2.3. Impact of the new Transport Policy

2.3.1. Policy scenarios to be assessed

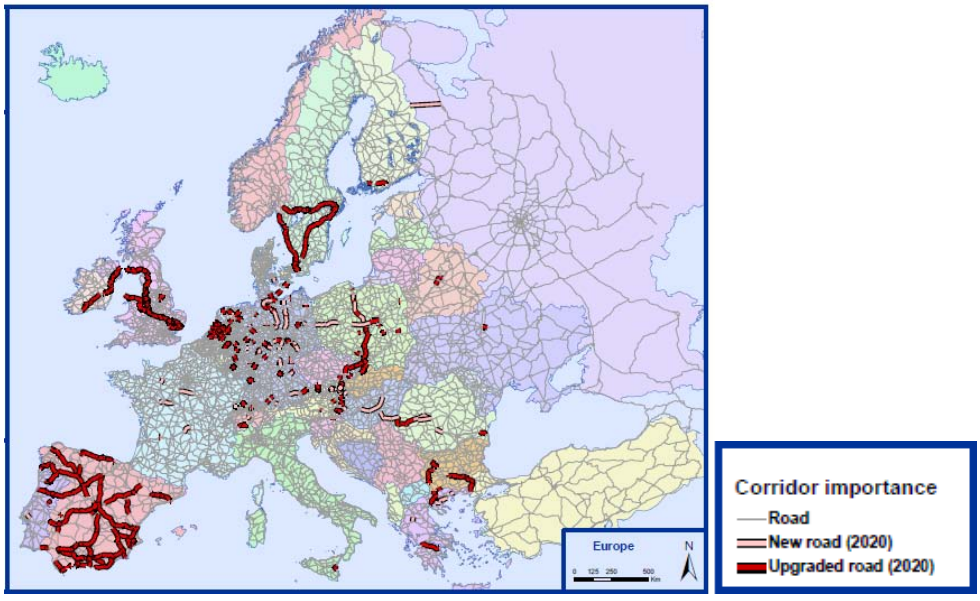
In this project, we focus on two types of measures inside the new transport policy: infrastructure and regulatory policies (i.e. “transport pricing”).

Infrastructure networks to be assessed include road network, railways dedicated to freight traffic, railways dedicated to passenger traffic, airports and ports. Networks cover EU-27. Differently from the CAP policy considered in the previous section, the impact assessment is carried out at NUTS3 level, and a forecasting model has been used, namely the TRANS-TOOL model developed by DG TREN and its consultants.

The first scenario to be used is the *Baseline 2030* as defined in TRANSVisions study (DGTREN, March 2009)[1]. The Baseline scenario assumes as policy framework the Revision of Transport White Book 2010-2030. This means that the Priority projects already defined are supposed to be completed in the horizon year 2030. Internalisation of external transport costs is applied according to PO2C scheme (congestion, noise and air pollution for trucks). Transport costs change differently according to each mode, with a significant reduction for rail freight as liberalisation continues and costs for selected corridors are taken down.

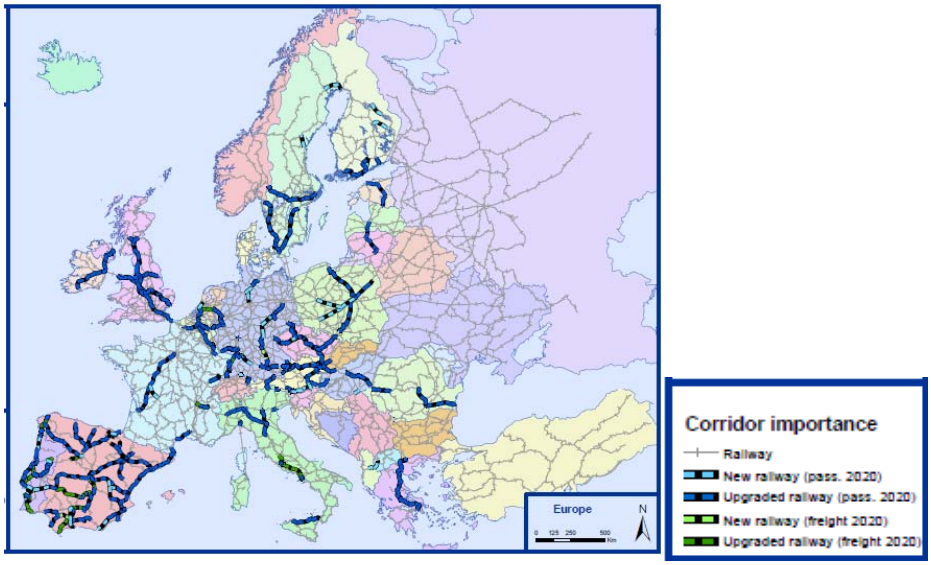
In the *Baseline Scenario* (scenario a in impact maps) links which have been constructed between 2005 and 2008 and links, which are currently under construction or already planned for construction are considered. Therefore, the baseline is a conservative estimate of what could be accomplished. The roads indicated on the maps are road projects improving the main road network. Two different types of road works are foreseen, namely new construction and changes of existing infrastructure. Most of the changes are related to roads changing class or speed. The road and rail networks in the baseline scenario are presented in Maps 2.3.1 and 2.3.2 below.

