EU ports, regardless of their flag and of the nationality of the crew.

204. The competencies of crews on board EU ships – including non-European seafarers – are a crucial element for safety, security, the protection of the environment and quality shipping and are regulated at EU and international level (the STCW Convention adopted by the International Maritime Organisation – IMO); these provisions are regularly upgraded to adapt them to new technologies and changes in the industry. In the same way well trained port workers, satisfied with their working conditions, are essential for the safe, secure and efficient operation of ports. Both issues will be equally addressed in the Social Agenda.

9. A Social Agenda for maritime transport

- Implement the measures identified for action in the Maritime Social Agenda, following up to the Commission's Strategic goals and recommendations for the EU's maritime transport policy until 2018.

[116] Directive 2009/13 of 16 February 2009.

- Enhance the enforcement of the Maritime Labour Convention (MLC) of the International Labour Organization (ILO) with regard to Flag States, Port States and labour supplying States.

- Include all or part of the currently excluded seagoing workers within the scope of several EU labour law directives or grant them an equivalent level of protection by other means.

- Update the seafarers training Directive (2008/106/EC) following a revision of the International Maritime Organization (IMO) Convention on the training and the certification of seafarers (STCW Convention). Establish a mutually recognisable framework on the training of port workers in different fields of port activities.

1.2.3. A socially responsible aviation sector

205. Aviation employment is increasingly of a transnational nature, a tendency that with the on-going consolidation of the sector will continue and even accelerate in the coming years. Some form of supervision of the applicable social standards in the aviation sector could become necessary, in particular as regards flying personnel, for which the nature of the contracts and applicable social legislation varies from one Member State to another.

206. Legal clarity could be enhanced as to the law applicable to the mobile staff in civil aviation, notably for the flying personnel belonging to an airline based in several Member States. In particular, it should be clarified to which extent Directive 1996/71/EC concerning the posting of workers, as well as Regulation (EC) No 593/2008 on the law applicable to contractual obligations, concern the flying personnel. At the same time, European Works Councils in the transnational EU airlines should be enhanced through the implementation of Directive 2009/38/EC on the establishment of a European Works Council[117].

207. The implementation of the Single European Sky gives rise to specific concerns for the air traffic management (ATM) sector. The Madrid conference on Air transport held in February 2010 endorsed a roadmap that highlighted the need for specific consultation mechanisms at Union level on the social dimension of ATM.

10. A socially responsible aviation sector

- Establish a mechanism to analyse the impact of regulatory developments on working conditions in the air transport sector.

- Establish Europe-wide minimum service and quality standards for workers in the whole aviation value chain (including ATM and ground handling). Encourage the European social partners to address the issue of prevention of conflicts and of disturbance of minimum service in the whole aviation value chain.

[117] Directive 2009/38/EC of the European Parliament and of the Council of 6 May 2009 on the establishment of a European Works Council or a procedure in Community-scale undertakings and Community-scale groups of undertakings for the purposes of informing and consulting employees, OJ L 122, 16.5.2009, p. 28.

1.2.4. An evaluation of the EU approach to jobs and working conditions across transport modes

208. Together with European social legislation, European social dialogue is a major instrument for improving labour standards and modernising labour markets – a tool from which the transport sector has largely benefited[118]. Social partners have a first-hand idea of the conditions in the workplace. This makes social dialogue an instrument of choice which should continue to be supported and facilitated by the Union. With the soon to be ended exception of seaports, all modes of transport have set up social dialogue committees. Further encouragement is needed underlining the fact that negotiated agreements between social partners have the possibility of being transposed into EU law. The Commission's role, according to Articles 154 and 155 TFEU, is to promote and support such collective agreements at European level, and, if requested by their signatories, to propose implementing them by a Council decision.

209. The inland navigation sector, which is increasingly faced with a shortage of personnel, notably nautical crews and entrepreneur-successors, provides a good example. Social partners are working on recommendations for improved working and living conditions on-board of vessels, on specific working time arrangements, on EU job profiles and manning requirements and the establishment of minimum standards for training and education as well as on recommendations against social dumping and unfair competition in the inland waterway transport sector.

210. The Commission intends to promote social dialogue and agreements between social partners on the issues mentioned above also in the aviation sector[119]. The 'Civil Aviation' Sectoral Social Dialogue Committee would be the appropriate framework to pursue this work.

211. Finally, in the railway sector, Directive 2005/47/EC lays down the working conditions of mobile workers engaged in interoperable cross-border services. It is also based on a social dialogue agreement which provides for minimum standards concerning working conditions, driving times and rest periods for international transport. The question of the number of consecutive rest periods away from home and of compensation for such rest away from home is currently under renegotiation between the social partners, while the enforcement of the working time rules and the need to harmonise working conditions also for domestic rail services still need to be assessed.

212. Despite progress achieved so far, working conditions and social standards in the transport sector are still perceived as less advantageous than in the economy as a whole. For all its merits, the social dialogue approach has its weak points which the Commission should contribute to strengthen, in collaboration with the social partners. Some capacity building may be required in some cases, stronger commitment of the parties in other cases. The Commission should support and facilitate a much deeper analysis according to its institutional role in the social

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118 SEC(2010) 964 "On the functioning and potential of European sectoral dialogue".

119 A precedent exists in the European Agreement on the Organisation of Working Time of Mobile Workers in Civil Aviation, concluded on 22 March 2000 by employers' and employees' associations in the civil aviation sector and implemented by Directive 2000/79/EC.

dialogue process. Such an evaluation will also indicate more clearly the limits beyond which social dialogue must be complemented with conventional law making.

213. The evaluation should also identify opportunities for increasing the quality of work in transport as a whole. Positive spill-over can be expected to come from the exchange of best practice between the modes in fields such as promoting gender equality, preventing labour accidents, and language and logistics training. Skills required from workers in different modes can be similar, notably regarding logistics, where training has to meet a fast pace of technological and economic change. An improvement in the qualifications of the logistics professions would result in a better performance of modal chains and more informed decisions on modal choices. It would also increase labour mobility and career perspectives within and between the modes.

214. A particular role in the training effort, to make it much better focussed, could be played by social partners with the creation – building on the experience coming from the new strategy on clean and energy-efficient vehicles – of a Skills Council for the exchange of information on skill needs and best practices on training. Such a multi-modal platform with expertise coming from all transport modes could help avoid damaging skill shortages by indicating in time the need to dedicate additional training efforts to a given field.

11. An evaluation of the EU approach to jobs and working conditions across transport modes

- Conduct an appraisal of the sectoral social dialogue processes taking place in the various segments of the transport sector to the end of improving social dialogue and facilitating its effectiveness.
- Ensure employee involvement, in particular through European Works Councils, in transnational companies in the sector.
- Address quality of work in all transport modes, with respect to, notably, training, certification, working conditions and career development, with a view to creating quality jobs, developing the necessary skills and strengthening the competitiveness of EU transport operators.

1.3. Secure Transport

215. The terrorist attacks of 11 September 2001 led to an international consensus on the need to improve transport security. The forums for this international effort were the International Civil Aviation Organisation (ICAO), the International Maritime Organisation (IMO) and the World Customs Organization (WCO).

216. The EU now has substantial legislation in the area of aviation and maritime transport security, where measures have been developed for protecting both passengers and cargo. In relation to land transport security, efforts have been made to spread best practices, for example in emergency planning, through regular contacts with Member State officials.

217. At the EU level, transport security translates into two main strategies: policy formulation and regulation, and monitoring (inspection) activities, covering national competent authorities, airports, ports and port facilities and ships, to ensure correct implementation of the *acquis*. The scope of current inspection regimes will need to be assessed and if necessary modified. The question of financing transport security will finally need to be solved. Consideration should be given to the application of Article 222 TFEU, which envisages the Union and its Member States acting jointly in a spirit of solidarity if a Member State is the subject of a terrorist attack or the victim of a natural or man-made disaster.

218. A common approach and a single set of rules in the EU is essential for high level security in the EU. In aviation, this approach not only provides for high levels of security to citizens, but also allows that passengers, baggage and cargo travelling within the EU benefit from "One Stop Security". It means that in principle no further controls are required at EU transfer points once security controls have been performed at the EU airport of departure. The effect of One Stop Security in terms of eliminating redundant standards and procedures is a major 'value added' of European security policy. The same can be said about the Commission's inspections of EU airports and ports, conducted in accordance with the *acquis*. Proposals enhancing security will need to protect privacy and personal data.

1.3.1. Cargo security

Action Plan on air cargo security

219. When, on 30 October 2010, viable explosive devices were found in cargo shipments originating from Yemen and transferring to US-bound flights at airports in Germany and the UK, the need for further strengthening air cargo security in Europe had become clear[120]. Following the incident, a high-level group drafted a report with an action plan to close security gaps and to develop a further co-ordinated approach at EU and international level for additional security measures. The report was endorsed by Council in December 2010 which asked for a speedy implementation of the action plan and a progress report for summer 2011.

220. The Commission intends to bring forward legislative proposals notably in relation to cargo originating from outside the EU. The proposals will draw on experience gained within the EU and internationally so far and will also take into account methods applied within the customs sector with the Authorised Economic Operator (AEO) programme. They will follow a risk based approach and require improved data quality of advance information about shipments while further improving supply chain security in third countries: through mutual recognition of security and trade programs of relevant third countries in order to benefit from security controls that already exist in third countries. Any new approach must mitigate the risk of consignments departing from third countries for the EU and have minimal impact on transfer cargo handling at EU airports.

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[120] In 2005, the EU Customs Code was amended – in accordance with the WCO SAFE Framework of Standards to secure and facilitate global trade – to introduce strengthened Safety and Security rules involving a common EU Risk Management framework, advance cargo information and the EU Authorised Economic Operator (AEO) program.

221. The Member States and the Commission should as a matter of urgency strengthen the compliance monitoring of the cargo and mail rules. The Commission has to date made 30 cargo inspections at Member State airports and the results of these inspections show that implementation of EU rules must be improved. The number of EU inspections will be increased and Member States must take action to strengthen national monitoring programmes. The proper implementation of cargo rules is linked to effective staff training. Standardised training packages for staff involved in air security ensure robust and harmonised security. Capacity building on transport security in third countries must receive greater attention in EU external assistance programmes, including through workshops with the support of bodies such as the European Civil Aviation Conference (ECAC).

Enhanced security of cargo in ports

222. In response to the increased security concerns, and in particular the September 11 events, many countries took unilateral actions in order to tackle potential threats. The United States, for example, introduced a 100% scanning requirement for US-bound maritime cargo at export, to be implemented by 1 July 2012. In an extensive Impact Assessment performed in 2008, the Commission pointed out that "*if 100% scanning at export was implemented in European ports, it would be excessively costly, would be unlikely to improve global security, would absorb resources currently allocated to EU security interests, and would disrupt trade and transport within the EU and worldwide*"[121].

223. On this basis, the EU does not consider implementing 100% scanning of containers at export. It advocates shifting the policy focus towards developing a package of measures to cope with the wide diversity of security risks and address supply chain security not only from a national perspective but also as a global and complex challenge. This alternative package would nevertheless be based on the principle that all exports, as well as imports, undergo comprehensive and effective multi-layered risk management processes using a range of methods and technologies commensurate to the risks associated with specific consignments. No consignment would go unassessed.

224. As an integral part of the multi-layered risk management policy, the intention of the EU is to intensify international cooperation to maximise effectiveness and efficiency of the foreseen measures. The Commission will count in particular on the constructive cooperation with the US.

12. Cargo security

- Implement the Action Plan on Strengthening Air Cargo Security, define new rules on Air Cargo screening as necessary and enhanced security of cargo in ports.
- Complete an EU-wide one-stop security system for air cargo.

[121] Cf. *Secure trade and 100% scanning of containers,* Commission staff working document, SEC(2010) 131 final.

1.3.2. High levels of passenger security, low levels of hassle

225. A common European aviation security policy has been developed in the aftermath of the 9/11 attacks. The rules have been updated regularly to address evolving risks and threats. On 25 December 2009 the attempted terrorist attack with hidden explosives on Northwest Airlines flight 253 from Amsterdam to Detroit reminded once again of the limits of aviation security.

226. These incidents highlight the fact that aviation security is facing ever evolving or new types of threats; threats to which the traditional security methods applied at airports may not always give an adequate and efficient response. EU aviation security legislation requires control methods and equipment standards to be constantly improved in order to apply up-to-date security measures. EU Member States are invited to test innovative equipment and methods. For example, some started to trial and deploy security scanners at their airports, a recent technology capable of identifying prohibited articles, such as knifes or explosives, carried under clothes or right on the skin.

227. Still in 2011, the Commission is expected to make a proposal for allowing airports to use security scanners[122] – under certain conditions – as a regular screening method. The Commission's internal assessment that will accompany any legal proposal must justify the need for defining and imposing common EU standards, requesting basic detection performance and ensuring compliance with European fundamental rights and health provisions.

228. Common EU standards contain the underlying principles for aviation security. They allow for 'One Stop Security' within the EU where, in principle, no further controls of passengers, luggage and cargo are required at EU transfer points once security controls have been performed at the EU airport of departure. As of April 2011, the One Stop Security arrangement is in principle extended to passengers originating from US airports with the potential to create an even wider area of passenger facilitation and security.

229. Currently available security scanners have the potential for enhancing the quality and efficiency of security checks, but other, still more innovative technologies are in the pipeline. While the Commission is in general looking for smarter ways of applying controls to passengers and their luggage, it also works on the development of more effective and efficient technology such as modern scanners for luggage, including liquids, or persons, explosive detection systems or smart chips. such technologies should underpin the development of a 'Check point of the future' – such as security corridors which would allow a high number of passengers being controlled with minimum hassle. Exploring new methods of control is critical to enhancing security at all points in the process.

13. High levels of passenger security with minimum hassle

[122] Communication from the European Commission to the Council and the European on the use of security scanners at EU airports, COM (2010) 311.

Promote improved screening methods, fully respecting fundamental rights; such methods should underpin development of a 'Check point of the future' – such as security corridors which would allow a high number of passengers being controlled with minimum hassle and intrusion. They should also support security provision in other vulnerable areas such as major transport interchanges.

- Promote, also through funding, the development of more effective and privacy-friendly technologies (scanners, detectors of new explosives, smart chips, etc) as well as more privacy-friendly solutions in existing technologies.

- Define common detection performance standards and certifications procedures for detection equipment.

1.3.3. Land transport security

230. Land transport security has been handled differently from air and maritime transport security, owing to its decentralised character, but also reflecting the current absence of a legal basis for EU action, as well as the lack of a leading and legally competent international organisation (like IMO or ICAO) to deal with the subject.

231. Land transport, in particular urban transport, has increasingly been targeted by terrorism and organised crime in the last decade. This has been the case in relation to urban and commuter rail transport (Madrid bombings in March 2004, London bombings in July 2005), and to long-distance rail (failed attack on regional trains in Germany in July 2006). The cost, both in human lives from terrorist attacks and in economic terms due to organised crime targeting the transport of goods, is high.

232. While EU competence in relation to urban transport security is limited, personal security in the urban context is a key factor to increase the attractiveness of public transport. The development of land transport security policy must reflect political obligations, legal bases and specificities of each sector of land transport. Security must not be an obstacle to the flow of transport and trade and support the further opening of the markets.

233. In line with the need to better address all aspects of land transport security, the Commission's work with National Focal Points on Urban Transport Security should be extended to cover local and regional rail, as well as high-speed rail. The establishment of a permanent expert group on land transport security is envisaged, also as a forum for exchanges of views with stakeholders, taking account of previous experience in the areas of aviation and maritime transport security.

234. A shortcoming of the current 'modal' approach to security is that it does not take sufficiently into account the increased vulnerability of multimodal transport hubs. Consideration should therefore be given to the setting of security standards also for these facilities.

235. The European Commission has in close cooperation with the Member States developed an EU Chemical, Biological, Radioactivity and Nuclear (CBRN) Action

Plan[123], which introduces an all-hazard approach to reduce the threat of and damage from CBRN incidents of accidental, natural or intentional origin, including acts of terrorism. In view of the new integrated approach set out in the Internal Security Strategy[124], the forthcoming Communication on Transport Security Communication will, in 2011, further develop ideas on how best enhance the level of security in transport, in particular for major transport hubs and public transport.

14. Land transport security

- Work with Member States on the security of land transport, establishing as a first step a permanent expert group on land transport security and introducing further measures where EU action has added value. Special focus will be put on urban security issues.

1.3.4. *'End-to-End' security*

236. While many tools for protecting cargo security exist in the European Union, there are currently no rules in place for the European land transport supply chain in its entirety. In principle, one could imagine monitoring and screening each cargo shipment all along the logistics chain, but such an approach would nevertheless increase security related costs to unsustainable levels and could still prove inefficient. The Commission promotes a less costly and potentially more effective solution of profiling economic operators based on their level of compliance with certain reliability criteria.

237. The Commission proposes to build upon the experience gathered with AEOs and 'known consignors' to develop an 'end-to-end' security management system involving a harmonised Joint Risk Assessment of operators involved in a entire transport supply chain, independently of the transport mode used. 'End-to-end' security certificates delivered to compliant operators would entitle them to benefit from security facilitations related to operations at any stage of the supply chain. To avoid duplication of efforts and reduce red tape, the new certificate would equally be integrated in the existing systems for secure maritime and air transport.

238. The initiative would aim at enhancing supply chain security in order to provide greater protection for all European freight transport against possible terrorist attacks, without impeding the free flow of goods. The system would be based on risk management and not on the elimination of risk. Procedures for restoring the functioning of the supply chain after a major terrorist attack or any other distortion linked to security would therefore be integrated in the design of European and national Mobility Continuity Plans[125].

239. Finally, international cooperation must be further strengthened in all the aspects of transport security where joint efforts can bring considerable synergies (such as the exchange of intelligence information on international terrorism) and where national competences are not clearly defined (for instance navigation on international waters).

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123 COM(2009) 273 of 24 June 2009.

124 COM(2010) 673 of 22 November 2010.

125 The topic of Mobility Continuity Plans is explored more in details in part 3.5.3. "Ensuring an uninterrupted mobility following disruptions in the transport system"

15. 'End-to-end' security

- Increase the level of security along the supply chain without impeding the free flow of trade. 'End-to-end' security certificates should be considered taking into account existing schemes.
- Joint Security Assessment covering all modes of transport.
- Integrate potential effects of terrorist and criminal attacks in the preparation of mobility continuity plans (cf. Initiative 23)
- Pursue international cooperation in the fight against terrorism and other criminal activities like piracy. The external dimension (cf. Initiative 40) is crucial.

1.4. Acting on transport safety: saving thousands of lives

1.4.1. Towards a 'zero-vision' on road safety

240. Road safety is a major societal issue and a great concern to citizens and governments all across Europe. Although significant improvements have been reached in the framework of the third European action programme for road safety up to 2010, much still needs to be done to get to a 'zero-vision'.

241. As a contribution to this ambitious goal, and as outlined in its new policy orientations on road safety for 2011-2020[126], the Commission proposes to halve the overall number of road deaths in the European Union by 2020 starting from the results reached in 2010.

242. Meeting this target will require defining a strategy of actions on road injuries and first aid, targeted actions for specific categories of road users while at the same time addressing new societal challenges ahead.

243. Within the next ten years, road safety policies will have to adapt to emerging challenges and concerns such as population ageing, urban congestion, increasing unsafe behaviours (drugs, medicines, use of mobile phones while driving, etc.), and a potential decline in public resources devoted to the maintenance of road infrastructure. Enforcement remains a key factor in creating the conditions for a considerable reduction in the number of deaths and injuries. The cross-border exchange of information on road safety offences on which a proposal[127] is currently examined in the European Parliament and in the Council represents a first attempt to better addressing the issue at European level. Further steps might be envisaged, building on the experience gained once the proposed Directive will be applicable.

Road safety technology

244. Technology is expected to contribute a great deal to the improvement of the safety record of road transport. A wider deployment of Intelligent Transport Systems that can detect incidents, support traffic supervision, and provide information to road

126 COM (2010) 389 final.
127 COM(2008) 151 final of 19.3.2008.

users in real time will considerably improve traffic safety. In the near future, cooperative systems allowing vehicles to communicate with both road infrastructure and other road users, will also contribute to better road safety. It is important to accelerate the deployment of advanced in-vehicle driver assistance systems and safety and security-related ITS systems[128].

245. The possibility of extending the implementation of advanced driver assistance systems such as lane departure warning, anti collision warning or pedestrian recognition systems by retrofitting them to existing commercial and/or private vehicles should also be further assessed. Accelerated deployment and broad market take-up of such safety enhancing applications needs to be supported in order for their full potential to be unleashed.

246. ITS technology should also contribute decisively to improving the effectiveness and speed of rescue, and in particular through the adoption of the pan-European emergency call service fitted to vehicles, eCall. Technological developments, such as in-vehicle systems providing real-time information on prevailing speed limits could contribute to improve speed enforcement. Since light commercial vehicles are becoming increasingly numerous on the roads, which also increase the risk that they get involved in accidents, the fitting of speed limiters on such vehicles should also be examined along the lines already identified by the Commission.