Map 2.3.1 - Road infrastructure development in Baseline Scenario, 2030
Source: TRANSTOOL Model, 2008



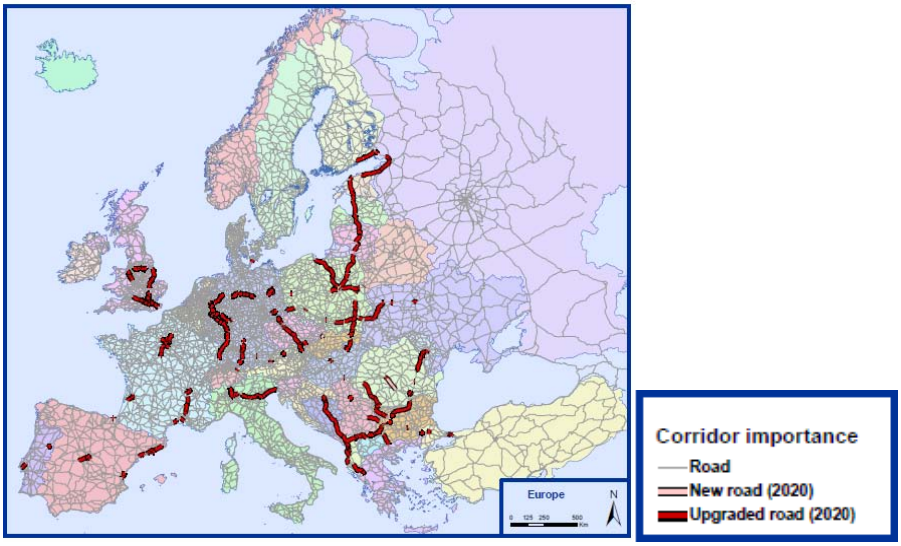
[1] The baseline scenario refers to year 2030; it is developed by exploiting the TRANSTOOLS model within the policy framework of the Revision of Transport White Book 2010-2020 and the Green Book on TENs revision.

Map 2.3.2 - Rail infrastructure development in Baseline Scenario, 2030
Source: TRANSTOOL Model, 2008

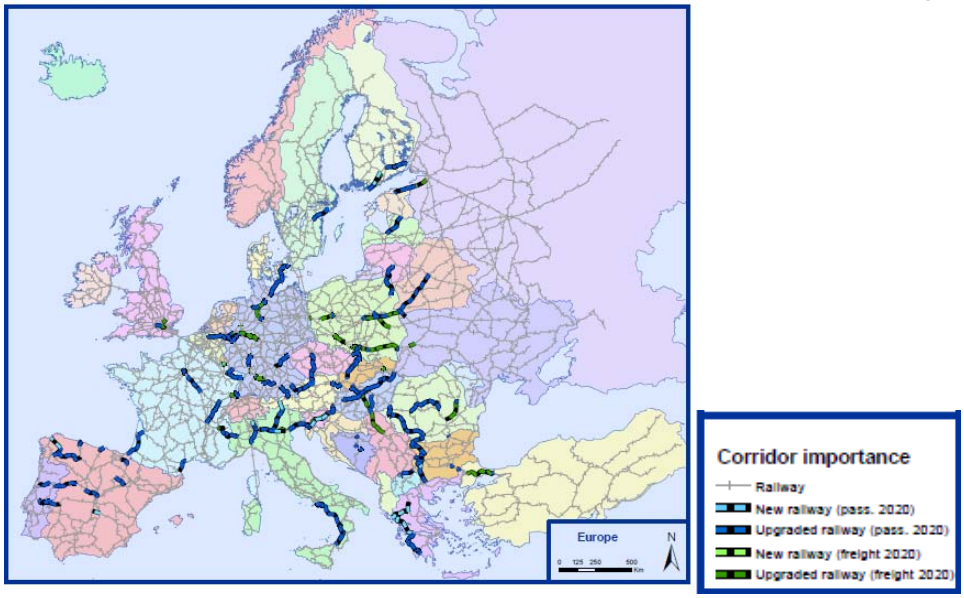


The second scenario is a *Infrastructure Enhancement* one (scenario b in impact maps), where policies are oriented towards new infrastructure provision. It is based on a High Growth 2030 scenario as defined in TRANSVisions study. In this case, a more comprehensive infrastructure development than foreseen in the baseline is assumed. The 30 priority projects defined in 2003 by the Van Miert Report are assumed to be completed as well as a number of other projects of relevance to European cohesion. These developments are mainly located in Eastern Countries, as Maps 2.3.3 and 2.3.4 show. The main objectives of this policy are improving cohesion, accessibility and reducing congestion by completing all the TEN networks and pan-european corridors that are not included in the priority projects, many of them in Eastern Europe and including axes for Peace and Development. However, as this policy has the effect of increasing total traffic, it is assumed that a higher renewal of the car fleet will be enforced so that average emission ratios are lower. This target can be achieved by banning the presence in roads of old vehicles and by enforcing legal limits of emission ratios in newly manufactured vehicles. No other changes are introduced compared to the Baseline.

Map 2.3.3 - Road infrastructure development in the Infrastructure Enhancement Scenario compared to Baseline, 2020. Source: TRANSTOOL Model, 2008



Map 2.3.4 - Rail infrastructure development in the Infrastructure Enhancement Scenario compared to Baseline, 2020. Source: TRANSTOOL Model, 2008



The third scenario is a *Regulatory and Pricing Scenario* (scenario c in impact maps), based on Low Growth 2030 as defined in TRANSVisions study, characterised by a low economic development further emphasized by a negative population development. Low growth occurs because of increasing costs of energy, particularly oil. Europe's answer to the increasing energy costs is mobility reduction in terms of higher operating costs which reflects the high energy prices. Policies in this scenario are oriented towards taxation, internalisation of transport externalities, and putting incentives for a modal shift towards rail.

The Pricing scenario is focused on changes in the costs and prices of the different transport modes, taking the Baseline as a starting point. The main policy applied is a generalisation of internalisation costs to road passenger transport, while at the same time the PO2C scheme is expanded to incorporate an extra charge in motorways. Moreover the transport costs are increased in relation to baseline to encourage modal shift and a global reduction of mobility. As road modes are the most heavily charged by both costs and internalisation, a change towards rail and maritime modes is expected on this scenario.

Of what concerns transport pricing, in the Pricing Scenario research and development initiatives are in line with the baseline, but fuel cost for passenger cars is expected to be 20 % higher than in 2005, in constant 2005 prices. Also, distance based transport costs for heavy goods vehicles is assumed to increase 10% in constant 2005 prices.