247. After being placed on the market, vehicles should continue to meet safety standards throughout their lifetime. The current system of roadworthiness testing[129] needs to evolve to include checks on the electronic safety devices and new propulsion systems of the vehicles of the future. This will also require the setting up of a European electronic platform with a view to facilitating the access to the information necessary for performing such tests by testing centres and other involved parties. Also, the obligation to regularly test the vehicle should be extended to powered two-wheelers in an effort to reduce the number of accidents involving this type of vehicles.

A comprehensive strategy on road injuries

248. Road safety strategies traditionally focus on the reduction of road fatalities. However, road injuries are often overlooked and have become a major health problem. In 2009, about 1,500,000 people were injured on the roads of the European Union, with huge economic and human costs to society.

249. Reducing the number and the severity of injuries by improving emergency and post-care services will be one of the priority actions in the EU for the next decade. Therefore, the Commission will develop the elements of a comprehensive strategy of action concerning road injuries and first aid, with the help of all relevant actors. Initially, it would seek to find a common understanding of definitions and concepts relating to casualties (notably the definition of major and minor injuries), to improve and harmonise data collection and to identify courses of action to improve prevention and intervention, including their socio-economic impact. On this basis,

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128 Cf. section 0 below on ITS.

129 Cf. Directive 2009/40/EC as amended by Directive 2010/48/EU.

specific actions could be identified, such as exchanges of good practices, development of intervention guides, promotion of the creation of mixed rescue units between Member States, etc., and a measurable injuries reduction target could be set.

Training and education

250. The current approach as regards driver training remains too fragmented and specialised. The Commission proposes to promote a wider approach and sees education and training as an overall process, a lifelong 'educational continuum'. The Commission also intends to extend training and education to all road users and to encourage traffic education and training offers adapted to each age group.

251. The driving licence test should not be restricted to checking the candidate's knowledge of the Highway Code or his/her ability to carry out manoeuvres. In order to increase the safety of powered two-wheelers and to reduce the consequences of accidents, the Commission will promote riders' education on the need and advantages of using personal protective equipment, airbags, eCall and advanced braking systems, and will foresee appropriate anti-tampering measures.

252. In addition, once the provisions of the Third Driving Licence Directive[130] become fully applicable, the Commission will define guidelines on driver education in order to include minimum standards for instructors in cooperation with the Member States.

Vulnerable users

253. Vulnerable road users represented 45% of all road deaths in 2008. The safety of cyclists and pedestrians is mainly related to urban management, where local authorities have the competence to carry out most of the actions. But significant scope remains for a concerted action within the implementation of the Commission's Urban Mobility Action Plan. For elderly people, several measures will be envisaged such as ensuring fitness to drive, conceiving appropriate infrastructure design and signalling, and providing adequate passive safety devices. To improve the safety of motorcyclists, the Commission will encourage research and technical developments aimed at increasing the safety of powered two wheelers and reducing the consequences of accidents. On-going efforts to better adapt road infrastructure to powered two-wheelers (e.g. safer guardrails) will also be continued.

16. Towards a 'zero-vision' on road safety

- Harmonise and deploy road safety technology – such as driver assistance systems, (smart) speed limiters, seat-belt reminders, eCall, cooperative systems and vehicle-infrastructure interfaces – as well as improved road worthiness tests including for alternative propulsion systems.

[130] Directive 2006/126/EC of 20 December 2006 on driving licences (Recast), OJ L403 of 30.12.2006. Member States shall apply the provisions as from 19 January 2013.

- Develop a comprehensive strategy of action on road injuries and emergency services, including common definitions and standard classifications of injuries and fatalities, in view of adopting an injuries reduction target.
- Focus on training and education of all users; promote the use of safety equipment (seat-belts, protective clothes, anti-tampering).
- Pay particular attention to vulnerable users such as pedestrians, cyclists and motorcyclists, including through safer infrastructure and vehicle technologies.

1.4.2. A European strategy for civil aviation safety

254. Although the EU has a high standard of aviation safety, it is still not the safest region in the world. The safety performance of the Member States also varies. With the increasing complexity of the aviation sector, and growing volumes of air traffic, the EU will need to maintain constant vigilance to preserve and further improve its safety record. In order to achieve this, the EU should move to a safety management system that is pro-active, evidence-based and takes action in advance to prevent accidents from happening.

255. Such a system must necessarily rely on a basis of prescriptive rules, complemented by performance-based rules and oversight. It requires constant collection of information to enable hazards to be identified and risks measured and mitigated. To this purpose safety information must be complete, in standard form, analysed to extract the pertinent safety facts, and made readily available to the decision-makers. At the moment this is still not the case, and the EU aviation safety strategy should aim at putting in place the means to build such a system.

256. For a consistent implementation of the EU-wide strategy across all aviation domains, the *system approach* is essential. Having established a Safety Management System covering all aspects of aviation activity, the EU will have to develop performance targets for the various domains. In addition, common priorities and objectives for the Union as a whole and for Member States should be defined and revised regularly. The central role of the European Aviation Safety Agency (EASA) will have to be developed.

257. The deployment of the technological arm of the Single European Sky – SESAR – will contribute to enhancing the safety level in air traffic over Europe. It is important that adequate European legislation supports the timely, coordinated and effective deployment of this innovative technology and that compatibility is ensured with standards developed elsewhere in the world, and notably with NextGen in the United States.

258. A robust aviation safety system in the EU has direct implications for Third countries, both for operators flying to and from the EU and for the aeronautical industry. It will therefore be necessary to cooperate with third countries, in particular the US, to achieve regulatory convergence, mutual recognition in case of equivalent safety levels, and to give technical assistance to countries in need for support.

259. The EU will have to work closely with ICAO in order to achieve safety goals set by the international aviation community. In this respect, the Memorandum of Understanding on a Global Safety Information Exchange, signed in September 2010 by the Commission with the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO) and the US Department of Transportation (DOT) paves the way to the creation of a comprehensive global information exchange system which will contribute to improving aviation safety and greater transparency of safety information. Furthermore the transition by ICAO towards the Continuous Monitoring Approach (CMA) as a new methodology for overseeing aviation safety across the world, offers great opportunities to better identify and mitigate safety risks, while focusing the resources of ICAO and Member States on where they are most needed.

17. A European strategy for civil aviation safety

European aviation safety is high but not the best in the world. Our aim should be to become the safest region for aviation. In order to do so, we will develop a comprehensive European aviation safety strategy, building on the work of the European Aviation Safety Agency (EASA), which includes the following aspects:

- Improve the collection, quality, exchange and analysis of data by reviewing legislation on occurrence reporting in civil aviation.
- Adapt the regulatory safety framework to the development of new technologies (SESAR).
- Ensure the implementation of the EU aviation safety strategy consistently across all aviation domains.
- Promote transparency and exchange of safety information with ICAO and other international aviation partners, in particular in the framework of the Global Safety Information Exchange initiative; cooperate with non-EU countries, in particular the U.S., on safety matters on regulatory convergence, mutual recognition and technical assistance.
- Develop a Safety Management System at EU level that incorporates safety performance targets and measurements in order to identify the risks and to achieve continued improvement in safety levels.

1.4.3. Safer shipping

260. EU action in the field of maritime safety and protection of the environment complements the international framework as defined within the International Maritime Organisation (IMO). The transposition of IMO rules into the EU legal system ensures their enforcement across the entire European Union. In addition, the EU plays an important role in improving international standards by initiating and contributing directly to their adoption at international level.

Passenger Ship Safety

261. There is increasing waterborne mobility and leisure activity in the EU, where 22 out of 27 Member States are coastal countries, with 4 being island states. There are

more than 200 million passengers on board ships in the EU every year. Major accidents involving passenger ships in EU waters are thankfully rare, but if they happen they can be terrible tragedies (Herald of Free Enterprise, Estonia). A proactive approach to passenger ship safety is essential.

262. With this in mind, simplification and clarification of the complex EU regulatory framework – with due account to the relevant IMO rules – will facilitate the work of Member State authorities. Technical innovations and developments at international level also need to be taken into account. Safety rules need to reflect, among others, that passenger ships are no longer only built from steel but also from other materials, such as Glass Reinforced Plastic (GRP). Finally, with over 70% of the world's ro-ro passenger fleet operating in EU waters, and taking into account the increasing size and capacity of passenger ships, emphasis must be put on ensuring the safety of such craft. The Commission will work in close collaboration with EMSA on a modernisation of the passenger ship safety legislation to face these challenges.

Enhancing SafeSeaNet and sharing functions for coastguards in the EU

263. The European Maritime Safety Agency (EMSA) has received the task to manage SafeSeaNet, the central tool of the European maritime information system for the surveillance of ships and of data on dangerous goods. Further work will be done to enhance the features of SafeSeaNet in particular by satellite-based information as well as ensuring compatibility with River Information Services (RIS) and the e-Maritime initiative and openness to other modal systems. The objective is to develop SafeSeaNet into the core system for all relevant maritime tools supporting maritime safety and security and the protection of the marine environment from ship-source pollution. It will thus provide the essential contribution to the establishment of a common information sharing environment for the surveillance of the EU maritime domain[131].

264. The idea of a European Coastguard has already been discussed between the European institutions. Certain Coastguard functions could benefit from coordination at European level or be performed more efficiently at European level (e. g. the EU LRIT data centre). In full respect of the principles of subsidiarity and proportionality, the Commission will examine several options: structured cooperation between Member States, ad hoc or permanent coordination of Member States coastguards, handover of certain functions to EU bodies.

An EU register and EU flag for EU shipping

265. The need to ensure a level playing field for the EU maritime industry and to guarantee a high level of safety for the benefit of EU citizens calls for a uniform, high level of quality for EU flags. At the moment, there are still EU flags in the grey and black list of the Paris Memorandum of Understanding on Port State control.

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131 COM(2009)538 and COM(2010)584.

266. Directive 2009/21/EC on compliance with flag State requirements represents a first step in this direction. The Commission will continuously monitor the implementation of this Directive and will assess the overall level of performance of EU flags.

267. Furthermore the position of the European shipping sector is being challenged by the impressive growth of the maritime transport sectors of emerging economies in Asia and elsewhere. Those competitors have the advantage of cheap financing and labour, huge ship-building facilities and the biggest and more rapidly developing ports in the world. While the competitive advantage of European maritime transport is based on a quality approach with strict safety, security, environmental and social standards, in the medium- or long-term there is a danger that the EU could become dependent on maritime transport services provided by third countries.

268. A European Register (implying an EU flag) could be created to serve as a tool for sustaining the competitive advantage of European maritime transport services. It would not challenge the existing registers (flags) of the EU Member States. It would provide for a sign of recognition, similar to those used today by the European aviation industry. In essence, the EU sign would represent a quality label certifying safe, secure, environmentally friendly ships manned by highly qualified professionals. A favourable treatment for ships qualified for the European register could be considered. Ships in the Register could benefit from reductions on, inter alia, port dues related to environmental performance, lower insurance costs or less frequent inspections.

269. The idea to establish in the long term a European register and flag for ships could also apply to the inland waterway fleet. A step in this direction has already been made by the standardised "European Vessel Identification Number" (ENI) and the development of a European Hull Database.

18. Safer shipping

- Work with the European Maritime Safety Agency (EMSA) to modernise passenger ship safety legislation.
- Develop SafeSeaNet into the core system for all relevant maritime information tools needed to support maritime safety and security and the protection of the marine environment from ship-source pollution.
- Assess the feasibility of the creation of an EU register and EU flag for maritime and inland waterway transport. In essence, the EU sign would represent a quality label certifying safe, secure, environmentally friendly ships manned by highly qualified professionals.
- Assess the feasibility of shared functions for coastguards in the EU, in particular, to ensure maritime safety, security and environmental protection.

1.4.4. Rail safety

270. A safe, modern and integrated railway network is one of the EU's major priorities. The European Railway Agency (ERA) was set up to help create this integrated

railway area by reinforcing safety and interoperability. ERA also acts as the system authority for the development of the European Rail Traffic Management System (ERTMS), which is the single signalling standard eventually to be deployed throughout Europe[132]. The gradual opening of the railway market in the EU has not had any negative effects on the overall level of safety. Railways remain a very safe mode of transport in which a risk of a serious accident for passengers is kept to the very minimum.

271. The development and improvement of railway safety is mainly an issue for the railway undertakings and infrastructure managers. Through the certification system these two main players should demonstrate that they have in place a system to manage safety and satisfy requirements for the safe operation on the relevant network.

272. However, other players such as wagon keepers or maintenance workshops also contribute to rail operations. This is why in 2006 a debate was open in the rail sector on the relations to be established between certified and non-certified players and the opportunity to extend the regime of mandatory certification to the latter.

273. In order to progressively achieve a harmonised safety certification of all entities in the sector, the Commission will also evaluate the feasibility of relying on a European standard for designing and implementing safety management standards. The Commission intends to enhance the certification of entities involved in the manufacturing and maintenance of safety critical components used in the rolling stock and the infrastructure.

274. A number of common safety targets and common safety methods were adopted by the Commission in the last two years. It is important that ERA follows up the correct application of these measures. It is also important that indicators are monitored and that results of investigation following important accidents are discussed at European level. The dramatic accident of Viareggio (Italy) of 30 June 2009 led to the adoption of an action plan with several measures already implemented or under development, including a Task Force on freight wagon maintenance focusing on wagon axles' maintenance. That Task Force already delivered concrete results, but also showed that it is important to avoid that National Safety Authorities, in the aftermath of serious accidents, adopt measures that create new barriers and hamper the development of the internal market for rail.

19. Rail safety

- Progressively achieve a sector-wide approach to safety certification in the rail transport sector, building on existing approaches for infrastructure managers and railways undertakings and evaluating the possibility to rely on a European standard.
- Enhance the role of ERA in the field of rail safety, in particular its supervision on national safety measures taken by National Safety Authorities and their progressive harmonisation.

[132] The proposals for accelerating the implementation of ERTMS are central to rail safety and are discussed in section 0 below.

- Enhance the certification and maintenance process for safety critical components used to built rolling stocks and railway infrastructures.

1.4.5. Transport of dangerous goods

275. Rules for ensuring the safe transport of dangerous goods have been developed independently for each transport mode. The rules for maritime transport emanate from the International Maritime Organisation. The rules for rail have been established by OTIF, the Intergovernmental Organisation for International Carriage by Rail. Rules for road and inland navigation result from the work of UN-ECE, the Economic Commission for Europe of the United Nations. Therefore, a cargo to be transported by different means of transport is subject to cumulating rules, thus leading to complications and additional costs compared to a transport using a single mode. This is particularly inconvenient for maritime transport of containers despite sea transport being particularly well-suited for such low-cost-high-risk cargo. The Commission therefore intends to streamline the rules to ensure interoperability between the different modes for the transport of dangerous goods.

20. Transport of dangerous goods

- Streamline the rules for the intermodal transport of dangerous goods to ensure interoperability between the different modes.

1.5. Service quality and reliability

276. The quality of passenger transport services is an aspect that will gain increasing importance in the coming years, in view of the ageing of the population and of the need to promote more resource efficient public transport. Attractive frequencies, reliability and intermodal integration are the main characteristics of service quality. The availability of information over travelling time and routing alternatives is equally relevant. Finally, quality consists also in the ability to provide the elderly, disabled persons and transport users with special needs with a high-standard level of services.

1.5.1. A better enforcement of passenger rights

277. Currently, general passenger rights, including the rights of disabled passengers and passengers with reduced mobility are governed in the EU *acquis* for air, rail, sea and inland waterways transport as well as for transport by bus and coach. Due to the distinct characteristics of the different transport modes and their markets – differences on the company size, revenues and number of routes as well as differences in the length and the conditions of the trip – the precise contents of these rights vary, but the typology of rights guaranteed by the four existing regulations for transport by air, rail, waterways and road are comparable: namely the right to information, reimbursement, re-routing, assistance while waiting to travel, and compensation under certain conditions. The Commission will present a Communication on these common principles applicable to all passenger rights.

278. In the short term, the objective is twofold: to significantly improve the application of the existing legal frameworks through uniform and consistent interpretation and a more harmonised and efficient enforcement at EU level, notably through the

network of National Enforcement Bodies; secondly, to contribute to develop a worldwide approach to passenger care by including appropriate provisions in bilateral and multilateral international agreements.

279. The Commission will review the existing modal passenger rights legislation with a view to define a minimum set of passenger rights common to all transport modes, both through binding and non-binding instruments. The Commission will also assess the need to adopt new legislative measures aiming at modernisation or clarification of certain provisions on air passenger rights, also covering airline bankruptcy and problems related to the mishandling of luggage.

280. The Commission will then work for further improvements for passengers with reduced mobility (PRM), not only through their specific rights, but through a better access to infrastructure.

281. Currently there is no European legislation on the rights of passengers which, in the course of one journey, use two or more transport modes and have bought the different tickets under a single purchase contract. Such travellers may be exposed to higher costs in the case of delays (because of missed connections) or loss of luggage (because the final destination is not at the end of the route on which the luggage was lost). The Commission will work on promoting and developing the concept of integrated tickets and may, therefore, propose to include the question of the rights of passengers with integrated tickets on multimodal journeys on any of the current or future legislative frameworks.

282. The Commission envisages to propose a single EU regulation (an "EU Codex") covering all issues related to passenger rights for all modes of transports, which might include rights in case of disruption of travel, price transparency vis-à-vis consumers and non-discrimination, treatment of PRM, mishandled luggage, and more harmonised enforcement measures and sanction schemes.

21. Passengers' rights

- Develop a uniform interpretation of EU Law on passenger rights and a harmonised and effective enforcement, to ensure both a level playing field for the industry and a European standard of protection for the citizens.

- Assemble common principles applicable to passengers' rights in all transport modes (Charter of basic rights), notably the 'right to be informed', and further clarify existing rights. At a later stage, consider the adoption of a single EU framework Regulation covering passenger rights for all modes of transports (EU Codex).

- Improve the quality of transport for elderly people, Passengers with Reduced Mobility and for disabled passengers, including better accessibility of infrastructure.

- Complete the established legislative framework on passenger rights with measures covering passengers on multimodal journeys with integrated tickets under a single purchase contract as well as in the event of transport operator's bankruptcy.

- Improve the level playing field at international level through the inclusion of care quality standards in bilateral and multilateral agreements for all modes of transport, with a view to further passengers' rights also in the international context.

1.5.2. Seamless multimodal travelling and integrated ticketing

283. Swift travel across Europe should be seamless with single tickets or billing systems and door-to-door information readily available. The challenge is to access, integrate and use the data to deliver meaningful real time and personalised travel information services to the user. This is especially needed for cross border and multimodal travel.

284. In line with the ITS Action Plan[133] and following the adoption of the necessary specifications under the ITS Directive in support of EU-wide multimodal travel information services[134], it will be essential to ensure EU-wide multimodal travel information platforms that could provide possible commercial services. Access to public information shall be available to private operators who can provide this and other value added services.

285. New forms of electronic ticketing on mobile devices (smart cards, mobile phones, etc.) gradually take over from the old paper ticket. To use the full possibilities that the new technologies offer, it is vital to have interoperable systems in place. Much is left to be done, as each mode has developed its own solutions, sometimes local, sometimes global as for air transport.

286. For public transport the IFM project[135] has set up a road map to European interoperability and showed the interoperability of three main national systems. The next step will be further pilots and a set-up of the needed framework on a European level. For the rail sector, the ticketing component of TAP-TSI needs to be developed and implemented.

287. The successful liberalisation of air transport in the EU has lead to strong competition and a dynamic market where consumers can benefit from the many travel options available to them. Regulation (EC) No 1008/2008 on common rules for the operation of air services in the Community and Regulation (EC) No 80/2009 on a Code of Conduct for Computerised Reservation Systems (CRS) include, respectively, provisions concerning the display of travel options in CRS and price information for air transport services when these are offered to consumers. These provisions are aligned with the objective of safeguarding price transparency in the airline sector and to allow consumers to compare prices in a competitive environment.

288. Recent commercial developments in air transport services include increased direct distribution by airlines – which falls outside of the CRS/travel agency channel –

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133 Action Plan for the Deployment of Intelligent Transport Systems in Europe, COM(2008)886 of 16.12.2008.

134 Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, OJ L207 of 6.8.2010

135 The "Interoperable Fare Management Project" (IFM-Project) is an FP7-funded project that aims to make public transport networks more user-friendly by facilitating access, http://www.ifm-project.eu.

and the unbundling of ancillary services. This means that services that used to be normally included in the total price of the ticket now have to be purchased separately. Such industry practices can contribute to the development of a competitive air transport sector and to greater consumer choice, but need to be monitored to avoid possible abuses.

22. Seamless door-to-door mobility

- Define the measures necessary for further integrating different passenger transport modes to provide seamless multimodal door-to-door travel.
- Create the framework conditions to promote the development and use of intelligent systems for interoperable and multimodal scheduling, information, online reservation systems and smart ticketing. This could include a legislative proposal to ensure access of private service providers to travel and real time traffic information.

1.5.3. Ensuring an uninterrupted mobility following disruptions in the transport system

289. The ash cloud crisis in April 2010 and the weather-related disruptions towards the end of 2010 have shown that the capacity of the EU transportation system to tolerate and absorb disruption triggered by natural or man-made disasters is not sufficient to fulfil its basic function, which is to ensure a seamless mobility of people and goods. It has therefore highlighted the need to build greater resilience into Europe's transport system to preserve the mobility of passengers and businesses in case of disruptive events.

290. The lessons drawn suggest that, besides obstacles of a more structural nature such as missing links in the transport network and the lack of Single Transport Area, the vulnerability of the EU transport system can be attributed to the inadequate level of preparedness and cooperation between all actors, which has been felt at three levels.

291. First, at this stage, no Member State has currently in place emergency mechanisms to preserve the mobility of passengers and goods in case of a major disruption of its transport system. At the same time, since there is no systematic coordination between the existing business continuity plans of transport operators, the mobility of passengers and goods – especially cross-border – is not necessarily ensured in crisis situation. This low level of preparedness has resulted in a lot of 'operational' obstacles to a timely and efficient re-routing of passengers and goods (no ease of restrictions such as night or week end bans…) and has led to a suboptimal use of crisis-dedicated resources.

292. Second, there is evidence that the information management (access to information as well as sharing and communication of information to/between involved actors) which is a key factor in crisis situations is not sufficiently efficient. As a result, the quality of information made available to transport users, market operators and Member States is not adequate for them to take well informed decisions.

293. Third, the reaction of Member States has been mostly unilateral and uncoordinated. As a result, solidarity between Member States was limited, and where existent, only occurred at bilateral level. Increased cooperation would have accelerated

considerably the recovery phase and would have allowed the re-routing of transport users in a more effective and timely manner.

294. In the aftermath of the ash cloud crisis, the European Commission proposed the development of an EU-wide mobility plan for passengers and goods to be activated in case of a sudden transport crisis in the EU triggered by natural or man-made disasters or terrorist attacks.

295. Among the measures aimed at preserving the mobility of passengers and goods in a crisis situation, the Commission will explore possible ways to enhance the level of preparedness of the different actors concerned, including Member States, industry and international partners, to increase the efficiency of information management and to improve institutional cooperation. The temporary lifting of operational restrictions such as night flight restrictions or weekend bans for trucks could also be envisaged to facilitate the full use of remaining capacity for the transport of goods.

23. Mobility Continuity Plans

- Ensure the definition of mobility plans to ensure service continuity in case of disruptive events. The plans should address the issue of prioritisation in the use of working facilities, the cooperation of infrastructure managers, operators, national authorities and neighbouring countries, and the temporary adoption or relaxation of specific rules.

2. INNOVATING FOR THE FUTURE: TECHNOLOGY AND BEHAVIOUR

296. Changing the current transport paradigm, and achieving the goals presented in Section II.3 with respect to the development and deployment of sustainable fuels and propulsion systems and to the improvements in the efficiency of transport and of infrastructure use, cannot rely on a single technological solution, but rather requires a new concept of mobility supported by a cluster of new technologies.

297. It is also important to develop the related social, business and organisational innovations. Indeed, considering the future challenges, technology can be expected not only to help perform more efficiently the same actions as today, but also to satisfy the same needs in different ways. For this reason, this section brings together the technological and behavioural aspects.

2.1. A European Transport Research and Innovation Policy

298. Technological innovation can help the transition to a more efficient and sustainable European transport system by acting on three main factors: vehicles' efficiency through new engines, materials and design; cleaner energy use through new fuels and propulsion systems; better use of network and safer operations through information and communication systems.

299. Until now, transport research and innovation policy did not adequately support the development and deployment of the key technologies that are needed to develop the EU transport system into a modern, efficient and user-friendly system. A rethink of policy is therefore necessary. A systems' approach is required, taking care of

infrastructure and regulatory requirements, coordination of multiple actors and large demonstration projects to encourage market take-up

300. Internationally, Europe has to seek win-win cooperation with partners who are already competitors in many fields of transport. In air transport this is the case with the USA and especially China. We should promote European standards, supporting them through public and private partnerships in R&D. In parallel we must make sure that the European commitment to realise the Single European Sky, includes international cooperation in order to ensure interoperability across the globe. Partnerships such as the EU-USA Memorandum of Cooperation on civil aviation research support a strong and credible role of Europe in global standard setting. Opportunities for a global approach are to be explored as regards the development and uptake of sustainable low-carbon fuels in aviation.

301. In rail, the focus is on interaction with Asia, where China appears as a main partner and competitor especially regarding high speed trains. There is a window of opportunity in the next 5 years to make ERTMS the international standard. That will help our rail equipment industry to compete in the Asian, US and possibly Latin America markets. In road transport, Japan is a key partner in the development of alternative energy engines and in ITS, but cooperation is needed with multiple actors, particularly at demonstration level. Research cooperation on fuels cells for heavy duty vehicles proved to be fruitful with Australia and USA. Similar steps can be taken for the development and demonstration of bio-ethanol engines, where China and Brazil are our key partners. In urban traffic and decarbonisation, CIVITAS FUTURA will be an area of future development especially with Mediterranean countries.

302. The automotive sector is considered one of the largest corporate investors in research and development. Other sectors of the transport industry, such as aeronautics, space, shipbuilding and civil engineering, also make substantial investments in the development of new technologies. The energy industry is investing in research on alternative fuels and delivery systems. However, the efforts of the industry are not always successful because of the difficulties in the demonstration and pre-commercial phases of the innovation chain, often due to the high number of stakeholders involved or to the magnitude of the required efforts (for example, a demonstration project for a new generation of merchant ships would require several hundred million Euros). Initiatives stimulating both innovation and market take-up are needed to overcome these challenges.

303. The necessary framework conditions must be established in order to support the market introduction of promising technologies[136]. The European Union has an important role to play through setting long-term objectives, establishing open standards, promoting interoperability, co-ordinating expenditures, encouraging the application of best practices, and ultimately through defining a clear and stable legal and regulatory framework. The Europe 2020 Flagship initiative: 'Innovation Europe' proposes to do so by strengthening every link in the innovation chain.

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136 COM(2009) 279 final, Communication "A sustainable future for transport: Towards an integrated, technology-led and user friendly system".

304. A research framework for transport in the form of a Strategic Transport Technology Plan (STTP) could contribute to tackling these problems and better align transport research and innovation with EU objectives. Following the approach of the Strategic Energy Technology Plan, the STTP would establish a technology roadmap identifying areas where joint European research and innovation efforts will bring the greatest European added value.

2.1.1. Vehicles for the future

305. Vehicles in all transport modes need to become cleaner, safer and more silent. The transport system overall will need to become safer and more secure. In many cases, the new materials, propulsion systems (electric, fuel cells, etc) and ICT tools to manage and integrate the complex systems required for this radical transformation have already been developed. The technologies are available but need to make their way promptly to wider deployment. In addition to supply-side measures, green public procurement, such as foreseen under the Clean Vehicle Directive for publicly owned fleets, can be an effective instrument[137]. Generally speaking, public and commercial fleets could become the early adopters that are needed to create critical mass. In particular, the high potential of electromobility, be it through hybrid vehicles or pure battery based cars or light commercial vehicles for shorter trips, needs to be exploited.

CO_2 and energy efficiency standards

306. The success of the EURO standards on conventional pollutants demonstrates that, in the presence of market failures, technological standards can be an effective way of accelerating the introduction of cleaner vehicles, by providing fixed targets for the industry and avoiding 'wait and see' strategies of manufacturers. Minimum standards can thus be instrumental in maintaining Europe's position as a global trend-setter.

307. Together with the Climate and Renewable Energy Package of 2009, the EU put in place a regulation on CO_2 emission standards for new passenger cars, setting binding targets for 2012/2015 and 2020. However, such standards are currently non-existent for other vehicle categories and modes, such as locomotives and railcars, vessels and aircraft.

308. A reliable and realistic method is needed to certify the fuel consumption and CO_2 emissions of complete heavy duty vehicles as well as trailers and semitrailers. The Commission has started work on the development of such a method. As for rail vehicles, the average weight – and thus energy consumption – has been increasing over time due to a perceived need to improve ride comfort[138]. Whereas an

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137 Cf. Clean Vehicle Portal: www.cleanvehicle.eu

138 According to a recent study, a 10% increase in train mass resulted in energy consumption increases of 0.5-1% for high-speed trains; 2-3% for long distance/conventional trains; 5-7% for suburban trains and 6-8% for urban trains. Hazeldine, Pridmore, Nelissen and Hulskotte (2009) Technical Options to reduce GHG for non-Road Transport Modes. Paper 3 produced as part of contract ENV.C.3/SER/2008/0053 between European Commission Directorate-General Environment and AEA Technology plc; http://www.eutransportghg2050.eu/cms/assets/UPDATED-EU-Transport-GHG-2050-Paper-3-Technical-options-for-non-road-modes-30-10-09.pdf

improvement in energy efficiency has not been a main concern of the rail sector, the situation might well change in the future[139].

309. The International Maritime Organisation has prepared a draft text on mandatory requirements for an Energy Efficiency Design Index for new vessels and on the Ship Energy Efficiency Management Plan for all ships in operation. While agreement on these items could not yet be reached, the EU will continue to work towards adoption of the index, as it will continue to actively support a global agreement on tackling CO_2 emissions.

310. As regards air transport, the ICAO Assembly has requested the development of "*a global CO_2 standard for aircraft*" by 2013[140]. The Commission will provide its full support to the international negotiations.

311. The energy efficiency of vehicles should continue increasing in the long term to ensure that the available energy supply from alternative fuels can match the expected increase in transport demand. Presently implemented and proposed CO_2 standards imply limits on energy consumption only as long as the main supply comes from fossil sources. With decreasing CO_2 intensity of transport fuels, fuel consumption could go up again. Therefore, energy efficiency standards may in future need to replace the present CO_2 standards. The combination of targets for the CO_2 intensity of transport fuels and standards for the energy efficiency of vehicles should ensure that the two objectives of decarbonisation of transport and substitution of oil by alternative fuels are achieved simultaneously, and in a cost efficient way.

Standards for controlling noise pollution

312. The World Health Organisation concluded that noise has emerged as the leading environmental nuisance and represents the third biggest environmental burden of disease (after air pollution and exposure to Second Hand Smoke)[141]. Transport noise, particularly from road traffic, but also from rail and aviation, is a major contributor to noise pollution in urban areas. While type-approval noise limits for road vehicles, including their tyres, have been tightened over the years, the overall exposure to noise generated by road vehicles has not improved due to increasing traffic volumes. Electric or hybrid vehicles could help in providing a solution. Noise pollution from railways remains one of the main barriers for expanding their use in urban areas and along densely populated rail freight corridors; and aircraft

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139 According to a study, aluminium car bodies, articulated trains and lightweight coach interior equipment could each achieve weight savings of 2% to 5% on a single vehicle and 1% to 2% if applied to the whole fleet. It was estimated that double deck trains and wide body trains could achieve savings greater than 10% on a single vehicle and 2% to 5% for the whole fleet. The same study also proposed benchmarks in terms of 'best in class' weight per seat. CE Delft suggested that for high-speed trains (where a higher mass is necessary for stability) the Japanese Shinkansen at 537kg/seat should be the target. In contrast, for suburban trains 342kg/seat would be the benchmark. Buurgaard Neilsen et al (2005) *Tracks for Energy Saving,* CE Delft in: Hazeldine et al. 2009.

140 2010 ICAO Assembly Resolution (A37-19) paragraph 24(e).

141 Health and environment in Europe: Progress assessment, Copenhagen, WHO Regional Office for Europe 2010; http://www.euro.who.mt'en/what-we-do/health-topics/envirorimental-health/Climate-change/publications/2010/health-and-environment-in-europe-progress-assessment

noise is often the reason for the difficulty of expanding airport capacity at major European hubs.

313. Moreover the role of L-category vehicles (mopeds, motorcycles, quads etc.) is of particular importance for certain conventional pollutants and noise[142].

314. It is also crucial that the method of measurement of energy consumption, noise and air pollutant emissions fully reflects real world use in order to avoid perverse incentives for manufacturers[143].

Potential new or unconventional transport systems and vehicles

315. Looking forty years ahead, it can be foreseen that certain radically new technologies and concepts will emerge over the next decades. Based on a recent assessment carried out for the Commission[144], it has been found that in particular in road transport there appears to be the largest number of options[145]. In rail transport, magnetic levitation seems to be the only technology that could be deployable at a relatively early stage in light of the experience of Transrapid and recent developments in Japan[146]. In waterborne transport mainly wind-based concepts but also LNG and nuclear energy could have a significant impact on emissions and appear to be deployable in the medium-term. Widespread deployment of many of the unconventional technologies for aviation seems however unlikely until 2050, although the development of alternative fuels for aviation is accelerating. Other possibilities such as unmanned airborne vehicles and unconventional freight delivery systems (pneumatic pipelines etc) could be more closely examined in this context.

2.1.2. A comprehensive alternative fuel strategy

316. The transport sector is for 96% dependent on oil. Alternative long-term options for substituting oil as energy source for propulsion in transport are electricity, hydrogen, and liquid biofules. Synthetic fuels can be seen as a technology bridge

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142 For example, hydrocarbons emitted by L-category vehicles are estimated to reach approximately 55% of total hydrocarbon emissions of the road transport sector by 2020, if no additional measures will be introduced. This is mainly due to the significant reductions of hydrocarbon emissions from the other road transport categories. Mopeds are already today one of the most significant contributors to hydrocarbon emissions, anticipated to be at 36% of total emissions by road transport by 2012.

143 The average efficiency of an engine is strongly related to the way it is used. In Europe, the New European Driving Cycle (NEDC) is the official driving cycle used for vehicle type approval, but there is some discrepancy (typically 10-20%) between the fuel consumption as measured on the NEDC and that in real world driving Sharpe, R.B.A. (2009) Technical options for fossil fuel based road transport Paper produced as part of contract ENV.C.3/SER/2008/0053 between European Commission Directorate-General Environment and AEA Technology plc. http://eutransportghg2050.eu/cms/assets/EU-Transport-GHG-2050-Paper-1-Technical-options-for-f-fuel-road-transport-11-02-10.pdf

144 Wynn, D and Hill, N. (2010) *Review of potential radical future transport technologies and concepts.* Task 9 Report VI produced as part of contract ENV.C.3/SER/2008/0053 between European Commission Directorate-General Environment and AEA Technology plc; http://www.eutransportghg2050.eu/cms/assets/EU-Transport-GHG-2050-Report-VI-Radical-technologies-and-concepts-04-06-10-FINAL.pdf

145 EXPLAIN: dual mode transit, electric trolley-trucks, self-drive vehicles

146 http://english.jr-central.co.jp/company/company/others/eco-report/_pdf/p38-p41.pdf; http://search.japantimes.co.jp/cgi-bin/nb20080826a3.html

from fossil to biomass-based fuels; methane (natural gas and biomethane) as a complementary fuel; and LPG as supplement.

317. The different transport modes, require different options for alternative fuels. It is generally thought that road transport could be powered by electricity over short distances, hydrogen and methane up to medium distances, and biofuels/synthetic fuels, LNG and LPG over long distances. Railways could be further electrified or use biofuels. Biomass-derived kerosene appears, at the moment, the only alternative for aviation. Waterborne transport could be powered by biofuels (all vessels), hydrogen (inland waterways and small boats), LPG and LNG (short sea shipping), LNG and nuclear (deep sea).

318. There are growing indications that the indirect land use impact of first generation biofuels might question the GHG benefits of some of these fuels. More advanced biofuels, based on waste and algae and requiring less primary resources, will need to come to market, and their use should focus on the modes where the use of non-liquid fuels can not be an alternative, such as aviation and long-distance road transport. Hydrogen and fuel cell technology development and market preparation are supported by a Joint Technology Initiative. The European Green Cars initiative[147] gives priority support to electric vehicles and the further optimisation of the internal combustion engine. The Commission is also undertaking a study to investigate the feasibility and the impact of the use of alternative fuels in aviation[148].

319. Reaching a higher share of alternative fuels in transport's energy demand has long been one of the EU's policy objectives due to growing concerns about security of energy supply. However, the market uptake of alternative fuels has been slow and fragmented across Member States[149].

320. As part of the Climate and Renewable Energy Package of 2009, the EU has agreed on a binding target requiring that the share of renewable energy reaches 10% by 2020 in the final energy use of transport[150], and that fuel suppliers progressively reduce the greenhouse gas intensity of the energy that they supply for the road sector to achieve a 6% lower GHG intensity by 2020. To achieve these targets Member States have been providing financial incentives, as currently available alternatives are not price competitive with oil.

321. In order to further facilitate the efforts of Member States, and of the transport and energy industry, the Commission will put forward in the second half of 2011 a comprehensive alternative fuel strategy that is in line with the objective of resource-

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147 http://www.green-cars-initiative.eu.

148 SWAFEA–Sustainable Way for Alternative Fuels and Energy for Aviation http://www.swafea.eu/Home/tabid/38/Default.aspx

149 Liquefied petroleum gas (LPG) was the first alternative fuel in the market; it has currently a total share of 3% and it is offered at 27,000 filling stations in Europe, particularly in the Netherlands, Poland and Bulgaria. Natural gas has been introduced as motor fuel first in Italy in the 1940s, but has then remained at a constant market share of around 2%; a strong build-up of natural gas filling stations and cars has been seen in Germany in recent years. Biofuels benefited strongly from subsidies in Sweden and Germany.

150 Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

efficiency of the Europe 2020 strategy, and will help the EU to put an end to oil dependency in the longer term.

322. EU action is particularly necessary as high-level coordination is required across multiple policy areas – transport, energy, climate and environment, industrial, trade, agriculture, employment, health and consumers, research – and stakeholders – the automotive industry (vehicle manufacturers and suppliers), fuel and energy suppliers, grid managers, component manufacturers, infrastructure managers, network operators, scientific and standardisation bodies, EU, national and regional authorities, municipalities and consumers.

323. The relationship between vehicles capable of running on alternative fuels and the appropriate refuelling infrastructure is often described as a 'chicken and egg' problem. The EU should take a leading role by working with Member States at national and regional levels on the gradual build-up of charging and refuelling infrastructures. Ensuring interoperability and reliability is required for the EU-wide free circulation of vehicles, vessels and aircraft that are powered by alternative fuels. Not only the road network, but airports and ports will need to be upgraded and modernised in order to allow for the transition.

2.1.3. Permeating the transport system with advanced information technology

Further developing the modal systems…

324. Many applications of ICT (Information and Communication Technology) to transport exist in all modes and prove their utility in improving transport efficiency by making vehicles and the infrastructure more intelligent. Increasingly, these systems are also at the heart of market integration since they are essential to transport operations and the lack of interoperability creates a barrier between borders. On the other hand ICT can simplify and harmonise administrative procedures and thus reduce the cost associated to trans-border operations.

325. In **road transport**, Intelligent Transport Systems (ITS) are an important tool to achieve policy objectives, such as increased safety and lower congestion, as underlined in the Action Plan for the Deployment of Intelligent Transport Systems in Europe (the ITS Action Plan[151]) and the related ITS Directive[152].

326. Overall it is estimated that the benefit of ITS in terms of road safety and congestion on roads can amount to a 10% reduction in fatalities per year (3,500 lives) and 10% reduction in congestion costs (€ 12.3 billion). In addition ITS can contribute to environmental and climate change objectives through the improvement of energy efficiency, a more efficient use of infrastructure and vehicle capacity, and by allowing to choose the most efficient transport mode for a given route.

327. In the last decade, on-board telematic units have been introduced in road vehicles to control, report, command or record events. Specific applications exist for commercial vehicles such as the digital tachograph, or electronic tolling. For passenger vehicles more and more sophisticated applications are added to the

[151] Cf. footnote 133.
[152] Cf. footnote 134.

existing control functions. Work to try and standardise the interfaces of such in-vehicle platform and, ideally, to build an architecture that would enable the parallel operation of different such applications (safety, tolling, information, etc…) on single open platform is ongoing.

328. Indeed, a critical success factor for the wide-spread introduction of road user charging will be the ability to provide road users with one single electronic tolling service. Today a truck from Lisbon to Bratislava via Lyon, Milan, Munich and Vienna needs at least 7 different contracts with toll operators and 7 on-board units, and this in addition to at least a digital tachograph and an on-board computer. To avoid such a proliferation of devices and simplify the life of drivers, the EU has already adopted a Directive setting up a European Electronic Toll Service which now needs rapid implementation[153].

329. Work to standardise the interfaces of an electronic in-vehicle platform and, ideally, to build an architecture that would enable the parallel operation of different applications (safety, tolling, information, etc…), has been the subject of past research projects and is currently been further analysed within the context of the ITS Action plan. The automotive industry and the telecom sector have been coming closer to each other to address such issue, but a clear regulatory boost is necessary to promote the introduction of such platform on all vehicles by 2020.

330. Building on this platform, relying on the regulatory framework for the exchange of transport and data information, it is also important to deploy a set of mature road ITS applications for which specifications are being designed from the ITS Directive and should be ready by 2014. The harmonised deployment of critical road safety and security-related information services must be ensured by appropriate legal instrument.