Additionally, the network is assumed to be the same as in the baseline scenario (Maps 2.3.1 and 2.3.2). However, cost recovery for heavy goods vehicles is being anticipated in the Vignette countries. In the Pricing scenario the introduction of the cost recovery is assumed as a necessity in order to carry out necessary maintenance and reconstruction of the network under low growth conditions. Internalisation is anticipated at the slightly higher level than in the Baseline scenario (i.e. internalisation of noise, air pollution and congestion has the same values per km as indicated in the Baseline scenario plus an increase of 0,04euro/km). Passenger rail fares are expected to be the same as in the Baseline scenario. For rail freight the rail transport costs are assumed to increase mainly because the improvements in rail

technology and cross border operations are not advancing as fast as in the Baseline scenario. An increase of rail transport costs of 6% has been assumed.

The air transport industry is supposed to be under strain because of high oil prices and a slow economic development. In order to ensure profitability of the business the 2005 air fares are assumed to increase 20% in real terms. The transport costs of freight transport by inland waterways are unchanged compared to the Baseline scenario. Also, maritime transport are supposed to develop along the same path as truck transport, i.e. maritime transport costs is assumed to increase 10% in real terms.

2.3.2. Policy intensity in regions.

Policy intensity in each region (NUTS 3) is defined considering the new infrastructure links passing through each region's territory, determining an increase in generalised accessibility.

Intensity of policy pricing and regulations is attributed to regions with the intensity indicated explicitly in a Table in the Scientific Report, determining transport costs and emissions proportional to the traffic which is forecasted.

2.3.3. Impact typologies.

With reference to the experience of the first version of the TEQUILA model (ESPON 3.2 project), some changes were introduces in the present project concerning the impact criteria (see Table 6 below). The main differences refer to:

- The inclusion of productivity of infrastructure and airports in Territorial Efficiency;
- The inclusion of congestion costs in the Territorial Efficiency macro-criterion;
- The inclusion of freight traffic passing through regions, and of accidents/safety in Territorial Quality;
- The exclusion of an indicator of "Creativity" in the Territorial Identity criterion, judged too weak;
- The inclusion of an indicator of globalisation in Territorial Identity (I2: exposure to external visitors) [2].

2.3.4. Logical chain from policy measures to impacts.

TRANS-TOOLS, official DGTREN forecast model has been used to move from policies to the assessment indicators above defined. The three components of territorial cohesion, namely territorial efficiency, territorial quality and territorial identity represent the main macro-criteria for SI, although each single sub-component has been inspected per se as SDI. Within each macro-criterion a number of criteria have been identified, and their relevance and their link to the policy measure being examined is explained below.

[2] Impact indicators were firstly indicated by sectoral experts and next discussed by the TPG through extensive interactions and discussions. This differs from and represent an improvement upon TEQUILA 1 indicators and model. A lively discussion took place among partners concerning Territorial Identity indicators. Transport experts judged regional and national connectivity as leading to reinforce regional and national identity. On the other hand, territorial experts judged connectivity as an element of Territorial Quality and intended Territorial Identity as "local" identity. The Project specification required to analyse impacts on the following dimensions: economy, society, environment, competitiveness, climate change and territorial impact (conceived of as the summative impact of single impacts on the above mentioned dimensions). Thus, the indicators selected aims at capturing these dimensions but have been next combined in the three main criteria of Territorial Efficiency, Territorial Quality and Territorial Identity.

Table 6. Impact criteria in territorial impact assessment - Transport policies[3]

Macro - criteria	Variable	Criteria	Definition	Type	Measurement	Unit of measure
TE Territorial Efficiency	PIM_E1	**Productivity of inland transport infrastructure**	Productivity of inland infrastructure	Benefit	total traffic/km road and rail	passenger and tons / km
	PIM_E2	**Productivity of airports**	Productivity of airports	Benefit	pax noEU/ total pax	dimensionless
	PIM_E3	**Economic growth**	GDP per Capita	Benefit	GDP variation including the marginal increase due to new infrastructure	€/capita
	PIM_E4	**Congestion costs**	Congestion cost	Cost	time on congestion/total time	dimensionless
TQ Territorial Quality	PIM_Q1	**Traffic passing through**	Road freight crossing the region borders	Cost	non-intraNUTS2 road freight traffic/total freight traffic (no internal)	dimensionless
	PIM_Q2	**Emissions**	CO2 emissions per usable land	Cost	Road emissions for cars and trucks in MTonnesCO2 / usable land	million Tonnes CO2 / km2
	PIM_Q3	**Safety**	Traffic separation in different infrastructure levels	Benefit	traffic on motorways / (traffic 2-lane road + traffic on motorways)	dimensionless
	PIM_Q4	**Market opportunities**	Market potentially accessible	Benefit	GDP at less than 3 hours (multimodal)	million €
TI Territorial Identity	PIM_I1	**Landscape fragmentation**	Density of high capacity road and rail infrastructure	Cost	km of motorway + km of 2track rail / surface (km/km2)	km/km2
	PIM_I2	**Exposure to external visitors**	External passengers (outside the region) at more than 3h	Cost	All passengers reaching the NUTS3 at more than 3h	passengers
	PIM_I3	**Regional integration**	Regional road connectivity	Benefit	average time by road to other NUTS3 capitals in the same NUTS2 (inverted)	time in hours

Logical chains from policy measures to impacts are clear, and incorporated into the general logics of the TRANS-TOOL model. For details, see the Scientific Report.

2.3.5. Calculating impacts on single dimensions / criteria.

As in the previous case of CAP policies, impacts are first of all calculated on single dimensions, and presented under the form of:

a. impacts on the economy
b. impacts on competitiveness
c. impacts on society
d. impacts on environment and climate change
e. impacts on landscape and local identities

Of course, single impacts may refer to multiple dimensions: for example congestion is both an element of territorial competitiveness and quality of life of the local society. We have allocated single impacts to their priority class according to our judgement, but of course impact measures are open to other interpretations.

[3] The main source exploited to compute impact indicators is the TRANSTOOL model developed within the TRANSVISION study.

2.3.5.a. Impacts on economy

The first indicator in this case is impact on economic growth (E3a). In the baseline scenario a generalized positive impact, though limited, is found throughout Europe, thanks to a sufficiently spread out new infrastructure provision and to processes of growth diffusion. An increase between 2005 and 2030 ranging around 25.000 euro per capita (see PIM_E3) will be relatively less appreciated in rich regions, while more important impacts will show up in eastern countries. Most relevant positive impacts will touch:

- capital city regions in central-eastern Europe: Vienna, Bratislava, Tallinn, Riga, Vilnius, Bucuresti, Sofiya,
- border regions, benefiting from lowering of international institutional barriers: the areas of Pécs, Nova Gorica, Stettin, Timisoara, Katowice-Krakov, the entire south-western Poland, the entire western border of Czechia,
- big and medium city regions at the crossroad of, or along the new important transportation axes: Poznan, Lodz, Ostrava, Brno, Linz and Graz,
- port and maritime areas: Dantzig, Umea, Trieste, Koper, Costanza, the entire coast of the three Baltic republics.

In most of these areas, new infrastructure provision will represent quantum jumps with respect to previous accessibility conditions; moreover, these increases will be highly desirable given the lagging conditions of these areas in economic terms. It looks relevant to highlight the emerging reality of a new central European macro-area, encompassing southern Poland, Czechia, eastern Austria and western Slovakia and Hungary, around the crossroad between a north-south axis (Dantzig – Vienna) and a east-west axis Munich – Vienna – Budapest – Costanza (Map 2.3.1.).

Passing to the Infrastructure Enhancement scenario (E3b), a more varied outcome emerges. Countries where new infrastructures are envisaged – like Spain, Italy, Greece and UK – still show an (extra) positive impact on GDP in almost all regions. In New Member states, important benefits will come to Czechia (thanks to both road and rail improvements), Hungary (mainly rail improvements), Bulgaria, Estonia and Lithuania (mainly road improvements). In aggregate, European terms, the improvements in GDP per capita will be modest. In the Pricing Scenario (E3c) more peripheral countries will lose (but also France apparently will) and more central countries will gain (but also UK, Greece and Finland will).

A second impact indicator concerning economic structure refers to (intra-)regional integration (I3a), an indicator that is also relevant for enhancing local identity. Increases are visible only in those countries in which present infrastructure engagement is higher, namely Spain and Germany. Other positive impacts are visible along the Tyrrhenian coast in Italy, along the Paris-Nantes-Bordeaux axis, interested by the new high speed train line, and the axis moving southward of Warszawa. Eastern countries in general show negative impacts, as a result of increasing congestion on main intra-regional links which are not sufficiently upgraded. On the other hand, this condition of New Member countries is due to change in the Enhanced Infrastructure scenario (I3b), where consistent positive impacts on internal integration show up, particularly in Romania and Bulgaria but also in the Baltic Republics, north-eastern Poland and Slovakia. Among Old Member Countries, Portugal, UK and south-western Sweden show some positive impacts.

Interestingly enough, the Pricing scenario appears very advantageous for most EU regions in terms of internal integration, with the highest positive impacts in eastern countries, Ireland and UK, but also in Spain, Portugal, Northern Italy, south-western France (I3c), probably thanks to reductions in congestion on roads.

2.3.5.b. Impacts on competitiveness

Productivity increases on infrastructures, measured by increase in traffic/km, and reduction of congestion costs may be rightly interpreted as contributing to territorial competitiveness. Concerning the productivity indicator on inland traffic infrastructure (E1a), a generalized increase shows up, particularly intense along some major transportation axes in eastern countries (as the Warszawa-Krakow axis, and its continuation from Vienna to Gyor) and around some of their major urban areas (Dantzig, the Trieste-Koper integration area, Ljubljana, Bucuresti and Sofiya). Some productivity reductions also show up in some rare, scattered areas. Similar positive results are shown by the airport productivity indicator (E2a), where major increases concern French and British regions, but in particular main increases apparently concern second and third level airports.

Opposite results are of course pointed out by the congestion indicator (E4a), where the negative sign is pervasive, in particular in many major northern metropolitan areas (the entire England and London in particular, København, Malmö, Stockholm, Helsinki, Amsterdam and Rotterdam, many areas in Westfalen, Berlin, Warszawa and Praha).

Considering the Infrastructure Scenario, an increase in network productivity with respect to the baseline scenario is confirmed (E1b), especially in main eastern corridors, while airport productivity (E2b) still concerns, in the positive sense, not really big airports but second and third level airports (e.g., Florence, Pisa, Brescia, Naples, Sassari and Brindisi in Italy), especially in countries like Germany and Portugal. Concerning congestion (E4b), this scenario brings strong support to eastern countries, northern countries like Sweden, Germany, Denmark, and southern countries like Greece and Portugal.