331. The development of cooperative Intelligent Transport Systems, based on an exchange of information between vehicles and the road infrastructure (infrastructure to infrastructure (I2I), vehicle to infrastructure (V2I) and vehicle to vehicle (V2V) communications), is progressing rapidly. In addition to the required technical feasibility, it is essential to evaluate the impact of the introduction of such systems to the wider community of stakeholders, and notably road infrastructure authorities and telecom operators. Building on the results of EU-funded research projects, field operational trials, current standardisation work, and relying on specifications to be developed through the ITS Directive, the Commission will further support the development of such systems, leading to a viable deployment model by 2020.

332. In **rail transport**, control-command and signalling, as well as traffic management systems are still often incompatible between Member States and represent one of the reasons borders are still a major barrier, hampering the development of rail in Europe. This has led to the creation of a European Railways Traffic Management System (ERTMS). Today, ERTMS encompasses two main components:

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153 (EETS) – Directive 2004/52/EC on the interoperability of electronic road toll systems in the Community, OJ L166 of 30.4.2004.

– GSM-R, the radio system used for exchanging voice and data information between the track and the train;

– ETCS, the European Train Control System[154], harmonising the speed control systems, the divergences in which constitute today one of the major technical problems for trains running on international routes. It is made up of an on-board and a trackside module.

333. Signalling systems bring about considerable economic advantages because they allow more trains to operate safely on a given section of track than would otherwise be possible with other methods of safe working. ERTMS will replace the many incompatible systems that exist on the European network by a single system which is more modern, more sophisticated, safer and compatible at EU level.

334. With a view to ensure that the main European lines are equipped within a reasonable time period, the Commission has set concrete requirements for lines to be equipped by specific dates[155]. In practice, the main freight hubs should be interconnected over the period 2015-2020.

335. Furthermore, there will be a need to develop the next generation of rail traffic management systems which will contribute to transform the present technologies into an integrated rail traffic management system.

336. Also in **waterborne transport** the use of ICT tools can lead to optimisation of routes and better fleet and cargo planning. This is indeed one of the aims of e-Maritime and of River Information Services. The advantages of the e-Maritime initiative in reducing administrative costs in shipping were described in section 0 above.

337. River Information Services (RIS) stands for harmonised information services in support of traffic and transport management in inland navigation, providing geographical, hydrological and administrative information on the waterway and enables the electronic reporting of cargo and voyage data and the tracking and tracing of vessels. The information provided supports amongst others navigation, traffic management, accident abatement, fleet management, transport planning, execution and monitoring[156]. Some studies on inland waterways transport report that through such measures a reduction in emissions of around 40% could be possible.

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154 Decision 2006/679/EC concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system and Decision 2006/860/EC concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European high-speed rail system,

155 Commission Decision of 22.7.2009 amending Decision 2006/679/EC as regards the implementation of the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system. http://ec.europa.eu/transport/rail/interoperability/ertms/doc/edp/edp_en.pdf.

156 RIS are regulated through Directive 2005/44/EC – which defines binding rules for data communication and RIS equipment as well as the minimum level of RIS Services – and through the Commission Regulations defining the technical guidelines and specifications identified under the Directive. The Directive provides the framework for the deployment of harmonised and interoperable RIS systems and services.

338. Maximising the benefits of RIS require a continued deployment of RIS services and systems, the further development of services and specifications, the integration of new technologies, the exploitation of RIS data for logistical purposes and the interoperability and interconnectivity with other modal traffic and transport management systems such as SafeSeaNet to achieve continuous monitoring and support to sea-river transport.

339. In **aviation**, SESAR is the technological component of the Single European Sky – as described in Section 0 above – and the best example of how traffic management systems underpin market integration. Indeed, because of the global nature of air transport, interoperability issues go beyond the EU. Cooperation with the US NextGen[157] is becoming operational, and the two world regions will lead the overall ATM modernisation and performance improvement at global (ICAO) level. Europe has therefore a unique chance to determine new global standards. Cooperation with further international partner countries will open business opportunities for the European industry.

340. The case of aviation is not isolated. In maritime, rail and road there are also opportunities to develop products that set international standards and open up new markets for EU manufacturers.

…and integrating them in a common framework: the European Integrated Multimodal Information and Management Plan (EIMIP)

341. One fundamental barrier affecting equally the transport of passengers and of freight is the limited or very inefficient, if at all existent, exchange of operational, traffic and travel data among the various stakeholders, even more so across the modes of transport. This is no longer viable in a world where, increasingly, transport is not only about moving people or goods from point A to point B, but about knowing in real time where people and goods are.

342. For multimodal freight operations, knowing the exact location and real-time capacity of multimodal exchange platforms between rail, road and inland water transport would allow an optimised planning of freight transport operations, including the cross-modal end-to-end traceability of the transported goods. Likewise, for passengers transport it is no longer acceptable that road traffic information or traffic management remain confined to a single regional centre and are not shared with the adjacent conurbations or regions. Similarly, passengers on a given journey should dispose of all possible real-time information (e.g. on train, metro, parking, car-sharing, bicycle sharing) to allow them to select 'en-route' the best possible travel option.

343. For both freight and passenger transport, users want to be able to buy multimodal transport services through integrated ticketing. Whereas specific initiatives have been taken to improve the situation and which should lead to preliminary results,

[157] NextGen is an umbrella term for the ongoing transformation of the United States National Airspace System basically shifting the ground-based system of air traffic control to a satellite-based system of air traffic management. http://www.faa.gov/nextgen/

mostly at modal level by 2015[158], the general availability, interoperability and sharing by stakeholders of the relevant transport data and information, which would facilitate and boost the creation and uptake of ICT solutions, is still missing. Building on those initiatives, it is crucial to set the general framework that will complement and foster synergies between all existing initiatives in all modes.

344. Accompanied by an appropriate regulatory framework, a "*European Integrated Multimodal Information and Management Plan" (EIMIP)* based on common open platforms for radio navigation, positioning, transport and traffic management and information systems would ensure a coordinated use of scarce resources and provide integrated intermodal travel information and other value added services to citizens and companies.

Fostering innovation and deployment of urban transport technologies

345. Satellite-based applications, on-board equipment, public transport electronic ticketing, electric networked vehicles, fuel cells, Bus Rapid Transit (BRT), Personal Rapid Transit (PRT), freight pipelines…: there are many new technologies and organisational innovations that could contribute to reducing congestion, emissions and to improve mobility in urban areas. Typically, innovations and new technologies in transport require critical mass adoption and the adaptation/upgrade of the transport and energy infrastructure. This can be a long-term process and is not without risk of stranded investments. As part of their strategy for minimising risk, cities should support each other in implementing and evaluating cost and benefits of new concepts.

346. Market deployment requires multi-stakeholder co-operation, involving technology providers, energy and infrastructure providers and cities themselves – as well as support from financial bodies. The Commission will look at ways of fostering partnerships for smart mobility and of building consensus on future deployment pathways.

347. Large scale demonstrations of new technologies are necessary to prove their benefits, viability and users' acceptance under a broad range of different conditions. They are key in preparing the ground for deployment. The CIVITAS initiative demonstrated the advantage of combining supportive policy measures with technology demonstrators.

24. A technology roadmap

Fragmentation of research and development efforts in Europe is most harmful, and joint European efforts will bring the greatest European added value in areas such as:

- Clean, safe and silent vehicles for all different modes of transport, from road vehicles to ships, barges, rolling stock in rail and aircraft (including new materials, new propulsion

[158] For example, the ITS Directive for road, the eFreight initiative for freight transport, e-maritime initiative to be launched soon or TAP-TSI (Telematic Applications for Passenger Services) and TAF-TSI (Technical Specifications of Interoperability on Telematic Applications for Freight) for the rail sector.

systems and the IT and management tools to manage and integrate complex transport systems).

- Technologies to improve transport security and safety.
- Potential new or unconventional transport systems and vehicles such as unmanned aircraft systems, unconventional systems for goods distribution,…
- A sustainable alternative fuels strategy including also the appropriate infrastructure.
- Integrated transport management and information systems, facilitating smart mobility services, traffic management for improved use of infrastructure and vehicles, and real-time information systems to track and trace freight and to manage freight flows; passenger/travel information, booking and payment systems.
- Intelligent infrastructure (both land and space-based) to ensure maximum monitoring and inter-operability of the different forms of transport and communication between infrastructure and vehicles.
- Innovations for sustainable urban mobility following up the CIVITAS programme and initiatives on urban road pricing and access restriction schemes.

25. An innovation and deployment strategy

Identify the necessary innovation strategies including the appropriate governance and the financing instruments in order to ensure a rapid deployment of results developed in the research process. Examples are:

- Deployment of smart mobility systems such as the air traffic management system of the future (SESAR), the European rail traffic management system (ERTMS) and rail information systems, maritime surveillance systems (SafeSeaNet), River Information Services (RIS), ITS, and the next generation of multimodal traffic management and information systems.
- Definition and deployment of an open standard electronic platform for vehicle on board units, performing various functions including road charging.
- Development of a plan for investment in new navigation, traffic monitoring and communication services to allow for the integration of information flows, management systems and mobility services based on a European Integrated Multimodal Information and management Plan. Demonstration projects for electro mobility (and other alternative fuels) including recharging and refuelling infrastructure and intelligent transport systems focussing in particular on those urban areas where air quality levels are frequently exceeded.
- Smart mobility partnerships and demonstration projects for sustainable urban transport solutions (including demonstrators for road pricing schemes etc).
- Measures to promote increased replacement rate of inefficient and polluting vehicles.

26. A regulatory framework for innovative transport

Identify the necessary regulatory framework conditions through standardisation or regulation:

- Appropriate standards for CO_2 emissions of vehicles in all modes, where necessary supplemented by requirements on energy efficiency to address all types of propulsion systems;
- Vehicle standards for noise emission levels;
- Ensure that CO_2 and pollutant emissions are reduced under real-world driving conditions by proposing at the latest by 2013 a revised test cycle to measure emissions;
- Public procurement strategies to ensure rapid up take of new technologies;
- Rules on the interoperability of charging infrastructure for clean vehicles;
- Guidelines and standards for refuelling infrastructures;
- Interface standards for infrastructure-to-infrastructure, vehicle-to-infrastructure, and vehicle-to-vehicle communications;
- Access conditions to transport data for safety and security purposes;
- Specifications and conditions for transport related smart charging and payment systems;
- Better implementation of existing rules and standards.

2.2. Promoting more sustainable behaviour

348. User behaviour plays a determining role in the success or failure of new technologies. Users, apart from 'early adopters', are often unwilling to change their customary way of travelling and transporting goods, whereas the uptake of new technologies might require modifying deep-rooted habits. For example, although electric vehicles already on the market may not be suitable for long-distance travel, they respond to the needs of urban mobility and their use would greatly benefit local air quality. However, users of electric cars would have to accept switching to another vehicle or to public transport means for their long-distance journeys. A different approach toward ownership of personal vehicles might also be warranted. Such difficulties linked to various aspects of our behaviour need to be recognised and further explored in order to make progress towards sustainable mobility.

349. Another aspect is that of information and perception. Transport users, customers of equipment and even operators may not have the ability of making truly informed decisions for lack of relevant, correct and well presented data. Wrong perception or uncertainty may also influence decisions, as, for example, in the case of the overestimation of waiting times for public transport. The integrated ticketing system outlined in Section 1.5.2 is an essential way to increase awareness of the users on the various options to complete their journeys.

27. Travel information

- Promote awareness of the availability of alternatives to individual conventional transport (drive less, walk and cycle, car sharing, park & drive, intelligent ticketing etc.).

2.2.1. Fuel and vehicle efficiency labelling

350. Information on the relative performance of vehicles is particularly effective at the time of purchase. The car labelling Directive 1999/94/EC establishes requirements for the provision of consumer information for cars. However analyses[159] have indicated that the implementation of this Directive may not have been as effective as desired. In addition, a more uniform approach to the provision of information and a widening of the scope to other classes of vehicles could be desirable.

28. Vehicle labelling for CO_2 emissions and fuel efficiency

- Review the labelling Directive to make it more effective. This will, inter alia, consider the extension of the scope to light commercial and L-category vehicles, and the harmonisation of the label and vehicles fuel efficiency classes throughout the Member States.
- Support the market take-up of fuel efficient, safe and low-noise tyres beyond the performance requirements set in type approval[160].

2.2.2. A certified carbon footprint calculator

351. Carbon- and environmental foot-printing of transport services is an area where a lot of initiatives from the industry are already taking place. However many schemes have been developed by individual companies and do not provide data that is comparable with that from other schemes. Efforts are under way to develop standardised methodologies and their rapid completion is desirable to provide a tool to companies wishing to procure less environmentally damaging transport services and to passengers wanting to travel in a more environmentally friendly way.

29. Carbon footprint calculators

- Encourage business-based GHG certification schemes and develop common EU standards in order to estimate the carbon footprint of each passenger and freight journey with versions adapted to different users such as companies and individuals. This will allow better choices and easier marketing of cleaner transport solutions.

2.2.3. Lower speeds for cleaner and safer transport

352. Over the course of the last two centuries, slower transport modes have gradually been replaced by faster ones. Based on the quasi-constancy of time budgets of around 1 hour per day, travelling at higher speed allowed people and goods to cover

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159 ADAC e.V., 2005, Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars. http://ec.europa.eu/clima/studies/transport/vehicles/docs/final_report.pdf

160 This includes the adoption of all implementing measures of the tyre labelling Regulation (EC) No 1222/2009. It would achieve 5% fuel savings on the total EU fleet by 2020.

larger distances during the same amount of time. This clearly resulted in greater transport volumes.

353. The relation between speed and European mobility and social cohesion is an element that should be acknowledged. Many Europeans now live and work a great distance away from their home regions and countries and from their families. Increasing the cost and time of travel would negatively affect labour mobility and social cohesion.

354. At the same time, it is clear that reducing speed is an extremely effective way to reduce not only the risk of accidents but also fuel consumption. At the moment, a voluntary agreement limits passenger car speeds to 250km/h. A reduction in the maximum designed speed could favour the introduction of lighter, quieter and more economical tyres and braking systems.

355. The lack of speed limitation in light commercial vehicles (vans) leads to potential distortions in decision making in favour of less energy efficient but faster smaller vehicles. It may be desirable for such vehicles to be speed limited in the same way as heavier commercial vehicles to ensure a level playing field.

2.2.4. Eco-driving training and applications

356. In addition to the regulatory and market instruments that provide incentives for change in user behaviour, the deployment of Intelligent Transport Systems themselves, as outlined in Section 2.1.3, may facilitate this shift. A number of Member States already promote eco-driving through training or awareness campaigns, and the Commission supports eco-driving dissemination through various projects[161] and it may consider the inclusion of eco-driving requirements in future revisions of the driving licence Directive[162].

357. With technological progress in vehicles, the driver's influence on fuel consumption will be, in longer time horizon, diminishing. ITS can however be used to enhance the eco-driving behaviour and especially secure its contribution to reducing GHG emissions by direct and real-time feedback to the driver.

30. Eco-driving and Speed limits

- Include eco-driving requirements in the future revisions of the driving licence directive and take steps to accelerate the deployment of ITS applications in support of eco-driving. Fuel saving techniques should also be developed and promoted in other modes – for example continuous descent for aircrafts.
- Examine approaches to limit the maximum speed of light commercial road vehicles, in order to decrease energy consumption, to enhance road safety and to ensure a level playing field.

161 See e.g. Ecodriven at http://ec.europa.eu/energy/intelligent/projects/steer_en.htm.

162 Directive 2006/126/EC of 20 December 2006 on driving licences (Recast), OJ L403 of 30.12.2006.

2.3. Integrated urban mobility

358. Europe's cities are its main engines of economic growth, but the trend to urbanisation is leading to increased congestion, GHG emissions, air pollution, noise, wasteful consumption of energy and avoidable associated costs. Some recent land-use trends have increased urban sprawl, compromising sustainability.

359. A considerable part of EU policy and legislation relevant to transport applies to metropolitan as well as to other areas. EU legislation on noise and emissions from vehicles and air quality legislation are examples of general legislation having its primary effect in metropolitan areas. Other examples are rules on public procurement and on public service contracts. The refinement and development of EU legislation will also in the future provide an important contribution to achieving transport policy goals in urban and metropolitan areas.

360. Action targeted directly at transport in urban and metropolitan areas is however best defined and implemented at local level: Europe's urban areas are diverse and, while facing more or less the same challenges under different circumstances, they are at different stages of development, have different geographic, topographic and weather characteristics and have different needs. There is a need to better integrate European transport policy with local initiatives, for example within the framework of Cohesion Policy.

361. In recent years, EU policy and legislation respecting the subsidiarity principle and targeting urban mobility have been developed – including a Green Paper and an Action Plan on Urban Mobility[163]. Significant funding has been provided through the Structural and Cohesion Funds[164]. EU-funded initiatives, often supported by the Framework Programmes for research and technological development, have helped to develop and evaluate a wealth of innovative approaches. Direct engagement of local authorities through the Covenant of Mayors has proved to be a successful bottom-up tool to promote sustainable energy, including sustainable transport. The CIVITAS Initiative demonstrated the substantial benefits of networking and mutual learning through an integrated approach. Compatible rules, schemes and technologies facilitate implementation and enforcement. Agreeing standards at EU level enables volume production resulting in lower costs.

2.3.1. A new type of urban mobility

362. The necessary transition from a primarily car based personal mobility in cities to a mobility based on walking and cycling, high quality public transport and less-used and cleaner passenger vehicles is the central strategic challenge for cities in the decades to come. In addition to this, cities need to find solutions for a cleaner and safer delivery of goods and services. These transformations are not only about transport, but are basically a transition to a new way of life in an urban environment.

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163 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Action Plan on Urban Mobility, COM/2009/0490 final

164 For example, the URBACT II programme which supports exchange and learning between cities, also supported transport-related projects.

363. Most cities have been working on elements of this transition for a long time seeking to compromise quality of city life and car traffic. Cities in the Netherlands and Denmark have a long tradition for promoting cycling. London and Stockholm are two well-known examples of cities applying urban road pricing. Cities with existing waterways are experimenting using them for transport of passengers, especially commuting. These differentiated experiences constitute a valuable knowledge pool for European cities in developing long term sustainable city transport.

364. Developing multi-modality in urban passenger transport will help facilitate the transition to a more sustainable transport system. The interfaces and links between urban and interurban transport, including all the information components as reflected in the ITS and Urban Mobility Actions plans, are especially important.

365. In urban freight logistics, research suggests that the present management of terminals and interchanges is often inefficient. New business models are likely to develop. Land planning decisions on the localisation of production and retail activities must be taken jointly with those on transport infrastructure, combining the various facilities whenever appropriate and feasible (e.g. shopping malls, car parks and collective transport terminals). Key questions are how to attract investors and select locations for these facilities, what are the respective roles of the public and the private sector, and what should be the quality indicators for terminals and interchanges.

366. An important prerequisite for using public transport is to be aware of the services offered and the terms and conditions. The spread of information and communication technologies interconnecting a substantial part of the European population increases the possibilities for providing the consumer with relevant travel information. Real-time information provided online or at bus and metro stops on the position of vehicles and their arrival times provides vital information for journey planning. Similarly, mobile devices could provide real time information on the cost and speed of reaching a certain destination with different (combination of) modes.

Urban transport governance, Urban Mobility Plans and Mobility Management

367. Achieving integrated and sustainable urban transport is an increasingly complex task which touches many stakeholders and interests. Long delays in planning are often a result of insufficient involvement of relevant actors and stakeholders in the planning process. Competencies for policies which impact transport within the city often lie outside the local government. A greater coordination of all authorities having an influence on the transport system is highly desirable, possibly bringing together the responsibilities for land-use and transport planning, public transport, road use and transport infrastructure. Equally desirable is an extension of the co-ordination of such authorities beyond the strict city borders, so to cover entire metropolitan areas or regional transport systems and their connection to trans-regional networks.

368. It is clear that significant changes in urban mobility require comprehensive and integrated actions that bring together land-use planning, road use and parking, transport pricing, infrastructure development, public transport policy and much more. This has to be accompanied by sound financial planning, securing sources of

funding and appropriate financing mechanisms. Auditing urban transport systems by local authorities helps evaluate the performance of passenger and freight transport, and identify the main bottlenecks. *Urban Mobility Plans* are meant to do all this, providing a coherent framework for different actions. They also represent a primary way to promote walking, cycling and public transport.

369. The preparation of Urban Mobility Plans also offers an opportunity for dialogue with the citizens, for reflection on long term needs and for setting goals. There are many cities that establish Urban Mobility Plans, but unfortunately this is not yet the norm and this practice needs to be further encouraged.

370. It is not for the Commission to develop such Urban Mobility Plans which are to be elaborated under local, regional and national institutional arrangements. The Commission can nevertheless encourage the necessary coordination by providing improved forums for discussion, continuing to facilitate the exchange of best practices, so as to engage cities in common objectives. An effective governance structure and an overall strategic Urban Mobility Plan should however be developed for projects being submitted to EU funding, under the new principles promoted by the 5th Cohesion Report on regional policy instruments.

371. Based on the ongoing work under the research project CIVITAS and in the context of the Covenant of Mayors, consideration should also be given to the possibility of establishing a European framework for such Urban Mobility Plans. This could set out a planning process and typology of possible measures stemming from European best practice to achieve sustainable urban transport and include monitoring of a select number of common targets. Such a European framework would become mandatory over time for European cities and support efforts of local and regional authorities to promote more effective urban transport policies. Clearly, the content and mix of measures to be set out in individual Mobility Plans would be entirely for local and regional authorities to decide.