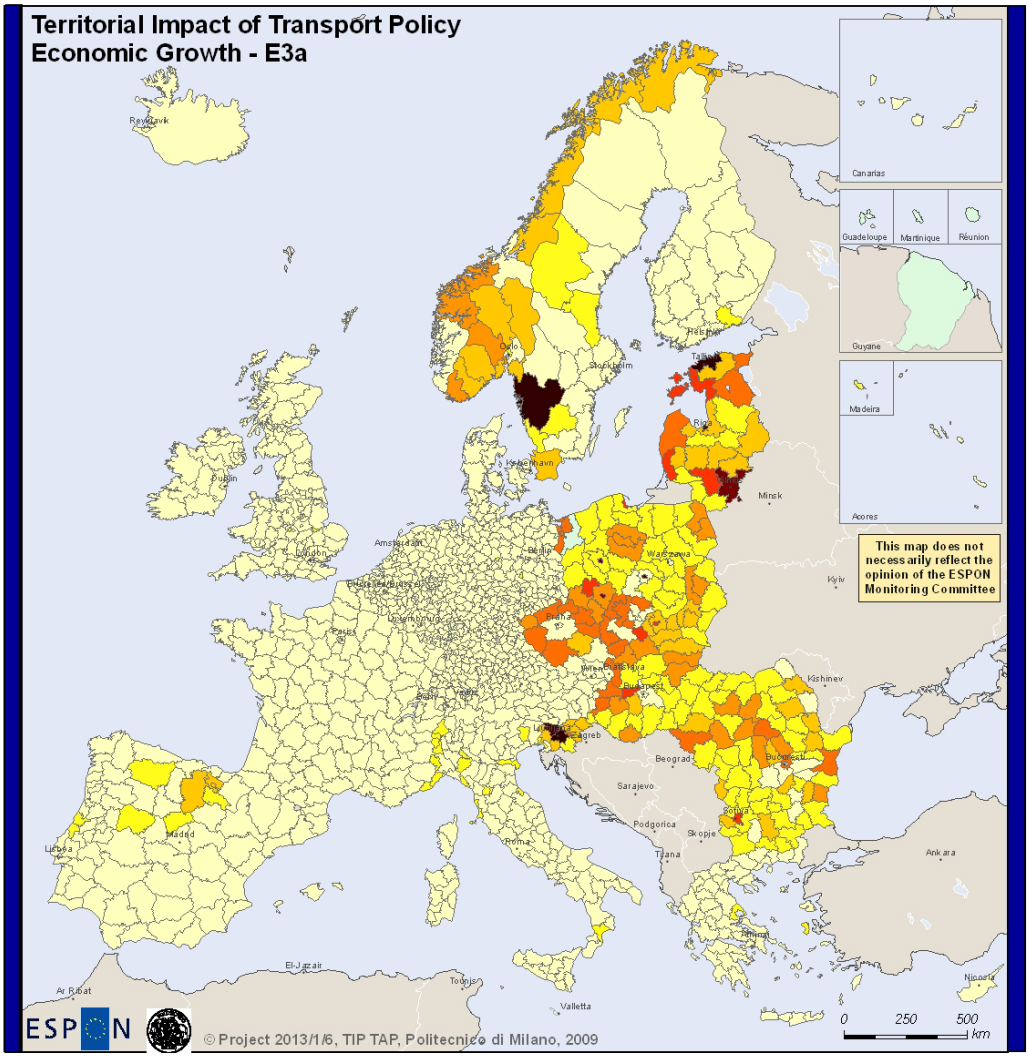
Interesting results come also from the Pricing scenario. Regulatory and pricing measures will overall reduce traffic per km on the entire network (E1c), increase air traffic (E2c) in areas characterized by congested transport networks (western German regions and Dutch regions, London, Milan, Rome) or by huge distances from the European barycentre (Lisbon, Ljubljana, Budapest, Praha, Bucuresti, Sofiya). Interestingly enough, pricing policies will reduce congestion overall and in particular in already heavily congested areas; exceptions regard mainly southern Italian and a few Spanish regions (Map 2.3.2., E4c).

2.3.5.c. Impacts on society

Impacts on safety and market opportunities (Q3 and Q4) refer to societal impacts. Safety will increase pervasively according to the baseline scenario (Q3a) and in eastern countries and Germany in the Infrastructure one (Q3b). Positive impacts from regulations (Q3c), contrary to expectations, do not regard the main metro areas, where road pricing will mainly apply, but concern scattered areas and, interestingly, the entire EU eastern border, from Finland to Greece.

New market opportunities, measured by the increased income potential thanks to new accessibilities, are pervasive in the Baseline Scenario (Q4a) and particularly intense in wide areas of southern and central Poland and in the greater Praha area. These opportunities would further increase in the case of the Enhanced Infrastructure Scenario (Q4b) and expand towards the greater Budapest area (Map 2.3.3.); they would not be reduced in a Pricing Scenario (Q4c). Only some congested areas around large metropolitan areas could suffer from some reductions: the areas of London,

Map 2.3.1.



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Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
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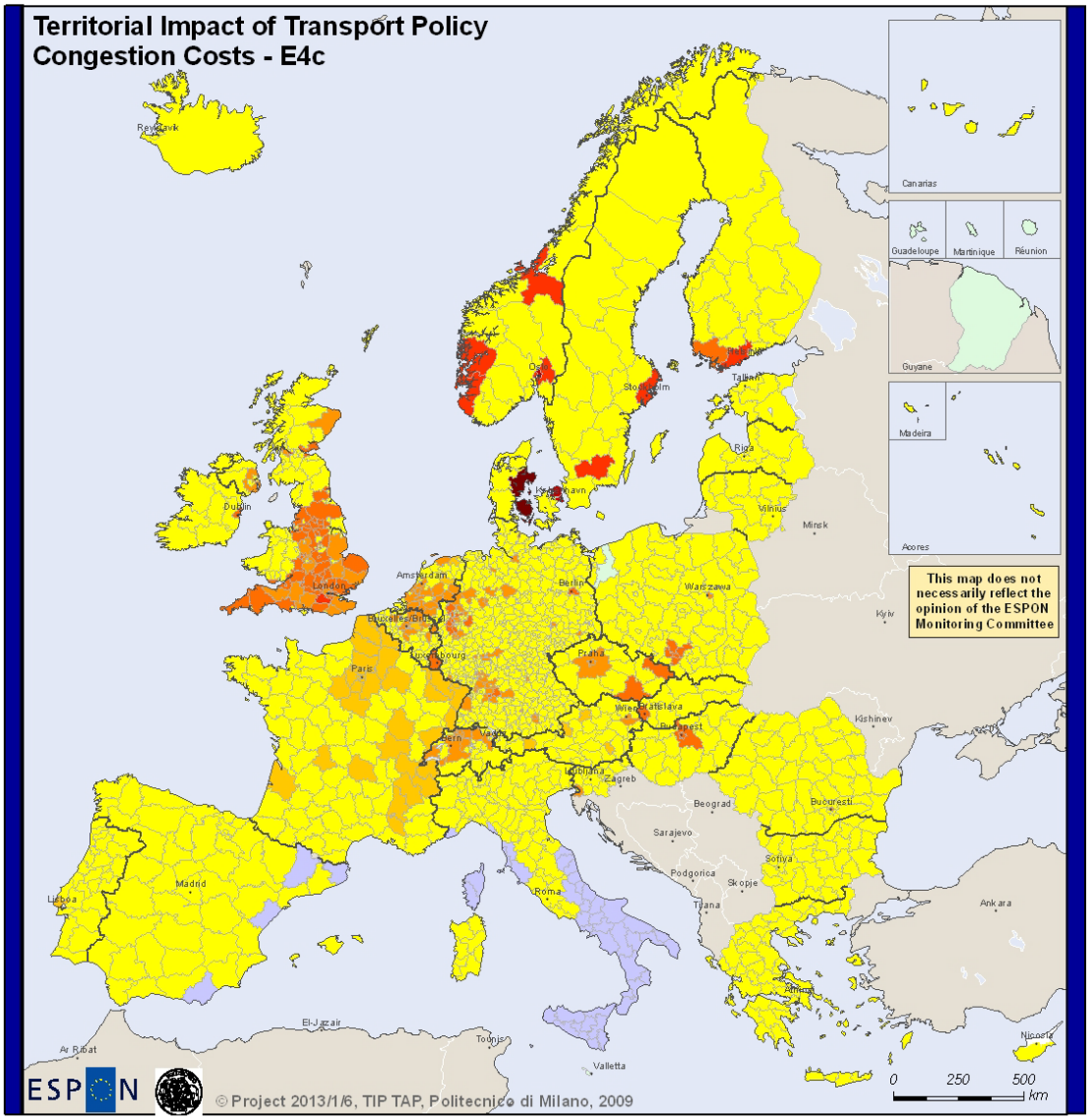
Legend

NA	0.00 - 0.04	0.24 - 0.27	
	0.05 - 0.08	0.28 - 0.31	
	0.09 - 0.12	0.32 - 0.35	
	0.13 - 0.15	0.36 - 0.38	
	0.16 - 0.19	Outliers (>0.38)	
	0.20 - 0.23		

Map 2.3.2.


Territorial Impact of Transport Policy
Congestion Costs - E4c
Reykjavik
Canarias
Guadeloupe
Martinique
Réunion
Guyane
Madeira
Acores
Dublin
London
Amsterdam
Bruxelles/Brussel
Luxembourg
Paris
Berlin
Kobenhavn
Stockholm
Tallinn
Riga
Vilnius
Minsk
Warszawa
Kyiv
Praha
Wien
Bratislava
Budapest
Kishinev
Bern
Ljubljana
Zagreb
Beograd
Sarajevo
Podgorica
Skopje
Tirana
Sofiya
Bucuresti
Roma
Madrid
Lisboa
Ankara
Athinai
El-Jazair
Ar Rabat
Tunis
Valletta
Nicosia
This map does not necessarily reflect the opinion of the ESPON Monitoring Committee
ESPON
© Project 2013/1/6, TIP TAP, Politecnico di Milano, 2009
0 250 500 km
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Legend
NA
-0.12 - 0.00
0.01 - 0.17
0.18 - 0.34
0.35 - 0.51
0.52 - 0.68
0.69 - 0.85
0.86 - 1.02
1.03 - 1.19
Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
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Dublin, Amsterdam and Rotterdam, the Kiel-Hamburg axis, Berlin, Madrid, Milan, Rome, Naples and Côte d'Azur.

2.3.5.d. Impacts on environment and climate change
Traffic passing through the region generates negative externalities and no benefit (except for highway owners, gas stations and some highway restaurants); therefore they are considered as costs in the territorial impact assessment exercise. In the Baseline Scenario these costs are visible, though limited (Q1a); in some rare cases through traffic will be reduced thanks to re-assignment to other trunks. A stronger reduction would derive from pricing policies (Q1c): in many regions in Austria, Germany, Denmark, Ireland and UK and in some peripheral areas hit by rise in transport cost. But also new infrastructure provision could reduce the related externalities (Q1b): this is visible in many northern countries, in Germany and also in the Iberian peninsula.

Impacts on emissions are mapped in Q2a: they are not huge but pervasive in the Baseline Scenario, being positive (indicating reductions) only in many German and Dutch areas and in some regions in southern Italy. Enlargement of the network generates some even robust increases, especially in Spain and Poland. In the Enhanced Infrastructure Scenario (Q2b), some new benefits are forecasted, thanks to the hypothesis of trend improvements in fuel efficiency of vehicles, mainly in old Member States but rarely in eastern countries, while in the regulatory, Pricing Scenario, these benefits would appear pervasive and mostly visible in Spain, Portugal, central Italy and Poland as well as in Norway and Switzerland (Q2c).

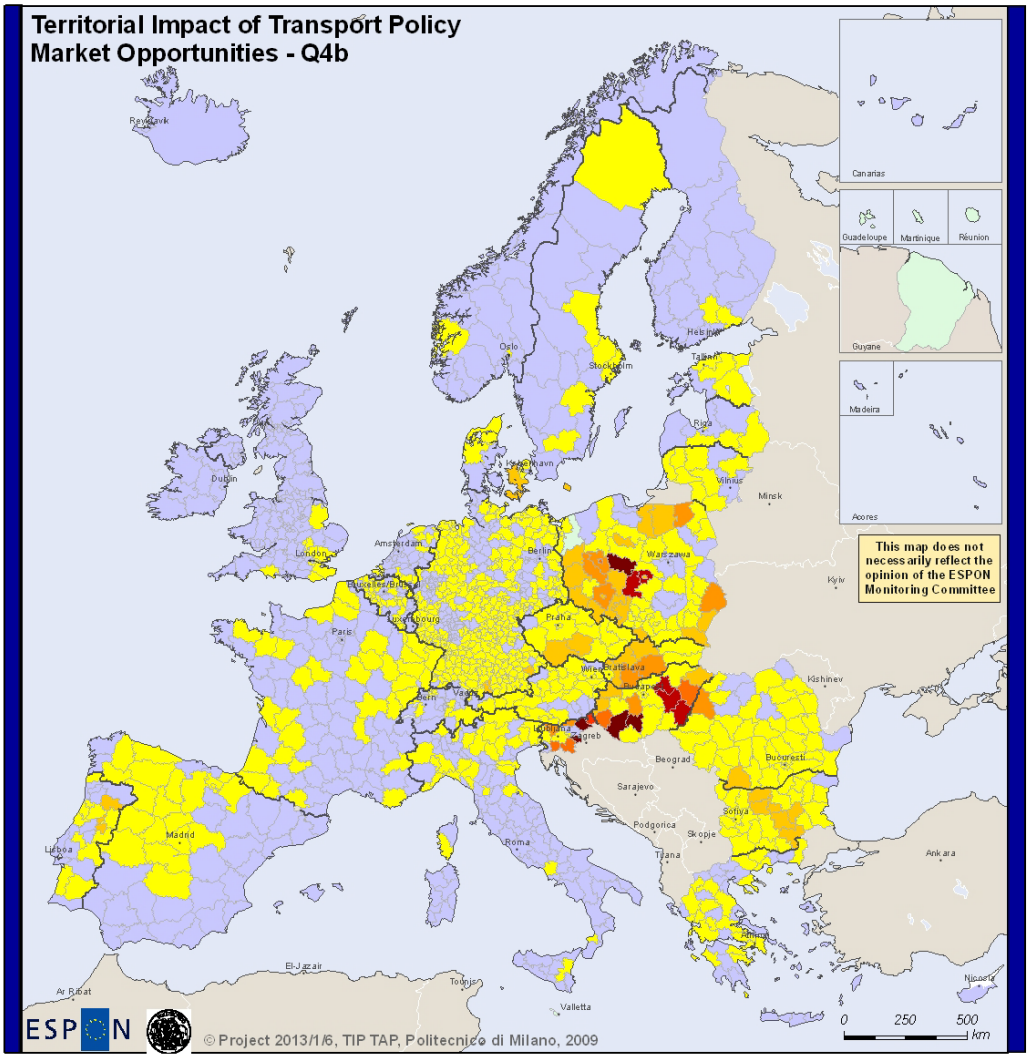
2.3.5. Impacts on landscape and local identities.
Landscape fragmentation and exposure to external visitors (I1 and I2) are the main impact indicators in this case. An increase in landscape fragmentation in the Baseline Scenario (I1a) will mainly happen in countries where most infrastructure will be built, and namely in Spain, Ireland, central Britain and along a large cross inside Poland (Map 2.3.4.). Adding new infrastructure will generate damage in almost all regions (I1b).