372. Cities and urban areas play a crucial role in the transformation towards a low carbon society. They will have to adapt their infrastructure to reduce carbon emissions while continuing to ensure citizens' well-being and economic performance. In particular, cities and urban areas will have to reduce the energy consumption and adapt energy networks. The Commission intends to launch a Smart Cities Initiative during 2011. This cross-sectoral partnership will fully integrate urban mobility issues. It will reinforce the search for new solutions which can serve as examples for other European cities and display a high potential for replication.

373. *Mobility Management* is a narrower concept to manage the demand for car use by changing attitudes and travel patterns. At the core of Mobility Management are 'soft' measures like information and communication, organising services and coordinating activities of different partners. These soft measures often help to promote 'hard' measures – for example by encouraging use of new tram lines, bike lanes, park and ride systems, etc. Mobility Management measures (in comparison to hard measures) do not necessarily require large financial investments and often have a high benefit-cost ratio.

374. Mobility Management is not only a responsibility of local authorities. Quite a significant number of companies and other large employers have put in place initiatives to address the traffic generated by their activities and, in particular, the traffic generated by their workers and customers. The magnitude of change brought about by Corporate Mobility Management (CMM) initiatives can be quite large (15-20% reduction in drive-alone travel[165]) and cost-effective. Indeed, these initiatives have the potential to save money for both employers and employees.

31. Urban Mobility Plans

- Establish procedures and financial support mechanisms at European level for preparing Urban Mobility Audits, as well as Urban Mobility Plans, and set up a European Urban Mobility Scoreboard based on common targets. Examine the possibility of a mandatory approach for cities of a certain size, according to national standards based on EU guidelines.
- Link regional development and cohesion funds to cities and regions that have submitted a current, and independently validated Urban Mobility Performance and Sustainability Audit certificate.
- Examine the possibility of a European support framework for a progressive implementation of Urban Mobility Plans in European cities.
- Integrated urban mobility in a possible Smart Cities Innovation Partnership.
- Encourage large employers to develop Corporate/Mobility Management Plans.

Urban pricing and access rules

375. Space is a precious commodity in cities. Charging for the use of infrastructure is an important element in the decision over the allocation of space to different uses and users. Moreover, the scarcity of public funds to meet the challenges of urban transport infrastructure will require the development of innovative financing schemes. Differential charging according to location, time and type of transport can be very effective in optimising capacity, promoting sustainable travel patterns, and stimulating market deployment of clean and efficient technologies.

376. Different forms of urban pricing schemes and of access restrictions will probably become more widespread and this can be confusing to users and even act as a barrier to the free flow of goods and people. An operational and technical framework will likely enhance acceptability, and interoperability standards for tolling equipment would enable large scale production of the equipment and reduce production costs, while avoiding confusion for users.

32. An EU framework for urban road user charging

[165] OECD / International Transport Forum (2010), Effective Transport Policies for Corporate Mobility Management.

- Develop a validated framework for urban road user charging and access restriction schemes and their applications, including a legal and validated operational and technical framework covering vehicle and infrastructure applications.

Urban logistics

377. Inefficient urban logistic can result from urban circulation of heavy goods vehicles (HGV) used for long-distance freight, concentration of deliveries at few selected hours of the day and sharing of infrastructure by local and long distance traffic. Technical and organisational innovation can considerably improve the situation.

378. The design of HGV is not adapted to the requirements of the urban environment. While the loading factors of big trucks are optimal for consolidated interurban flows, they are too high for the needs of typical end customers. The use of these vehicles for final deliveries implies a lot of empty runs and the large dimensions and engines accentuate the problems of congestion and emissions.

379. The transhipment of cargo from long-distance trucks to cleaner urban trucks and vans performed in logistics centres located outside the cities has the potential to solve the problems listed above. Such consolidation centres already exist in some branches of the economy, such as manufacturing or retail trade, but the practice could be extended to other sectors to optimise the functioning of logistics systems; some pilot projects support this conclusion with very encouraging results[166]. Consolidation centres could also develop as multimodal hubs, facilitating the integration of different transport modes. ITS will contribute strongly to assuring quality and reliability of delivery services whilst optimising capacity and reducing trips.

380. More generally, the use of alternative vehicles for local distribution would have various advantages, including silent operation, which could lift objections to night deliveries and allow a more balanced use of the network throughout the day[167].

381. Another element not to be overlooked is the potential of inland waterways to reduce the traffic related to last-mile deliveries. Inland ports are typically located very close to the city centre and therefore close to the final destination of the transported goods. Inland waterways are most effective for bulk transport, which makes them particularly well suited for the evacuation of waste or the transport of construction materials, two products relevant for urban logistics. However, in many cities inland ports are blocked in their development by expanding housing and leisure areas. It is

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166 A report on the two pilot projects for construction materials in the London area (one for Heathrow airport and one for the city of London) indicated savings amounting to 2% of the overall construction costs, greatly reduced loading/unloading times, reliability increase to nearly 100%, a drop in the number of trucks by up to 68% and in CO2 emissions by up to 75%, considerably lower material waste and higher productivity. *Construction Logistics Consolidation Centres. An examination of new supply chain techniques – managing and handling construction materials*, October 2004. Transport for London, *London Construction Consolidation Centre*, Interim Report, May 2007.

167 A pilot project in the Netherland on night deliveries, with silent certified equipment (trucks, forklifts) and specially trained drivers, led to considerable time and cost savings – respectively one hour over a 35 km distance and € 35.000 per truck/year – with very high social acceptability. www.piek_international.com.

therefore important that cities reserve sufficient space along the river banks for logistics operations to allow the present and future expansion of inland ports.

382. There are many examples of innovative vehicles and transport modes being used in urban freight. Local train and subway networks can be used during the night when passenger traffic is low[168]. Electric bicycles and tricycles can access with light loads areas normally restricted to pedestrians[169]. These modes are unlikely to become true alternatives to trucks for mainstream urban logistics, but can efficiently complement them for certain specific operations.

383. Traffic re-organisation through adaptation of the physical and intelligent infrastructure can also be source of optimisation. Multi-use lanes – used for traffic, parking or loading/unloading depending on the time of the day – have proven to enhance the capacity of the streets[170]. More sophisticated tools, such as online booking of time slots for cargo unloading, are currently being tested and could prove efficient.

384. Finally, many companies from the express delivery industry are investing in the deployment of automatic collection points, from which recipients can retrieve their parcels at their best convenience rather than at a fixed time. The solution could be extended to other sectors, such as internet shopping, to reduce unnecessary trips and time loss.

385. The innovative solutions described above have the potential to considerably enhance the efficiency of urban logistics, but their dissemination and market uptake take place at a deceivingly slow speed. A major reason for this lies with the conflict of interest between different stakeholders, and in particular between logistics operators and residents. The public authorities have a clear role to balance the different needs at stake and, when needed, to compensate residents for losses they incur following the necessary expansion of logistics-related activities.

33. A strategy for near- 'zero-emission urban logistics' 2030

- Produce best practice guidelines to better monitor and manage urban freight flows (e.g. consolidation centres, size of vehicles in old centres, regulatory limitations, delivery windows, unused potential of transport by river).
- Define a strategy for moving towards 'zero-emission urban logistics', bringing together aspects of land planning, rail and river access, business practices and information, charging and vehicle technology standards.
- Promote joint public procurement for low emission vehicles in commercial fleets (delivery vans, taxis, buses…).

168 For example, in Paris a RER regional line is used for freight transport by the supermarket chain Monoprix: http://cata-online.fr/monoprix/rapport_dd/.

169 Freight cycles are used for deliveries of loads of up to 158 kg in seven French and two other European cities. See: http://www.lapetitereine.com/fr/index.php.

170 Such solutions have notably been put in place in Spain in Barcelona and Bilbao.

3. MODERN INFRASTRUCTURE AND SMART FUNDING

3.1. Transport infrastructure: territorial cohesion and economic growth

386. Transport infrastructure is a prerequisite for the mobility of people and goods and the competitiveness and territorial cohesion of the European Union. The EU is endowed with a dense transport network[171], but overall the resources to maintain and upgrade it are declining.

387. Moreover, a considerable disparity in the quality and availability of infrastructure persists within the EU. The infrastructure endowment gap is most evident in the meagre 4,800 km of motorways in the Member Sates which joined the EU in 2004 and 2007. These new Member States do not have high speed rail lines and – more importantly – their conventional railway lines are often in poor condition. This gap needs to be closed and an infrastructure of high and uniform quality should span the entire EU.

388. Competitiveness, economic growth and prosperity rely on efficient transport infrastructure. Several studies have analysed the link between infrastructure and economic growth. The majority of these have shown positive impacts of infrastructure investments on GDP, despite significant variations between countries[172]. Moreover, there are indications that particularly low endowments can inhibit economic growth[173].

389. Infrastructure shapes mobility. The efforts towards a more sustainable transport system need to include a reflection on the required characteristics of the network and must foresee adequate investments. Not only cleaner fuels need the support of dedicated infrastructure, but, as discussed in Section 3 above, new vehicles cannot be expected to be the only solution for the reduction of transport emissions, nor would they address the problem of congestion in large parts of the network. A network that supports more efficient operations and a greater use of more sustainable modes is also needed.

390. The challenge is thus to improve the existing network and render it capable of connecting all regions of Europe in a way that is efficient in economic and in energy terms. This can be achieved by creating a backbone network of selected corridors that carry large volumes of traffic with high efficiency and low emissions, thanks to the consolidation of large volumes, the extensive use of more efficient modes in multimodal combinations and the wide application of advanced technologies and low-carbon fuels. Within this backbone or 'core network', widely deployed information technology tools would optimise procedures (e-Freight) and traffic flows.

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171 Around 5 million km of paved roads, more than 66,000 km of which are motorways; more than 210,000 km of rail lines, slightly more than half of which is electrified, including around 6,000 km of high-speed rail lines; moreover, around 40,000 km of navigable inland waterways; over 450 commercial airports and around 1,200 sea ports.

172 See COMPETE Annex 6 http://ec.europa.eu/transport/wcm/infrastructure/studies/2006_10_compete.zip for a EU perspective and Aschauer, David Alan (1989). "Is Public Expenditure productive?" Journal of Monetary Economics, 23 (2), March, 177 – 200 for evidence from the USA.

173 5th EU Cohesion Report.

3.1.1. Exploiting the strengths of the individual modes

Better hinterland connections for Short Sea Shipping – Motorways of the seas

391. Indeed, the very long European coastline offers opportunities for a much greater use of **short sea shipping** (notably E-W and W-NE). Seaports should not become the bottlenecks of global supply chains. A continuous improvement of the efficiency and infrastructure capacity of seaports, along with the further improvement of their hinterland connections, is essential to meet user needs. Adequate infrastructure for greener fuels and energy supply for ships in ports will also be needed.

392. A European infrastructure policy for ports should pay particular attention to ensuring the availability of ports well connected to the land transport system along the entire EU coastline. For such an approach to allow over time a more balanced distribution of entry and exit flows into the European transport system, ports would also need to improve further the availability, quality and reliability of their services as developed above in Section 0 above.

Untapped potential in Inland Waterway Transport

393. It is also commonly recognised that **inland waterways** have a lot of spare capacity. The EU waterway network connects the major seaports and many cities and centres of commerce and industry, often along major transport corridors.

394. The efficiency and competitiveness of inland navigation is largely determined by the quality and conditions of the waterway infrastructure, including smaller waterways, where efforts need to focus on the maintenance of the waterways, the upgrading of certain sections to the prevailing standard of the entire waterway link and the extension of the existing network, notably by closing gaps ('missing links')[174]. The investments need increasingly to take into account the possible effects of climate change which are likely to affect the navigability of the waterways.

395. River port infrastructure and multimodal connections are also crucial. The inland waterway network includes around 350 important inland ports, with a wide disparity between the Western and Eastern part of the European Union in equipment, facilities, productivity and management. In many river ports in the Eastern part of the EU, significant investments are needed for transhipment and storage facilities, whereas in the northern range several sea/river ports are confronted with a lack of spare capacity, resulting in long waiting times at terminals.

396. Besides ports' infrastructure, the quality of the connections (road, rail) to the hinterland is crucial. The competitiveness of supply chains involving inland waterway transport often depends on the efficiency of the port operations, since the costs for transhipment, pre- and end-haulage typically add up to more than 50% of

[174] Examples of the latter are the Seine-Scheldt link, and in the longer term the connection between the Rhone and the Moselle/Rhine river systems.

the door-to-door transport costs. Sufficient attention has to be paid to measures improving the interface function of inland ports.

Rail corridors for freight and high speed lines for passengers

397. The EU has a well developed **railway network**, which is slightly longer than in the United States (215.9 versus 203.6 thousand kilometres). However, in the EU, the infrastructure is shared between passengers and freight trains. Since freight trains operate at slower speeds and must give right of way to the faster passenger trains, they typically have long running times and suffer considerable delays in case of traffic disturbances. As a result, the efficiency of European freight transport by rail is much lower than in North America, where most rail lines are freight dedicated. According to some estimates, while the costs per tonne/km in the EU amount to 8 cents, they are close to 1 cent in the US[175].

398. Such a huge difference in operating costs advocates the creation of a freight-dedicated network in Europe or at least of corridors where rail freight would be given sufficient priority to become competitive. This is the aim of Regulation 913/2010 concerning the establishment of a European rail network for competitive freight, which includes the definition of nine initial rail freight corridors, the establishment of 'one stop shops' to request capacity and the setting of priority rules for freight and passenger trains.

399. The Regulation also foresees the implementation of infrastructure standards and coordinated investments at corridor level. Harmonisation of maximum weights and lengths of trains at a high level – for example 1 km – for selected corridors, or functional sections of the corridors, would have positive implications for the efficiency of rail transport[176]. Demonstration projects and tests with longer and heavier trains are already taking place. Coordination of investments is also important: in the case of the deployment of ERTMS along a corridor crossing several countries, as a longer migration period by one party would impose the costs of dual equipment (ERTMS & national systems) on all others. Finally, long distance and freight traffic should be as much as possible isolated from interference with local commuting traffic: rail bypasses of city nodes should also be in the priority list for investments.

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175 COMPETE Final Report. Annex 1: Analysis of operating costs in the EU and the US, Version 2, 14.7.2006, p.57.

176 Current infrastructure is not always capable of accommodating such longer trains; the length of sidings and yard tracks is a critical issue. The maximum axle load on major corridors typically ranges between 20 and 22.5 tonnes per axle, and the possibility of harmonising it at a higher level should be considered. Larger loading gauges would contribute to higher transport efficiency especially for voluminous cargo and certain types of intermodal loading units. Positive experience with a combination of enlarged loading gauges and higher axle-loads has been made in Sweden with transport efficiency – in terms of payload per train-meter – up to 50% higher than even that of North-American double-stack container trains. Wider loading gauges would also enable wider, more efficient passenger trains.

400. The impact assessment[177] on the Regulation on rail freight corridors demonstrated that investments of € 3.2 billion on the analysed portion of the network would yield an internal rate of return of 18.7%.

401. As regards passenger rail, the development of high speed lines is the key to absorb some of the medium-distance travel currently performed by aviation and private cars. In the urban context, investments in rail, light rail, underground and trams will be necessary to reduce the use of private cars.

Information technology to optimise road transport

402. With respect to the rail and waterborne modes, **road transport** is less resource efficient due to its physical characteristics such as surface friction, aerodynamics and engine efficiency. It is also responsible for higher levels of air pollution, congestion and accidents. However, road transport has the important advantages of speed, flexibility and reliability and is the only mode capable of door-to-door deliveries.

403. Road will presumably remain the main mode for short- and medium-range (below 300 km) freight of non-bulk materials and – while the aim is to reduce drastically its role in the longer distances – it will still need to absorb large volumes of traffic until the infrastructure is fully adapted to a high share of multimodal freight. Similar considerations apply to passenger traffic on intermediate distances. Accordingly, infrastructure policy for road transport needs to focus on enabling the use of cleaner fuels and in deploying the ICT tools to optimise traffic flows, avoid accidents and allow fuel-savings techniques[178]. Examples of such ICT applications for road include information and reservation systems for safe and secure parking areas for trucks.

Modernising the Single European Sky infrastructure

404. In the future, the aviation sector will have to cope with increased demand for air travel while at the same time reducing its environmental footprint. The implementation of the SES is crucial for addressing these challenges. The extended and revised SES legislation adopted in 2009[179] has led to the establishment of a binding performance scheme with targets agreed at EU level for capacity, cost-efficiency and environmental performance. The performance scheme will drive the optimisation of routes and flights structure leading to a reduction in the current fragmentation of the European Air Traffic Management system and improving the overall performance of the European aviation network. The SES *acquis* has been described in Section 0 above.

405. The SES cannot be fully achieved, nor the future performance requirements of the network delivered, without the synchronised deployment of a harmonised and

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177 SEC (2008) 3028 of 11.12.2008.

178 Studies suggest that platooning of trucks using electronic systems to link and to transmit information between them can lead to fuel savings in the order of 10-25%. Shladover, S.E. *Energy Savings by Automated Driving,* in *ITS World Congress*. 2007. Beijing.

179 Regulations (EC) 549/2004, 550/2004, 551/2004, 552/2004, OJ L96, 31.03.2004, p.1-26, as amended by Regulation (EC) 1070/2009 of 21.10.2009, OJ L300, 14.11.2009, p. 34.

modernised ATM infrastructure based on new technologies and procedures developed and validated in the SESAR Programme. The size of the capital expenditure for the deployment of SESAR is estimated at 30 bn EUR[180] over the timeframe 2008-2025. The funding and financing of the new ATM infrastructure is an issue for many stakeholders in the current economic context. It is therefore important to establish appropriate financing and funding mechanisms that facilitate investments that enable to pool and manage public and private funds for deploying SES technologies and procedures. Failing to establish such mechanisms, in due time, would lead to non-synchronised deployment, which would hinder the performance of the entire network and compromise expected benefits. There is also the risk of losing ground with competing ATM modernisation initiatives, such as the USA's NextGen programme.

406. The *Deployment strategy* should promote favourable conditions for stakeholders and private investors by reducing deployment risks. This strategy consists in implementing all system, procedural, regulatory and human enablers supporting the SESAR operational concept. It will require the joint efforts of stakeholders: EU institutions, Member States, civil/military service providers/users, airports, equipment/aircraft manufacturers, ATM staff and pilots. Defining an appropriate governance based on SES instruments and that ensures coordination and synchronisation of the deployment across the stakeholders and between airborne, ground and space segments is considered as a main priority as well as the biggest challenge for preparing the deployment of SES technologies and procedures.

3.1.2. TEN-T policy review: from individual projects to an integrated European network

407. Transport infrastructures have traditionally been developed by EU Member States. However, with decision 1692/96/EC of the EP and the Council[181] the EU adopted guidelines for the development of the trans-European transport network (TEN-T) in support of Community objectives, such as facilitating the functioning of the Internal Market and strengthening economic and social cohesion.

408. The Guidelines for the development of the TEN-T as currently in force, include modal networks for road, rail, inland waterways, ports and airports as well as provisions for relevant traffic management systems. 30 Priority Projects of common interest – which aim at removing bottlenecks and completing missing links along major trans-European routes – overlay this network and have been the highest priority for Community action for many years.

409. TEN-T planning and implementation has so far not been driven sufficiently by a coherent European design. National infrastructure planning remains to a large extent disconnected from planning at EU level, and is mainly done at a modal level rather than in an integrated way across countries and modes of transport. The lack of international cooperation and coordination typically produced a number of inefficiencies: lack of joint traffic forecasts leading to differing investment plans; disconnected or even contradictory timelines; lack of joint investment calculation

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180 European Air Traffic Management Master Plan, Edition 1 – 30 March 2009, p. 84. http://www.sesarju.eu/sites/default/files/documents/reports/European_ATM_Master_Plan.pdf

181 As recast with decision 661/2010.

and joint financial structures; incompatible technical characteristics; inadequate joint management of cross-border infrastructure projects.

410. Moreover, national and European infrastructure projects have largely focused on developing individual priority projects rather than on creating a network. Infrastructure planning and assessment of individual projects failed to give an accurate representation of wider effects of infrastructure projects and of how these projects contribute to the overall infrastructure network[182]. Also another main weakness of the existing priorities is that it does not actively promote synergies between policy and infrastructure measures.

411. A corridor approach to infrastructure investment, overcoming cross-border difficulties, appears promising and in line with the establishment of an efficient core network. Good progress on two corridors has been achieved in the framework of the multimodal Brenner Corridor Platform and the ERTMS – Rail Freight Corridor Rotterdam-Genova. Both structures have developed along important rail freight corridors, bringing together stakeholders from Member States, infrastructure managers and transport operators that allowed analysing the traffic flows beyond the pure viewpoint of infrastructure development.

Planning and implementing the new TEN-T Core network

412. The TEN-T planning framework will be based an a dual layer planning approach, consisting of a comprehensive network as the basic layer and a core network, overlaying the latter and representing the strategically most important part of the trans-European transport network, integrating the Eastern and Western part of the European Union and shaping the Single European transport area. It should also ensure adequate transport connections to the world markets, in particular supporting the progressive integration of neighbouring countries into the European transport system (Cf. section 4.4 below).

413. The comprehensive network would, essentially, result from an updating and adjustment of the current TEN-T and directly reflect the relevant existing and planned infrastructure in Member States. The core network, on the other hand, would be drawn up on the basis of a European planning methodology.

414. The core network will represent the backbone of a European integrated transport system. It will ensure efficient multi-modal links between EU capitals, entry points into the European transport systems and economic centres by focussing on the completion of missing links, mainly cross-border sections and bottlenecks/bypasses, and by making extensive use of already existing infrastructure and on upgrading and expanding this where required.

415. The core network shall be the result of a genuine European planning approach and provide for a coherent and transparent identification of projects of common interest that contribute to accomplishing this network. These projects are of different type, ranging from the building of new and the upgrading of existing rail, road, inland

[182] See Commission Staff Working Document "The new Trans-European Transport Network Policy – Planning and implementation issues" (SEC (2011) 101 of 19.1.2011) for an analysis of successes and shortcomings of the current TEN-T framework.

waterway or terminal infrastructure to intelligent and innovative solutions which boost the efficient infrastructure use within and across modes and the shift to low carbon transport.

416. While representing the long term infrastructure ambition for Europe, the Core Network should also be set up to make available in the short and medium term the infrastructure needed to serve the internal market, by targeting key bottlenecks hampering the smooth functioning of the European transport market. In most cases the Core network should therefore be formed of existing infrastructure. However, missing geographical links, mostly cross-border between national networks and bottlenecks and new infrastructure in the new Member States, as well as missing modal links connecting modes of transport, should equally be a priority under the Core Network.

417. In the medium term, the priority would therefore not be to make available high capacity links on the entire core network but to adjust the infrastructure capacity to real traffic needs. In that context, increased capacity stemming from modal integration as well as from the intelligent use of the infrastructure through deployment of traffic management systems, will also limit the need to build new and costly infrastructure to the above priorities.

418. A transport system that is articulated around a multimodal backbone and that relies on optimal modal choices to enhance its efficiency must benefit from efficient multimodal terminals placed strategically along the network. The objective is to minimise the number and 'friction' of transhipment operations. This 'friction' is particularly relevant in freight transport, where cargo requires external services in the form of administration and handling, but is also present in passenger transport, where interchanges may hamper the overall feeling of comfort and security of a journey. Multimodal terminals for freight are required at sea and river ports and in correspondence to logistic consolidation centres at the outskirts of cities. Multimodal stations must be developed for passenger transport in the urban context, while better rail/airport connections must be devised for long distance travel.

419. The availability of reliable and updated information regarding nodes and links is essential for an efficient integration of transport modes. The e-mobility initiative will play an important role in this regard[183]. Indeed, Information and Communication Technology (ICT) solutions have a large potential for optimising the use of existing infrastructure with relatively low levels of investment and environmental impact compared to the building of new infrastructure. They will form an integral part of the future TEN-T, and their further development both within and across modes shall be boosted. Their uptake should be encouraged by requiring minimum deployment rules on TEN-T infrastructure.

420. Galileo, the European Global Navigation Satellite System, once operational will be able to support existing ITS solutions and to become the basis for the development of improved and more integrated applications.

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[183] Cf. COM(2007) 607 – Green transport corridors.

421. One way for transport infrastructure to contribute to low carbon transport is the provision of relevant recharging and refuelling facilities for innovative vehicle technologies according to established standards. The 'core network' should test best practices and technologies with a view to minimising the environmental impact of transport.

422. The greening of infrastructure is an important parameter to consider in the maintenance and development of infrastructure. Infrastructure should be planned and constructed in a way to minimise land fragmentation and interference with environmentally sensitive areas, for example by including eco-ducts or eco-bridges, multifunctional zones and 'green' urban elements[184]. Attention should also be paid to construction materials, which can enhance durability, reduce maintenance requirements, and improve safety and CO_2 performance.

423. Moreover, new projects and infrastructure upgrades will need to be made resilient to foreseen negative impact of climate change such as rising sea level and more extreme weather including floods, droughts and more frequent storms. They will also need to reflect EU legislation on road safety and security[185].

424. Decisions on EU funding or co-funding of transport infrastructure projects should take all the above elements into account.

34. A core network of strategic European infrastructure – A European Mobility Network

- Define in new TEN-guidelines a core network of strategic European infrastructure integrating the eastern and western part of the European Union and shaping the Single European Transport Area. Foresee appropriate connections with neighbouring countries.
- Concentrate European action on the components of the TEN-T network with the highest European added value (cross border missing links, intermodal connecting points and key bottlenecks).
- Deploy large scale intelligent and interoperable technologies (SESAR, ERTMS, RIS, ITS, etc.) to optimise the capacity and the use of infrastructure.
- Ensure that EU-funded transport infrastructure takes into account energy efficiency needs and climate change challenges (climate resilience of the overall infrastructure, refuelling/recharging stations for clean vehicles, choice of construction materials…).

A corridor approach to improve governance…

425. The core network should have a prescriptive nature, i.e. Member States directly involved in projects – supported by a menu of instruments at Union level – shall make binding commitments to implement these projects within the agreed time frame. The strength of the commitment is vital for investors to maximise predictability and certainty, which will assist in minimising costs.

184 'Green Infrastructure' http://ec.europa.eu/environment/nature/info/pubs/docs/greeninfrastructure.pdf

185 Directive 2008/96/EC on road infrastructure safety management and Directive 2004/54/EC on minimum requirements for tunnels in the Trans-European Road Network.

426. To a large extent, core network infrastructure exists already, but its performance needs to be improved. A 'corridor approach' will be adopted as a way to implement effectively core network projects: a number of corridors, drawing on the core network, will be identified and subject to development in line with evolving capacity needs.

427. Infrastructure improvements and transport policy measures should closely interact within those corridors, and their realisation should be implemented through appropriate corridor structures. These structures could bring together the Commission, Member States, the regions, the local authorities, but also the infrastructure managers, transport operators, and of course the financiers and, when appropriate, neighbouring countries. They could also facilitate the creation of Special Purpose Vehicles, anchors of any consortium-based financing arrangement, which could take loans or issue project bonds to finance partly or fully the cost of construction.

428. Corridors, for which corridor structures are established, should be set-up within two years of the entry into force of the future Guidelines and would be determined starting from important entry points into the network, integrating the main cross-border sections and physical bottlenecks still to be realised. Corresponding to the main trans-national traffic flows, they could be expected to be partially based upon the current TEN-T Priority Projects, the ERTMS corridors and the rail freight corridors resulting from Regulation 913/2010, but should evolve to include multimodal corridors, integrating operators and, beyond the pure infrastructure, allow for the deployment of transport services along the corridor.

429. Corridors could be set up under the aegis of a European Coordinator with a secretariat supported by Commission services but also drawing on Member State resources. The Coordinator would be responsible for overall coordination issues following up on the implementation of the corridor in question, reporting to the Commission, ensuring transparency and accountability.

430. A Multi-annual corridor Development plan would identify, within a binding timetable, major needed investments and smaller scale short term improvements; it should also address interoperability and operational bottlenecks. It would allow coordination of EU and national infrastructure policies in the transport sector and even synchronisation of EU and national funding. Consideration should be given to the adoption of such Multi-annual corridor development plans in form of a Union decision. As such, it would constitute a contract where both the Union and Member States would commit themselves to the improvement of the corridor. Such Development plans would ensure long term availability of public funding, needed in most transport infrastructure projects, and would also facilitate innovative funding schemes to be deployed on the corridor, backed by transport revenues generated from transport operations on the corridor. They would foster at project level the synergies and added value sought by the Commission between EU funds and national sources of funding. They would also be a basis for public funding to facilitate project financing, including through appropriate legal structures. Finally, they would also facilitate the governance issues linked to revenue collection.

…and to support pilot projects for innovative and clean transport services

431. Many policy developments and measures targeted at multimodal and innovative freight transport solution would be implemented within such corridors. Regulation 923/2009 reviews the rules governing the Marco Polo programme to make it more effective, but further review is needed to support multimodality in particular within the Core network corridors.

432. One of the obstacles to the development of efficient and environmentally friendly multimodal transport is the lack of knowledge of potential transport options. For shippers and forwarders, the complexity of multimodal transport requires either a higher management and administrative effort or a 'leap of trust' by outsourcing transport services to third-party logistics providers. Promoting such new business practices would appear particularly promising within a corridor.

433. To better exploit the potential of rail transport, both single wagonload traffic and intermodal traffic need to be developed in terms of efficiency, reliability and accessibility. For Single Wagonload traffic special attention should be given to the 'last-mile' (industrial sidings and public rail freight terminals), where a policy promoting the (re-)establishment and modernisation of facilities, accompanied by a regulative framework ensuring open effective and non-discriminatory access to last mile and to train formation facilities is important to stimulate the use of rail transport. In addition, the use of automatic coupling systems would considerably improve the efficiency and flexibility of rail operations on a corridor.

434. Furthermore, a programme to promote the use of available best practices and innovative technologies for saving fuel and emissions should be launched. The spread of innovation is currently inhibited by the highly fragmented structure of the freight industry, particularly across the tail of small operators. A carefully designed programme combining awareness raising campaigns, grants and instruments to facilitate access to credit could correct this market failure. Through a "Clean Freight Partnership" involving representatives of the sector and authorities, the programme would first certify the potential CO_2 savings of individual measures and launch information campaigns in promotion offices across the TEN-T network. In a second step, it would support the acquisition of certified technologies for reducing vehicle emissions, the implementation of fleet and advanced logistics management systems as well as training in eco-driving.

435. Finally, worth mentioning is the sharp increase of the transport volumes in cross-Alpine freight transport which inevitably led to problems as regards environment, congestion and safety[186]. As a result, people living in the affected areas are less willing to tolerate the growth of traffic and its negative effects and are putting pressure on authorities to find a sustainable solution. While large-scale investments into alternative rail infrastructure to carry large quantities of goods have been initiated, discussions on new ways of managing heavy goods vehicle traffic have been launched in several Member States and also in Switzerland, with which the EU has an agreement on land transport. However, it is in the Union's interest to promote a concerted approach safeguarding the free movement of goods and

[186] Land transport has more than doubled during the past 20 years.

preventing isolated national initiatives to the detriment of a smooth functioning of the whole European transport system. Building on the existing Alpine Traffic Observatory, the Commission will therefore promote a coordinated reflection on new solutions to manage the freight traffic across the Alps in a more sustainable way, which if successful could be replicated in other geographical areas with similar problems.

35. Multimodal freight corridors for sustainable transport networks

- Create in the context of the 'core network' multimodal freight corridor structures to synchronise investments and infrastructure works and support efficient, innovative and multimodal transport services, including rail services over medium and long distances.
- Support multimodal transport and single wagon load business, stimulate the integration of inland waterways into the transport system and promote eco-innovation in freight transport. Support the deployment of new vehicles and vessels and retrofitting.

3.1.3. Ex-ante project appraisal

436. The method of selecting projects eligible for EU funding will have to evolve towards one which puts greater emphasis on European added value and on the contribution to the effectiveness of the overall EU transport system, but also on the compatibility with other EU policy goals, such as reducing greenhouse gas emissions and loss of biodiversity.

437. Besides demonstrating their EU added value, projects should also be based on 'services rendered' to the users and be capable of generating sufficient revenue. Infrastructure planning in Europe has had the tendency to be based more on a geographical approach than on the actual service needed by end users. It has often resulted in projects with weak economic viability proving difficult to finance and absorbing large resources – both financial and non-financial.

438. Besides creating the needed certainty for private investors during the project assessment and authorisation phase, conditions must be put in place to allow private investors to make positive business cases for infrastructure projects.

439. In the past, the lack of proper ex-ante appraisals methodology did not allow for projects selection based on socio-economic and environmental criteria. To overcome this shortcoming, the Commission issued a Guide on Cost-Benefit Analysis (CBA) in 2002 (last updated in 2008[187]) to assist Member States and to maximise the contribution of infrastructure investments to the economic and social development of regions and cities. This method is now used by all Member States in the preparation of infrastructure projects to be co-financed by the Commission.

440. The European added value of projects will be defined as the value of spill-over effects to non-investing countries and regions. Cross-border projects typically have high spill-over effects, but lower direct economic effects compared to purely

[187] http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_en.pdf

national projects and therefore, they are likely not implemented without EU support.

441. All projects co-financed by the EU (Cohesion, Agricultural and Fisheries Policies) need to contribute to EU energy efficiency and environmental goals and have to be subject to an Environmental Impact Assessment (EIA) or a Strategic Environmental Assessment (SEA) – depending on their nature. Certainty for investors requires further progress towards establishing a workable and effective framework for the environmental impacts of projects, including aspects that are not presently considered, notably the contribution to climate change and climate resilience.

442. The assessment and the authorisation of projects has to be carried out in an efficient and transparent manner that limits time, cost and uncertainty – factors which usually represent obstacles for private investors to engage in infrastructure investments. Today, for major TEN-T projects, the preparatory phase – starting with the initial design and leading to building permit and contracting of works – may take twice as long as actual construction works. When maturity for construction has been reached, previous appraisals are often questioned on the basis of new elements and parties involved feel not consulted, simply because the procedures took years or even decades.

443. Therefore, procedures for projects of overriding European interest should be streamlined, taking particular care of two aspects: the establishment of reasonable time limits for completing the whole cycle of procedures and continuous communication efforts to that implies a true involvement. This may result in one-stop-shop procedures for Strategic Impact Assessments and Environmental Impact Assessments and a communication framework that is in line with the project implementation. In order to encourage Member States to engage more with private sector and consider implementation of user-pays principles, a screening of TEN-T project proposals to identify those with PPP potential should be included in the ex-ante evaluation process.

36. Ex-ante project evaluation criteria

- Introduce ex-ante project evaluation criteria ensuring that projects duly demonstrate the EU added value or are based on ‘services rendered’ and generate sufficient revenue.

- Streamline procedures for projects of overriding European interest, in order to ensure (i) reasonable time limits for completing the whole cycle of procedures; (ii) a communication framework that is in line with the project implementation; and (iii) integrated planning which takes environmental issues into account in early stages of the planning procedure.

- Introduce PPP-screening to the ex-ante evaluation process to ensure that the option of PPP has been carefully analysed before a request for EU funding is being asked.

3.2. A coherent funding framework

3.2.1. Trends in transport infrastructure financing[188]

444. In the western part of the EU, investments in inland transport infrastructures steadily declined from 1.5% of GDP in 1975 to 1.0% of GDP in 1982 and stayed around that level until 1995. Thereafter the decline continued and reached less than 0.8% in 2008, the lowest recorded level ever. In the Eastern part of the EU, the share of investments remained stagnant at around 1% of GDP until 2002 and then grew sharply to 1.9% of GDP in 2008. However, the overall trend in the EU has been declining.

445. While the western countries of the EU increasingly directed their investment toward rail (share of rail has increased from 29.5% in 1995 to 33.4% in 2008), the eastern EU countries invested heavily in roads, which increased their share of total inland investments from 66% in 1995 to 84.4% in 2005. However, recent years indicate a turn in the trend combined with significant increases in rail investments. Investments in inland waterways remained steadily around 2% of total investments between 1995 and 2008.

446. By comparison, the volume of inland transport infrastructure investment in the US grew by 36% from 1995 to 2001, was then steadily falling until 2007 and has been growing since. The data show 5% growth in 2008 in real terms, driven by the federal economic stimulus programme.

447. The overall declining trend in transport infrastructure financing from government budgets was to some extent offset by an increase in private sector financing, mainly through PPPs. However, the effects of the financial and sovereign debt crisis are constraining government funding and impacting the capability of the private sector to obtain long-term bank loans. The new capital requirements for banks (Basel III) will likely continue to keep the pressure on long-term bank lending.

448. During the financial crisis, the increased lending for transport projects by European Investment Bank (EIB) and other Multilateral Financial Institutions played a crucial role. EIB lending, for example, amounted to € 79.1 billion in 2009, of which € 13.9 billion was lent to projects in the transport TENs and major transport axes, which is about 20% more than in 2008. However, multilateral banks, similarly to commercial ones, face capital constraints and cannot increase their lending forever.

3.2.2. Transport sector financing needs

449. The data on traffic volume and network length show that expenditure across Member States has not kept up with the growth in demand in recent years. In addition, investments have tended to favour new construction over maintenance, resulting in chronic maintenance backlogs in many countries. Road traffic has grown much faster than road capacity in many countries, resulting in congestion and increased costs in terms of travel time and delays.

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188 Based on International Transport Forum data: Trends in the transport sector 1970-2008, OECD/ITF 2010.

450. Transport infrastructure is not yet adequate across the EU and big funding requirements remain. The cost of EU infrastructure development to match the demand for transport has been estimated at over € 1.5 trillion for 2010-2030. The completion of the TEN-T network requires about € 550 billion until 2020 out of which some € 215 billion can be referred to the removal of the main bottlenecks. This does not include additional investment in vehicles, equipment and charging infrastructure which may require an additional trillion to achieve the emission reduction goals for the transport system.

451. To fill this transport infrastructure financing gap, well diversified and deep sources of finance both from public (EU, National and regional governments) and private (financial institutions and corporate) sources are required. Greater private sector engagement through new capital markets models is needed; new pricing mechanisms, such as congestion pricing, for example, should be introduced and the overall funding mechanisms need to be turned more towards the "user pays" principle[189]. In the meantime, public financing should not duplicate unprofitable transport infrastructures. Whilst some regional infrastructure may be necessary for local development, their duplication may only lead to waste of public resources.

3.2.3. A new funding framework for transport infrastructure

452. Although considerable progress has been made with respect to the implementation of TEN-T priority projects, a completion of the planned projects within the agreed timeframe of the TEN-T guidelines seems highly unlikely.

453. The expected delay is partly due to the available TEN-T Programme budget, which is limited in size and providing relatively low co-funding rates for works of maximum 30% for cross-border sections of Priority Projects, maximum 20% for other sections of Priority Projects and maximum 10% for non-Priority Projects. For studies the TEN-T Programme budget does provide up to 50% co-funding for all projects of common interest[190]. The situation is different for the Structural Funds (ERDF and Cohesion Fund), which provide higher amounts and higher rates of project co-funding – (85%) in convergence regions and (50%) in competitiveness regions.

454. Under the current financial perspectives (2007-2013), TEN-T projects are financed mostly by Member States (around 70%), with support from EU instruments: the TEN-T Programme provides € 8 billion (mainly to co-finance preliminary studies due to the higher co-funding rate as explained above), while the European Regional Development Fund (ERDF) and the Cohesion Fund account for € 43 billion (co-financing of the construction/rehabilitation of infrastructure). The EU budget contribution is about 13%[191] and the EIB financing contributes a further 16%[192]. An

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189 In a context of increasing budgetary constraints in most European countries, the needed infrastructure investment would have to be financed by the users themselves. The German Maut – although it applies only to heavy duty vehicles above 12t – allows the collection of between € 4 and 5 billion yearly; in 2010 it covered the cost of all investments in road infrastructure at the level of the federal government.

190 Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007.

191 2% from TEN-T budget, 9% from Cohesion and 2% from the European Regional Development Fund.

integrated funding framework for transport that allows better coordination of the Cohesion and Structural Funds with the transport policy objectives is needed in order to accelerate the implementation of infrastructure projects and increase the EU budget efficiency. In addition, Member States need to ensure that sufficient funding is available to adequately maintain their transport infrastructure and they need to reflect it accordingly in their budgetary planning.

455. Such a transport funding framework has many benefits. Firstly, leveraging the EU funding through better coordination would increase the impact and the potential of achieving the objectives of the TEN-T guidelines, including economic, social and environmental cohesion. It will build on the reflections put forward in the 5th Cohesion report, namely introducing conditionality in order to ensure that a certain number of key TEN-T projects of high EU added value get financed.

456. EU funding of projects is to a large extent already subject to conditionality, as foreseen in Article 13 of Regulation (EC) 680/2007 laying down general rules for the granting of Community financial aid in the field of the trans-European transport and energy networks. The conditionality could, for example, be subject to the compliance of Member States with EU law, to the pooling of funds of EU Member States along corridors and to the progress of Member States towards the planned completion of the TEN-T core network.

457. Secondly, other sources of funding and transport revenues can be considered in the context of this funding framework. These funds could include revenues provided under the Eurovignette directive[193] as well as other schemes for the internalisation of external costs. Adopting as far as possible the 'user pays' principle and allowing private investors to charge the full cost of construction and maintenance would create acceptable revenue streams, which in turn will make infrastructure investments more attractive to private capital.

458. Thirdly, it allows for a coordinated effort on the part of the Commission, the Trans-European transport Executive Agency, and others (EIB and other international financial institutions for example) to help the Member States to develop an adequate project pipeline.