Excessive exposure to external visitors, determining huge negative externalities to resident population and possibly to its cultural identity will hit mainly old Member countries, but also many capital cities in new Member countries (Warszawa, Praha, Budapest, Bucuresti, Sofiya, Tallinn and Riga) (I2a). Pricing would not change much this situation, though reducing it a little especially in large eastern capitals (I2c), while new infrastructure would multiply and possibly diffuse the phenomenon throughout almost the entire territory (I2b).

2.3.6. Calculating summative territorial impacts

Let's analyse now the results of the weighted averaging of single dimension impacts, in order to build summative impacts: on territorial efficiency, quality, identity and the general impact (overall Summative Impact). Concerning the weights, the same indications given in sect. 2.2.6 hold in this case: they were defined in two ways, through experts meetings, and through the questionnaire delivered during the 2009 ESPON meeting in Praha.

Map 2.3.3.



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NA	-0.0122 - 0.0000
	0.0001 - 0.0209
	0.0210 - 0.0418
	0.0419 - 0.0628
	0.0629 - 0.0837
	0.0838 - 0.1046
	0.1047 - 0.1255
	0.1256 - 0.1464

Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
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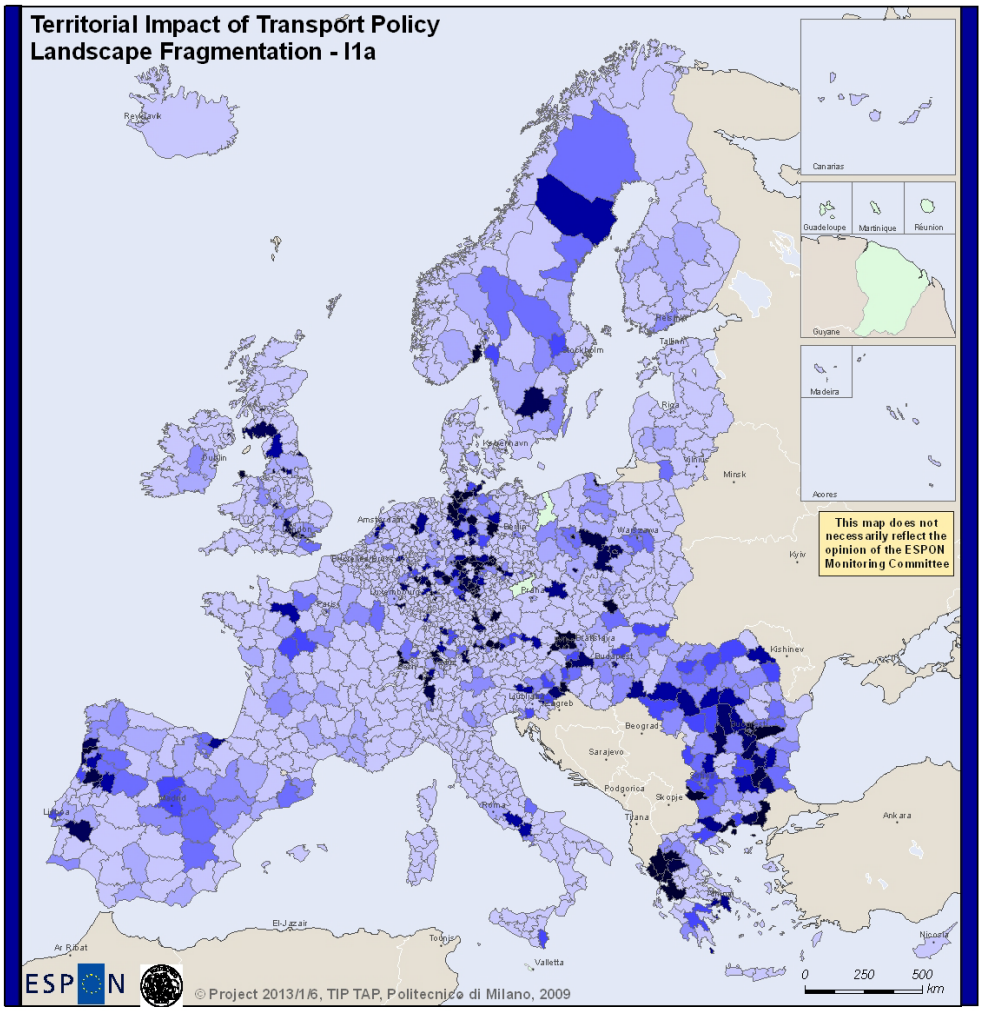
Map 2.3.4.