37. A new funding framework for transport infrastructure

- Develop an infrastructure funding framework with sufficient conditionality to provide support for the completion of the TEN-T core network as well as other infrastructure programmes, encompassing the investment strategies of both the TEN-T programmes and the Cohesion and Structural Funds, and considering revenues from transport activities.
- Provide EU support for developing and deploying technologies that improve infrastructure use efficiency and decarbonisation (new road network pricing and tolling systems, ITS and capacity improvement programs).

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192 Overall, EIB has committed to provide at least EUR 75 billion for trans-European transport projects in 2004-2013.

193 Public acceptability of charging schemes would be higher in cases where revenues from transport, or at least part thereof, are earmarked to infrastructure projects.

- Link TEN-T funding to progress towards the completion of the TEN-T core network and on the pooling of national resources along corridors.

3.2.4. Private sector engagements

459. With the pressures on public sector budget resources set to continue, unlocking the potential of private finances has become even more urgent. New financial instruments that can increase the leverage of the public sector budget support should be developed. The project bonds initiative, which can support the financing of Private Public Partnerships (PPP) on a bigger scale, is an example of the type of financial instrument that addresses this issue.

460. In many Member States, PPPs are established as valuable additional options for transport infrastructure investments. The Commission has taken a more active role in promoting PPPs[194] and also the Monti report of April 2010[195] considered PPPs as a viable solution to the lack of resources for important EU infrastructure investments. Nevertheless, there are many Member States who lack the capacity and legal framework to enable a systematic approach to PPP screening and procurement. The feasibility studies necessary to determine the value for money and to manage the procurement and contract management of a PPP can be daunting. Further EU support, both financial and non-financial, could come from a coordination framework involving Commission services, including the TEN-T EA, to assist in both the screening of projects for PPP potential and PPP procurement procedures.

461. PPPs for the transport sector can be further promoted in the context of the European PPP Expertise Centre (EPEC) established in September 2008 as a joint Commission and EIB initiative. EPEC responds to public sector needs by ensuring collaboration between the competent national "PPP task forces" and promotes best practices to encourage the development of PPPs.

462. Furthermore, the EIB and the Commission have jointly launched two dedicated facilities:

– First, the Loan Guarantee Instrument for TEN-T Projects (LGTT), which is a EUR 1 billion instrument supporting PPP projects in cases of traffic revenue shortfalls. To date, the LGTT has been used in 4 PPP arrangement and 17 projects are in the pipeline.

– Second, in 2010, the Commission took a stake in the Marguerite Fund, which makes equity investments in transport and energy infrastructure projects. The Fund will operate under market conditions and has a target size of EUR 1.5 billion. About a third of its equity and quasi-equity investments are expected to be invested in companies that own or operate transport infrastructure.

463. No viable capital market solution has emerged to replace the wrapped bond market. To address the gaps in debt financing for large infrastructure projects, primarily

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194 Communication- COM (2009)615 of 19 November 2009.

195 http://ec.europa.eu/commission_2010-2014/president/news/press-releases/pdf/20100510_1_en.pdf

financed through PPPs, and revive the infrastructure bond market, the Commission, in cooperation with international financial institutions, can play an important role in facilitating the issuance of project bonds by project companies.

464. The EU project bond initiative can help infrastructure project promoters enhance the credit quality of their senior debt, thereby providing access to the institutional bond market as an alternative to the bank loan market, which results in more competitive pricing for the project financing. The Commission's role will be to absorb a capped amount of risk in a project in order to enhance the credit quality of the whole project.

465. Transport project bonds could be an interesting long term investment opportunity for institutional investors such as insurance companies or pension funds. The EU project bond initiative could also be considered in designing the financing mechanisms for large pan-European programs, such as the Single European Sky Air Traffic Management Research (SESAR) project; following the establishment of a self funding, not-for-profit entity that is initially capitalized by proportional contributions from stakeholders.

38. Private sector engagement

- Establish an enabling framework for the development of PPPs: (i) introduce a formal screening of TEN-T projects to identify those with PPP potential, (ii) create a standardized and predictable PPP procurement process for TEN-T projects over time; and (iii) revise TEN-T regulations accordingly so as to accommodate the PPP procurement process and payment mechanisms.

- In the context of the cooperation framework established between the Commission services and EPEC, encourage MS to use more PPPs, while acknowledging that not all projects are suitable for this mechanism, and provide relevant expertise to Member States.

- Participate in designing new financing instruments for the transport sector, particularly the EU project bond initiative.

3.3. Getting prices right and avoiding distortions

466. Price signals play a crucial rule in many decisions that have relevant and long-lasting effects on the transport system. The localisation of a factory, the outsourcing of an activity, the organisation of retail distribution, the purchase of a house: all these choices are typically influenced by the availability and cost of transport.

467. It is therefore important that correct and consistent monetary incentives are given to users, operators and investors, so that their decisions on the mode of travel, on the technologies to deploy or on the type of infrastructure to invest in, are also the most desirable from the point of view of society. The internalisation of externalities and the elimination of distortionary subsidies are part of the effort to align market choices with societal concerns for sustainability.

468. Internalisation of external costs is also necessary to establish a level playing field between modes. This is most urgently needed between road, rail and aviation,

which are often in direct competition. Today, the charging principles applied in road, rail and air transport are so different, that they render impossible any comparison between the three modes[196].

469. An additional argument in favour of correct pricing is the increasing difficulty in finding the means for subsidising public transport and investing in transport infrastructure (Cf. para 19). It will be necessary, on the one hand, to find new sources of revenues and, on the other hand, to make sure that, on balance, public forms of transport and clean vehicles remain economically competitive. This could be achieved by a wider application of the polluter-pays and user-pays principle[197] and by the elimination of tax distortions and unjustified subsidies.

470. At the same time, a more visible link between polluter-pays and user-pays charges on the one hand and the use of the proceeds to fund sustainable transport projects on the other would enhance users' acceptability of new charging schemes. To give an example, a fraction of the tolling on international axes could be earmarked to fund the construction of cross-border projects of common European interest.

3.3.1. "Polluter pays" for external costs

471. The internalisation of external costs[198] aims at ensuring that prices incorporate all relevant externalities generated by transport users. It is useful to distinguish two type of externalities which are typically addressed by different instruments:

- The 'global' externality of GHG emissions, that is linked to the use of fossil fuels and that can be addressed via fuel taxes or cap & trade systems;
- The 'local' externalities – air pollution, noise, congestion, accidents – that can be addressed by charges differentiated according to place, time and vehicle characteristics[199].

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196 Rail pays for wear and tear on the entire network, both for freight and passengers. In road, the recovery of infrastructure variable costs is applied on some roads in some Member States, but is not mandatory at EU level. On the other hand, on some road segments construction costs are also recovered (toll motorways), both from lorries and passenger cars, which is generally not the case for railways. Road vehicles pay very high fuel taxes, but the share of infrastructure cost recovery or internalisation in them is not determined. Aviation pays charges for use of infrastructure, but is exempted from taxation. The list of examples could be further prolonged.

197 Cf. footnote 189.

198 "*Transport users have to pay costs that are directly related to the use of their mode of transport (fuel, insurance, etc.). Such costs are considered private in the sense that they are paid directly by the user. However, transport users also generate negative externalities that involve a cost to society, such as delays to other drivers as a result of congestion, health problems caused by noise and air pollution and, in the longer term, the effects of greenhouse gas emissions on climate change, but users do not bear those costs directly (external costs). Such costs are real, even if they do not always have an explicit market value: expenditure on police and infrastructure management, hospital charges, public health spending and loss of quality of life. They are generally borne by the State and its citizens. The sum of the private and external costs of transport gives its social cost. Only a price based on the total social costs generated by the transport user will help give the right price signal and take account of the services used and the consumption of scarce resources*". Extract from the Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions, *Strategy for the internalisation of external costs*, COM(2008) 435 final, page 3. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0435:FIN:EN:PDF

472. In the Communication on the Strategy for the internalisation of external costs[200] and in its Technical Annex[201] the Commission has indicated that the principle for charging externalities and making the 'polluter pay' should be that of marginal social cost pricing. It has also laid down a common methodology to charge all external costs across the whole transport sector.

Internalisation of greenhouse gas emissions

473. It can be considered that fuel taxation as imposed by the Energy Taxation Directive[202] effectively internalises for road transport the cost of climate change linked to GHG emissions. This is because fuel taxes are levied in proportion of fuel use and therefore of GHG emissions. However, under the current framework rules this is not achieved in a consistent manner as minimum rates as well as national rates in force do not set a consistent price signal on the CO_2 content of the energy products used.

474. The Directive on energy taxation fixes minimum levels of excise duties on fuels across the European Union[203]. The current Directive is under revision with a view to determine taxation on the basis of the energy component and of the carbon content rather than of the volume of fuel. The new approach would clearly identify the CO_2 element in fuel taxation and send a more visible price signal to the users. Together with a reduction in the number of exemptions, the new approach to excise duties would eliminate present distortions. Co-benefits in the form of lower local pollution levels can also be expected as optimised energy taxation would act as an incentive for cleaner fuels.

475. In theory, this approach could further develop by replacing the CO_2 component of fuel taxation with the inclusion of land transport in an emissions trading scheme. This needs to be properly assessed and compared with the potential disadvantages of this approach, such as increased implementation costs.

476. Air transport will be included in the EU-ETS from 2012 onwards, which will allow the internalisation of the CO_2 cost[204].

477. In maritime transport, climate change costs are not internalised currently. The EU preferred option is to reach an international agreement within IMO on a global

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199 The accident externality could also be addressed by insurance mechanisms that take into account the owner's profile.

200 See footnote 38.

201 SEC(2008) 2207, accompanying COM(2008) 435.

202 Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:283:0051:0070:EN:PDF.

203 Op.cit, note 20.

204 The key elements are the following: the exchange of rights to emit will begin in 2012; every flight that leaves or arrives at a European airport is covered, including those of foreign companies; in 2012 the emissions cap will be set at 97%, based upon a baseline value (calculated as an average over the period 2004-2006) – this will fall to 95% in 2013 until 2020; 15% of permits will be auctioned, 82% of the allowances will be provided free of charge, and 3% will be allocated to a special reserve for new entrants and fast growing airlines. The revenue generated from auctions should be used in the fight against climate change, to the extent that Member States decide so, in line with the principle of subsidiarity.

market-based instrument such as cap and trade or a bunker fuel levy to avoid introducing distortions in international competition.

Internalisation of local externalities

478. In **road transport**, most of the local externalities can be best internalised through charging the use of road infrastructure.

479. As regard freight transport, road charging is currently governed at the European level by a directive adopted in 1999, the so-called 'Eurovignette Directive' revised in 2006[205]. The Directive concerns only heavy goods vehicles. It fixes the maximum charges that can be applied to vehicles at the level corresponding to the recovery of infrastructure costs – including both construction costs and operation costs[206]. The application of infrastructure charges is optional according to the Directive.

480. The Commission's proposal amending the Directive[207] to enable the internalisation of external costs is expected to be adopted later in 2011. It is a first and transitional step which will help forerunner Member States to gain more practical experience in internalising external costs. It must therefore be rapidly adopted and implemented. However, such a framework provides only a small degree of harmonisation between Member States. While some Member States do not charge at all for the use of roads, 21 Member States implement road charging, all applying different pricing strategies and techniques[208].

481. This 'patchwork' of road charges may impede the smooth functioning of the road freight internal market. This is why the Commission in its 2008 strategy on internalising the transport external costs had already envisaged reviewing it, considering further steps in road charging.

482. The Commission believes that any further steps in the strategy to internalise external costs in road freight transport should primarily move away from such a patchwork and seek to accelerate the convergence of the national road charging policies. These steps will require the gradual phasing in of a mandatory harmonised internalisation system for commercial vehicles on the entire inter-urban network used by trans-European traffic before 2020. Such initiative will put an end to the situation of today when international hauliers have the Eurovignette, 5 national vignettes and 8 different tags and tolling contracts to drive on the European tolled roads. It will build as far as possible on the European Electronic Tolling Service planned to be offered as from 2013 in the framework of the Directive on the

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205 Include ref.

206 Since the 2006 revision, a modulation of the charges is allowed depending on the environmental performance of the vehicle (EURO class) or on the congestion level, but within the limit of infrastructure costs (i.e. the differentiation of charges cannot generate additional revenue).

207 Proposal for a Directive of the European Parliament and of the Council amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures COM(2008)436 final http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0436:FIN:EN:PDF.

208 Ranging from time-based charges (vignettes) to distance-based charges levied through tollbooths or electronic systems using Data Short Range Communication technologies or a combination of satellite positioning and mobile communication technologies.

interoperability of electronic tolling system[209]. With this respect, the Commission will also closely monitor that the promises made by the Directive on the interoperability of electronic tolls will be fulfilled at the date agreed and will take any initiative required if not.

483. For passenger cars, road user charges have remained confined to motorway networks or isolated tolled motorway sections in individual Member States. They have therefore remained outside the scope of European legislation, with the Commission limiting itself to verify that national rules comply with the Treaty principle of non-discrimination. The situation has now changed. Road charging applied to cars is increasingly considered as a way to generate new revenue and influence traffic and travel behaviour, and is likely to be implemented widely in the next decade. Already now, seven – and soon eight – Member States apply time-based charges, i.e. vignettes purchased to obtain the right of using the main road networks for a certain period of time.

484. As regards time-based charges, the experience has revealed that it may be difficult to assess whether such user charges levied on motorists are proportionate and do not discriminate occasional users which are typically tourists from other Member States. This situation creates legal uncertainty for national governments applying them. The Commission will therefore evaluate existing time-based road charging schemes applied to passenger cars and wherever necessary clarify the rules applicable to ensure their compatibility with the EU Treaties.

485. Time based charges should however be seen as a transitional instrument to prepare the introduction of more efficient forms of road charging, like distance based charging schemes or congestion charging. The latter, although more complicated to implement, will be more effective to properly internalise external cost and optimise the road capacities. In order to promote such schemes, the Commission will develop guidelines for the application of internalisation charges to all vehicles, covering the social costs of congestion, local pollution, noise and accidents and provide incentives to Member States who launch pilot projects for the implementation of schemes along such guidelines.

486. The long-term goal would be that the user charges applied to all vehicles and on the whole network to reflect at least the marginal cost of infrastructure (wear and tear), congestion, air and noise pollution. The existing rules to prevent abusive charges would be maintained and the revenue could be used to finance projects which reduce the externalities of transport. The Commission will also encourage appropriate schemes to fully account for the external costs of accidents; it is argued that more accurate insurance schemes (such as pay-as-you-drive) would be the right tool for this purpose.

487. In **railways**, the 2001 Directive on infrastructure charges[210], allows the internalisation of environmental costs on top of the infrastructure costs only on condition that "*such charging is applied at a comparable level to competing modes of transport*", i.e. to road. The Directive also allows charging for scarcity of

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209 Directive 2004/52/EC

210 *Op. cit.*, note 2.

capacity during periods of congestion, but subject to the submission of a plan for solving the capacity problem.

488. Particularly relevant in the case of rail is the noise externality. Noise is one of the most widespread public health threats in industrialised countries, not only a matter of comfort. The contribution of rail transport to noise pollution (with freight trains as the largest source) is considerable, with about 10% of the population exposed to significant noise levels. The European Union has already acted on this issue, adopting measures in the environmental[211] and rail interoperability fields[212]. However, given the long lifetime of rolling stock, it will take several years before overall noise emissions can be reduced significantly if no additional measures addressing the existing fleet are introduced. A retrofit programme, would allow to set up ambitious rail noise legislation and to ban noisy wagons within a decade[213].

489. In 2010, the Commission made a proposal for noise-differentiated infrastructure access charges[214] – an intermediate step which allows some degree of internalisation – but does not incorporate the full cost of the noise externality in the infrastructure access charge.

490. All in all, before 2020, the Commission will develop a common approach for the internalisation of noise and local pollution costs on the whole rail network. Later on, if earlier measures do not reach their objective, it will propose the phasing of a mandatory internalisation system in parallel with similar proposals for the road sector.

491. **In aviation**, there is currently no internalisation of local externalities such as aircraft noise and NOx. Directive 2009/12 defines the airport charge as a levy collected for the benefit of the airport managing body and paid by the airport users for the use of facilities and services, which are exclusively provided by the airport managing body and which are related to landing, take-off, lighting and parking of aircraft, and processing of passengers and freight.

492. The Directive allows airports to 'modulate' their charges as a function of public policy requirements and several Member States already make use of this provision by, for example, modulating charges for flights causing environmental nuisance (time of day, aircraft type). However, the underlying philosophy of the Directive (based on the ICAO approach) is cost-relatedness, i.e. the charges collected should relate to the cost of providing the necessary infrastructure. Similarly, airport charges do not take into account the cost of congestion, being the same regardless of the hour at which a flight is operated (peak or off-peak hour).

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211 Environmental Noise Directive 2002/49/EC providing for noise maps and action plans.

212 TSI Noise, introducing noise limit values for new and renewed vehicles.

213 The impact assessment to the proposal on retrofitting existing wagons (SEC(2008) 2203) demonstrated the very high EU added value of the initiative. The benefits for the affected population, in terms of reduction of externalities, are currently estimated at € 9 billon. The estimated costs of the measure would reach € 700 million and the additional costs in terms of maintenance are estimated at € 400 million. Member States invest each year several hundred millions in 'passive' noise reduction measures.

214 COM(2010) 475 of 17.9.2010.

493. **In maritime transport**, other than the GHG emissions from shipping, covered earlier in this document, externalities from shipping include sulphur and nitrous oxide emissions (SOx, NOx), noise (at sea and at berth), and pollution (e.g diffuse oil pollution, litter and waste water, introduction of alien/invasive species through ballast water).

494. Port charging can be a policy instrument for encouraging the use of less polluting ships as already provided in Directive 2000/59/EC, which foresees that the fees for reception of ship-generated waste may be reduced if a ship can demonstrate that it produces reduced quantities of ship-generated waste[215]. The Commission is in favour of such a sustainable approach[216], which could be fine-tuned to allow clear identification of the nature and scope of external costs internalised.

495. As for local noise and air pollution, the Commission adopted in 2006 a recommendation on the promotion of shore-side electricity for use by ships at berth in EU ports[217]. Shore-side electricity means providing electricity to ships at berth in ports from the national grid instead of ships producing electricity using their own engines. This eliminates local air and noise emissions from ships' engines while at berths in port[218]. While promoting the use of cleaner types of fuels, is also important to follow a path towards 'zero emission/zero waste ships' as described in the EU's Maritime Transport Strategy until 2018.

496. The international character of shipping makes it difficult to internalise the cost of air pollution at sea. The Baltic Sea and the North Sea and English Channel and recently parts of the US and Canadian coastlines (200 miles) were designated as Sulphur Emission Control Areas, where a strictly regulatory approach was adopted through the mandatory use by 2015 of distillate fuels (0.1% mass sulphur content in fuels). Including other fragile areas, such as the Mediterranean or Black Sea, on the list of protected environments will be advocated. Anyhow, a global switch to low sulphur fuel (0.5%) will become progressively mandatory by 2020.

497. A major part of **inland waterways** navigation in Europe takes place on the Rhine and its tributaries where it is subject to the rules of the Mannheim Convention. Article 3 thereof, stating that "*no duty based solely on navigation may be levied on vessels or their cargoes or on rafts navigating on the Rhine or its tributaries*", has been interpreted as forbidding any charges on navigation – including internalisation of external costs. Any revisions of these rules will have to go through international negotiations, as contracting parties to the Convention include Switzerland which is not an EU Member State. Similar problem exists on the Danube – another important trans-European inland waterway, the navigation on which is governed by

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215 Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues – Commission declaration, http://eur-lex.europa.eu/Notice.do?val=236999:cs&lang=en&list=236999:cs,&pos=1&page=1&nbl=1&pgs=10&hwords=&checktexte=checkbox&visu=#texte.

216 Communication from the Commission on a European Ports Policy, COM(2007) 616 final, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0616:FIN:EN:PDF

217 Commission Recommendation 2006/339/EC of 8 May 2006 on the promotion of shore-side electricity for use by ships at berth in Community ports, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:125:0038:0042:EN:PDF.

218 http://ec.europa.eu/environment/air/transport/ships.htm

a Convention in which Croatia, Moldova, Russia, Ukraine and Serbia take part along EU countries. The Commission will develop by 2020 an approach to the internalisation of external costs in IWT; it will later examine mandatory application.

3.3.2. "User pays" for infrastructure costs

498. Since externality charges could be levied in connection with the use of infrastructure, externality charges and charges for recovering or pre-financing the cost of infrastructure are currently addressed by the same pieces of legislation (Eurovignette Directive[219], Railway infrastructure charges Directive[220]).

499. Whereas marginal social cost pricing can apply also to variable costs linked to the use of infrastructure (namely wear and tear), other principles are generally followed in recovering fixed cost of infrastructure (construction costs) that do not depend on the use. The presence of wider socioeconomic benefits and of positive externalities justifies some level of public funding, but the 'user-pays' principle is increasingly adopted, also in view of the need for the consolidation of public budgets.

500. In railways, according to the 2001 Directive on infrastructure charges[221], user charges must be set at the cost that is directly incurred as a result of operating the train service. The charging of mark-ups to obtain full infrastructure costs recovery is allowed but only if it can be demonstrated that "*the market can bear it*". The Directive also allows infrastructure charges modulations to take into account environmental costs. In practice, these charging principles are applied in very different ways by Member States and the actual level of charges continues to differ considerably. This is why the Commission proposal to recast the existing rail market access legislation issued in September 2010[222] contains more detailed provisions clarifying how such principles must be implemented.

501. Airport infrastructure and operating costs are partly recovered via aeronautical revenues (airport charges), non-aeronautical revenues (revenue from shops rentals, car parks, for example) and by airport self-financing means. As a result of the creation of the European aviation market in 1992 and of the introduction of competition at European and international level, European airports are increasingly operated as 'normal' businesses in a competitive environment, although the situation of hundreds of airports in the European Union is very diverse. European legislation, in the form of the airport charges Directive 2009/12, takes into account the diversity of European airports and financing modes and does not seek to impose one single financing system for infrastructure financing and operating costs. The

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219 Directive 1999/62/EC of the European Parliament and the Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures as amended by Directives 2006/38/EC and 2006/103/EC. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1999L0062:20070101:EN:PDF.

220 Directive 2001/14/EC of the European Parliament and the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure as amended by subsequent legislation, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2001L0014:20071204:EN:PDF.

221 *Op. cit.*, note 2.

222 COM(2010)474 of 17 September 2010

Directive is to be transposed by March 2011 and the Commission will report on its implementation by 2013.

502. In maritime transport, the situation regarding infrastructure charges widely differs among Member States depending on the ports system in place, with operational and investment costs being sometimes recovered through port charges, concessions and other earnings; in other cases, construction and dredging costs are directly borne by the state. The Commission insists on the need for more transparency on the different items that compose port dues and on the level of charging, as well as for greater correspondence with relevant costs. It will continue to monitor the level of port charges and their relation to underlying cost. The Commission may consider further actions in this field if market conditions and developments would so require.

503. In the future, transport users are likely to pay for a higher proportion of infrastructure construction costs than it is presently the case. This would contribute to less distorted modal choices and more efficient decisions on organisation and localisation of activities. The recuperation of construction costs should be done over a period that is consistent with the economic life of the facility. Concession schemes might be considered, as well as pre-financing through congestion charges in case of extension works.

3.3.3. Aligning taxation with transport sustainability goals

504. Many branches of transport are treated favourably in terms of taxation, in comparison to the rest of the economy: tax treatment of company cars, VAT exemptions on international sea and air transport, etc. Some of these arrangements can provide conflicting incentives with respect to the efforts to improve the efficiency of the transport system and reduce its external costs. The following proposals have the aim of suggesting possible corrections to achieve greater consistency between the various elements of transport taxation.

Company cars

505. Company cars are defined as passenger light-duty vehicles, which companies lease or own and which employees use for their personal and business travel. They account for roughly 50 percent of all new passenger car sales in the EU[223]. Company car taxation includes, among other elements, the fiscal treatment of benefits in kind to employees, rules on the separation between private and business use and capital allowance regimes for employers. The situation in most Member States is that the taxation regime for company cars artificially promotes the use of such cars beyond merits. In particular, when looking at the tax treatment of the fringe benefits related to the use of company cars at the employee level, it can be observed that these benefits are in most EU member States undertaxed compared to what would be the tax neutral treatment.

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223 Copenhagen Economics, 2009, Company Car Taxation. Subsidies, welfare and environment. http://ec.europa.eu/taxation_customs/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_22_en.pdf

506. The consequences of this distortion are significant. A recent study[224] carried out for the Commission estimated that direct tax revenue losses may approach 0.5% of EU GDP (€ 54 billion) for the 18 EU Member States included in the study. Welfare losses from distortions of consumer choice resulting in an increased car stock, higher car prices and increased fuel use are substantial, perhaps equal to 0.1 to 0.3% of GDP (€ 15 billion to € 35 billion). CO_2 emissions are boosted by incentives to buy more fuel and larger cars, by about 21-43 Mt (equivalent to around 2-5% of road transport emissions).

507. The Commission will assess a possible revision of company car taxation to eliminate distortions and favour the deployment of clean vehicles.

Vehicle taxation

508. At present, there is little EU legislation on passenger car taxation and Member States apply diverse national rules. Vehicle taxation (circulation taxes and registration taxes) is not only linked to the environmental performance of the vehicle, but also to parameters such as value, cylinder capacity, engine power and weight. However, the majority of the Member States has introduced car taxes, during the last years, which are differentiated on the basis of the CO_2 performance of individual passenger cars. This situation may be a source of distortions on the Internal Market, possible double taxation, tax-induced cross-border transfer of cars, administrative procedures, extra costs, time losses and various obstacles for both the European citizen and the car industry and trade[225].

Value added tax

509. At present, transport services, like any other service supplied by a taxable person within the EU, are subject to VAT. Where VAT is applied, the supply of passenger transport is taxed pursuant to where the transport effectively takes place, proportionate to the distances covered and may be subject to a reduced rate of a minimum of 5% by the Member States[226],[227].

510. The EU VAT legislation nevertheless leaves scope for passenger transport to continue to be exempted through derogations accorded to Member States. Currently, the practices applied by Member States differ greatly. While for international passenger transport, sea and air are exempt of VAT in the whole of the EU-27, VAT is payable on inland waterways, rail and road transport in Belgium, Germany, Spain and the Netherlands. France levies VAT on inland waterways,

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224 Idem Footnote above.

225 COM (2002) 431, Communication on Taxation of Passengers cars in the European Union - options for action at national and community levels

226 The information on the current VAT rates applied in the EU Member States is available at: http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

227 In 2005, the European Commission consultation paper on VAT concluded that "The current rule governing passenger transport services, which is taxation according to the distance covered, has proven to be very impractical and difficult to apply in an internal market without fiscal borders. It implies that a coach company which transports tourists from Paris to Amsterdam needs to apply French, Belgian and Dutch VAT to each relevant part of the journey, and pay the corresponding amount of VAT to the tax authority of each of these respective Member States."

Greece and Austria do so on rail and road transport, while Poland and Slovenia on road transport only[228]. In addition, exemptions related to international transport, allowing certain passenger transport providers to purchase some goods and services free of VAT, have been in force since the introduction of VAT for international sea and air transport. This means that the VAT treatment of passenger transport combines different exemptions, depending on the kind of means of transport used to provide the transport and the place where the transport is deemed to take place.

511. Those exemptions result in a complexity of the current VAT system applicable to passenger transport and it is questionable if these rules ensure a level paying field in the sector. It is therefore important for the good functioning of the internal market and of the competition between modes to harmonise VAT rules in the transport sector. A study[229] carried out for the Commission in 1997 found that "*By 2005, the estimates suggest that High Speed Rail (HSR) might have anywhere between 36,203 and 295,900 fewer passengers if the existing VAT-induced distortion was not removed. This distortion represents up to 1.3% of HSR traffic…*" .

512. In December 2010, the Commission adopted a Green Paper on the future of VAT[230] by which it launched a public consultation on how the EU VAT system can be strengthened and improved, to the benefit of citizens, businesses and Member States. In the light of the complexity of the VAT treatment of passenger transport and the possible economic distortions it might provoke, the topic is addressed in those reflections.

3.3.4. Transport infrastructure and transport services: subsidies and State aid

513. The transport sector receives a great number of explicit or implicit subsidies. The construction of transport infrastructure – apart from concession motorways – is mostly funded from public money. Operators of passenger connections to/from remote or underdeveloped areas receive compensations in the framework of Public Service Obligations (PSO)[231]. In the case of railways, even connections between densely populated areas can be subsidised. It is estimated that in cities the operational costs of public transport are subsidised at around 50%.

514. Whereas there may be circumstances in which external benefits of transport justify subsidies from an efficiency perspective, it is important, particularly at times when public funding becomes scarce, to assess the merits of subsidies to infrastructure and to operational costs.

515. The question of whether public funding of transport infrastructure constitutes State aid within the meaning of Article 107§1 of the TFEU is regularly raised. Existing

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228 European Commission, DG TAXUD. 2010. VAT Rates Applied in the Member States of the European Union, http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

229 KPMG. 1997.A study of the VAT Regime and Competition in the Field of Passenger Transport, http://ec.europa.eu/taxation_customs/resources/documents/pass_tran_kpmg_final.pdf

230 "Towards a simpler, more robust and efficient VAT system", COM(2010) 695. Commission Staff Working Document SEC(2010) 1455 supplements the Green paper

231 Cf. discussion on PSO in part III.1 A single transport area: removing the remaining barriers to effective co-modality.

guidelines on state aid in railways[232] and airports[233] only cursory address the issue, concentrating on the assessment of compatibility of State aid measures with Article 107§3 of the TFEU. As a result, the state aid character of a public intervention in infrastructure building is regulated by the jurisprudence of the Courts.

516. In many cases the private sector might lack the incentives and/or the financial capability to provide transport infrastructure at an optimal level from the point of view of society. This is particularly the case of 'basic' infrastructure that has a life span and amortisation time that exceed the time horizon acceptable for private investors or for which the costs cannot be recovered by adequately charging users (e.g. breakwaters in ports)[234].

517. As the issue of the State Aid nature of the public funding of basic infrastructure and of the parallel profitability of commercially funded activities may lack clarity, the Commission will aim at providing clarification and uniform treatment of public funding to transport infrastructure. The clarification of the legal framework, however, does not detract from the need to apply a comprehensive and uniform cost/benefit analyses to different infrastructure projects to identify funding priorities.

518. Public budgets also intervene in funding transport services. Apart from the case of non-profitable links with remote areas performed for public service reasons, several transport activities are deemed worthy of support because of, for example, their lower environmental impact or social function (rail, public transport). In the future, the possibility to charge for transport externalities would modify the relative position of the different modes and possibly eliminate the need for correcting imbalances via subsidies to operations.

519. Public funding is also provided in case of activities exposed to international competition. This is notably the case of maritime where the role of the Commission is to assess what forms of public support might be useful in promoting safe and environmentally sound shipping and employment of Europeans on board ships and on shore without adverse effects on competition in the internal market. Since 1989 the EU's aim has been to encourage the re-flagging towards EU registers and the enhancement of the European maritime cluster. The international dimension of the maritime industry and the persisting risk that European ship-owners might leave Europe substantially weakening the European maritime cluster and its knowledge and employment basis, make the issue of public support for the industry particularly important. Fierce international competition and the lack of an international level-playing field for shipping – which have justified the granting of State aid so far – are still there to a large extent. Guidelines on State aid to maritime

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232 Communication from the Commission: Community guidelines on state aid for railway undertakings, 2008/C 184/07, part 2: Public financing of railway undertakings by means of railway infrastructure funding.

233 Communication from the Commission: Community guidelines on the financing of airports and start-up aid to airlines departing from regional airport, 2005/C 312/01.

234 These types of issues are referred to in economics as 'market failures' due to the existence of incomplete financial markets, public goods' characteristics, large indivisibilities and positive network externalities.

transport have been adopted in 1997 and in 2004. A review of the latter should be carried out in 2015/2016.

39. Smart pricing and taxation

Phase I (up to 2016)

Transport charges and taxes should be restructured. They should underpin transport's role in promoting European competitiveness, while the overall burden for the sector should reflect the total costs of transport in terms of infrastructure and external costs.

- Revise motor fuel taxation with clear identification of the energy and CO_2 component.
- Phase in a mandatory infrastructure charge for heavy-duty vehicles. The scheme would introduce a common tariff structure and cost components such as the recovery of wear and tear, noise and local pollution costs to replace the existing user charges.
- Evaluate existing car road charging schemes and their compatibility with the EU Treaties. Develop guidelines for the application of internalisation charges to road vehicles, covering the social costs of congestion, CO_2 – if not included in fuel tax – local pollution, noise and accidents. Provide incentives to Member States who launch pilot projects for the implementation of schemes along such guidelines.
- Proceed with the internalisation of external costs for all modes of transport applying common principles while taking into account the specificity of each mode.
- Create a framework for earmarking revenues from transport for the development of an integrated and efficient transport system.
- Issue guidelines providing clarification concerning public funding to the different modes of transport and to transport infrastructure, where necessary.
- Reassess transport taxation where necessary, namely by linking vehicle taxation to environmental performance, reflecting on possible way forward to review the current VAT system concerning passenger transport, and revising company car taxation to eliminate distortions and favour the deployment of clean vehicles.

Phase II (2016 to 2020)

- Building on Phase I, proceed to the full and mandatory internalisation of external costs (including noise, local pollution and congestion on top of the mandatory recovery of wear and tear costs) for road and rail transport. Internalise costs for local pollution and noise in ports and airports, as well as for air pollution at sea, and examine mandatory application of internalisation charges on all inland waterways on EU territory. Develop market based measures to further reduce GHG emissions.

4. THE EXTERNAL DIMENSION

4.1. Extending internal market rules and reinforcing the transport dialogue with main partners

520. The international role of the EU is particularly important for maritime and air transport, which are intrinsically global industries. To maintain a prominent position in these markets in the next decades, Europe needs to speak with one voice in those instances that bring together governments, industry representatives and regulators at a global level. More effective coordination between Member States needs to be ensured. In that respect, new opportunities of the EU's representation in international forums as foreseen under the Lisbon Treaty shall be fully explored.

521. Strategic and sectoral dialogues are already in place with some of our major partners like the United States, Russia, China, Japan, Canada and Australia and we intend to extend them to Brazil, India and South Africa. The emerging economies will play an increasing role in commerce with the EU but they also need an in depth modernization of their transport system. The EU could then share its transport expertise, use its technical leadership and promote its interoperability standards worldwide.

4.2. Promote energy efficiency and climate change goals in multilateral forums

522. Efforts carried out by the EU to reduce CO_2 and other pollutant emissions, as well as to improve energy efficiency, would be ineffective, and its competitiveness would be undermined, if its main partners do not follow similar strategies. It is therefore of crucial importance to promote the EU strategies through the main existing international forums (such as the International Transport Forum) or organisations (like ICAO or IMO), as well as through regular bilateral dialogues. We should also join efforts and funds in the field of research with our main transport partners to develop more efficient transport systems and vehicles.

4.3. An international dialogue on transport security

523. Following the 9/11 attacks, a lot has been done – under the initiative of the EU – to develop counter measures (at first in air transport, but quickly followed by similar measures in maritime) to prevent such dramatic event to take place again. Terrorism is a global threat and can only be successfully tacked internationally. Therefore international cooperation and harmonisation of security and privacy rules and practices are of utmost importance at the bilateral (e.g. EU–US transport security dialogue) or multilateral level (ICAO, IMO).

524. Action is also needed to counter the risks of piracy, where EU action should focus on early prevention measures to put in place in the zones at risk. An integrated approach should involve the EU's main partners and the countries concerned and include better monitoring, strengthened information exchange, capacity building and fighting poverty and corruption as the root causes of this kind of threat.

4.4. Extending our transport and infrastructure policy to our neighbours

525. Closer economic integration and increased mobility of goods and passengers with our neighbours will be one of the key challenges that Europe will have to face in the future. New trends and routes in transport might gain greater importance in the coming decades and this will definitely have an impact on the development of the infrastructure that connects with these routes and it will also have an impact on the development and the change of location of the main gateways to the EU.

526. The extension of the major trans-European transport axes to the neighbouring countries has been an important objective for the Union and is also a shared interest with the neighbouring countries. In this context, while developing the intra-EU rail freight corridors for speedy and competitive cross-border transport, their extension to neighbouring countries should be actively pursued.

527. The Commission is therefore preparing a Communication to set conditions for a renewed transport policy with its neighbouring partners. The objective is to provide a single policy umbrella for promoting transport infrastructure and market development in the EU's neighbourhood through transport, enlargement, foreign and neighbourhood policies with various political and financial initiatives, to make transport more efficient and to bring it closer to the EU's standards.

528. The ash cloud crisis in April 2010 showed the vulnerability not only of the European transport system, but also of the links to its neighbours. This demonstrated the need for even greater international efforts to ensure assistance mechanism and increase resilience of the system.

529. The EU has in the recent past established successful transport cooperation frameworks at regional level with its main partners. EUROMED, with the Mediterranean countries, the Northern Dimension Partnership for Transport and Logistics (NDPTL), the South-East Europe Transport Observatory (SEETO), as well as the EU-Africa transport forum. The aim of such cooperation frameworks is to provide customized mutual answers on issues that affect transport development in these areas. Such partnerships should be extended in the future as they have shown to be not only a powerful tool to strengthen transport relations, but also to improve political regional cooperation. The model of the Western Balkan Transport Treaty could be used to extend EU rules to other neighbouring countries. Cooperation with neighbouring partners in shared sea-basins is also important.

530. The completion of the European Common Aviation Area, covering 58 countries and a population of 1 billion, would create a truly integrated aviation market covering the EU and its closest regions. It would provide unified regulatory approaches in safety, security and other areas of importance to aviation, giving a concrete expression in transport to the Union's neighbourhood policy.

531. Finally, such cooperation should also include research and innovation partnerships to find common answers to the challenges related to interoperability of transport management systems, security and safety.

4.5. Intensifying cooperation to remove transport barriers

532. EU companies face a number of restrictions when trying to expand their businesses in third markets. In this context, widening market access for EU transport industry products needs to go hand in hand with the efforts to eliminate trade barriers. Promotion of shared social and environmental standards is needed to allow the transport sector to become truly global and to avoid unfair competition, while there is a need to adopt common technical standards on a world basis (that could be based on EU ones) to strengthen the competitiveness and the sustainability of the transport industry as a whole.

533. In aviation, the comprehensive air transport agreements with the United States and Canada can be considered as a benchmark for the whole sector globally. However, the time has come to expand this policy to Europe's other major economic and commercial partners, in particular in Asia, Latin America and the Middle-East. For maritime transport, it is also vital to improve exchanges and cooperation with major countries worldwide, reflecting the global nature of the shipping business.

534. Another step to improve competitiveness of the EU is through engagement with our trading partners to eliminate the barriers to investment, to attract international capital to aviation, thereby normalising the sector by allowing mergers and acquisitions like in any other sector of the economy. Furthermore reduce administrative burdens for carriers, and to ensure maximum efficiency in customs or other procedures when entering the EU. Creating a framework for exchange of transport documentation and clear, simple and efficient procedures could lead to establishment of dedicated fast transport corridors between the EU and its trading partners.

535. With regard to maritime transport, after the repeal of the exemption for liner shipping conferences on trades to and from the EU, the Commission is taking appropriate steps to advance the removal of price fixing exemptions for liner conferences that exist in jurisdictions outside the EU[235].

536. The Arctic region has come into the focus of many countries, not only linked to its natural resources, but also in view of Arctic commercial navigation, opening new and shorter shipping routes. Concerted international action is required to match commercial activities with the aim to protect this maritime basin.

537. Last but not least, Europe needs to speak with one voice in the relevant international transport organisations. Its economic power and its integrated policies should be reflected legally in a global framework. Full membership of the EU in ICAO, IMO and other international bodies, would better project our policies and defend our interests.

40. Transport in the World: The external dimension

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235 See Council Regulation (EC) No 1419/2006 of 25 September 2006 repealing Regulation (EEC) No 4056/86 laying down detailed rules for the application of Articles 85 and 86 of the Treaty to maritime transport, and amending Regulation (EC) No 1/2003 as regards the extension of its scope to include cabotage and international tramp services, recital 11.

Transport is fundamentally international. Because of this, most actions in this White Paper are linked to challenges related to the development of transport beyond the EU borders. Opening up third country markets in transport services, products and investments continues to have high priority. Transport is therefore included in all our trade negotiations (WTO, regional and bilateral). Flexible strategies will be adopted to ensure the EU's role as a standard setter in the transport field. To that end, the Commission will focus on the following areas of actions:

- Extend internal market rules through work in international organisations (WTO, ICAO, IMO, OTIF, OSJD, UNECE, the international river commissions etc) and where relevant attain full EU membership. Promote European safety, security, privacy and environmental standards worldwide. Reinforce the transport dialogue with main partners.

- Complete the European Common aviation area of 58 countries and 1 billion inhabitants. Conclude comprehensive air services agreement with key economic partners (Brazil, China, India, Russia, South Korea etc.) and eliminate air transport investment restrictions in 3rd countries. Promote SESAR technology deployment in the world.

- Take action in multilateral forums and bilateral relations to promote policy targeted at the energy efficiency and climate change goals of this White Paper.

- Continuously use multilateral (in ICAO, IMO and WCO) and bilateral layers to tackle the issue of terrorism, envisaging international agreements and enhanced security dialogues with strategic partners, starting with the US. Cooperate on joint threat assessments, training of third countries officers, joint inspections, piracy prevention, etc. Ensure recognition of the EU concept of 'one stop security' system internationally.

- Develop a cooperation framework to extend our transport and infrastructure policy to our immediate neighbours – to deliver improved infrastructure connections and closer market integration – including in the preparation of mobility continuity plans.

- Cooperate with Mediterranean partners in the implementation of a Mediterranean Maritime Strategy to enhance maritime safety, security and surveillance.

- Take appropriate steps to advance the removal of exemptions for liner shipping conferences outside the EU.

- Build on established research and innovation partnerships to find common answers to the challenges related to interoperability of transport management systems, sustainable low-carbon fuels, security and safety.