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Regional level: NUTS3 (2006)
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Origin of data: own calculation
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Legend

NA	Outliers (<-0.30)	-0.14 - -0.12	
	-0.29 - -0.27	-0.11 - -0.09	
	-0.26 - -0.24	-0.08 - -0.06	
	-0.23 - -0.21	-0.05 - -0.03	
	-0.20 - -0.18	-0.02 - 0.00	
	-0.17 - -0.15		

In the case of transport policy, the weights change with respect to CAP, as the impact criteria necessarily change. According to previous Table 2, they are defined as follows according to experts judgement:

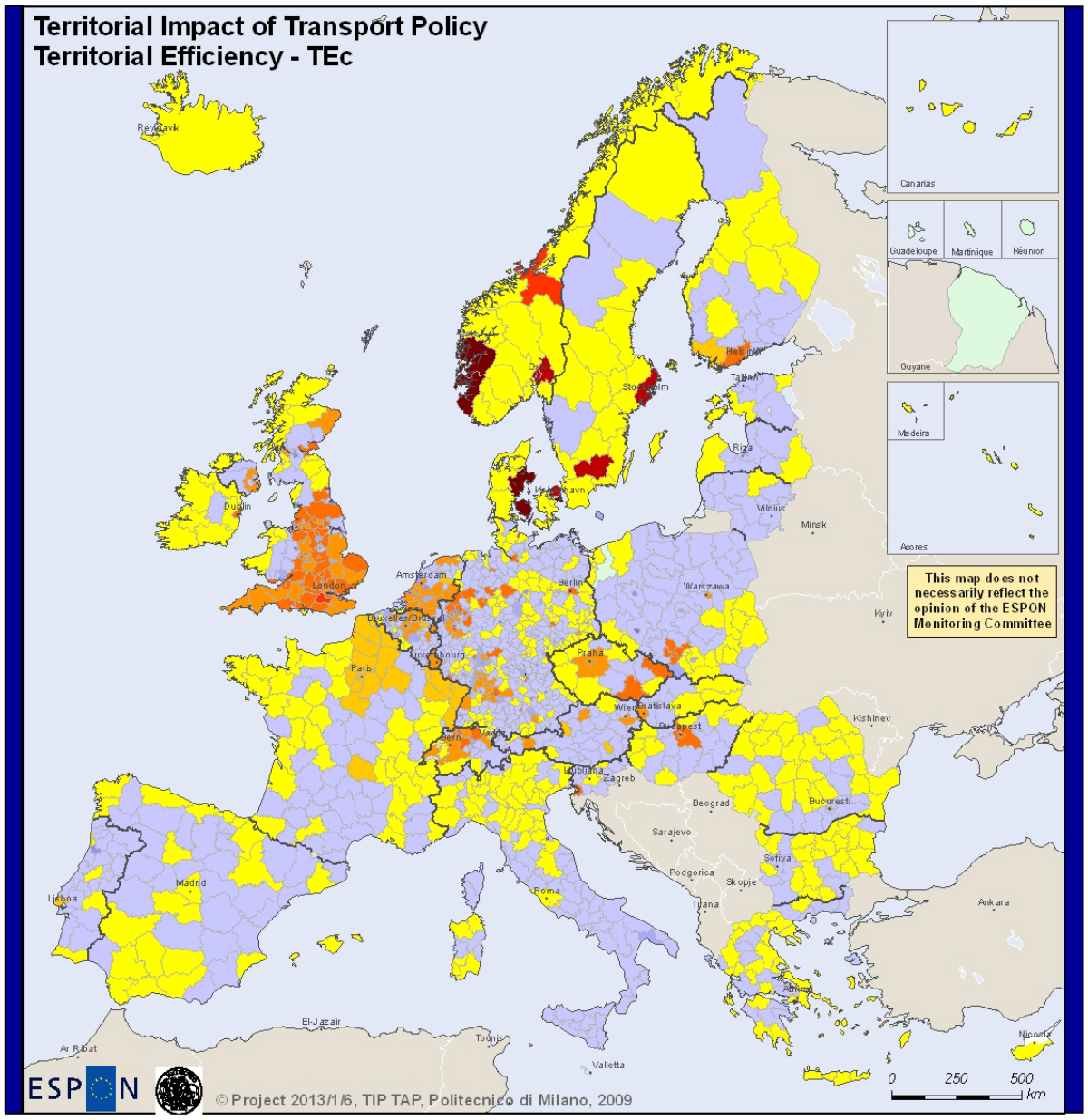
- concerning the weight of the three macro-criteria, territorial efficiency scores 43% (still the highest, but with a lower weight with respect to CAP policy), territorial identity comes second with 30% and territorial quality third with 27%;
- inside territorial efficiency, the most important score is given to economic growth (54%), the other criteria ranging between 18% (congestion and network productivity) and 10% (airport productivity);
- inside territorial quality, the maximum score is given to safety (35%), around 25% is given to emissions and market opportunities, 16% to through traffic;
- inside territorial identity, the maximum score is attributed to landscape fragmentation (45%), followed by exposure to external visitors (38%) and by regional integration (17%).

Impacts on territorial efficiency in the baseline scenario (TEa) show up with mixed signs throughout the EU: they are pervasively positive in eastern countries and Germany, but negative signs appear in those areas where congestion costs are higher. The picture does not change much in the Infrastructure Scenario (TEb) but changes in the Pricing scenario (TEc) where many punctual strong positive impacts show up, particularly in UK and in more congested areas like the capitals and big city regions (Map 2.3.5). The general synthetic value for this impact in the baseline scenario is negative (-0,01), but it increases slightly in the Infrastructure Scenario (+0,005) and more in the Pricing Scenario (+0,023). This last result is mainly linked to the fact that in the Pricing Scenario, as already said, a relevant reduction in congestion is achieved (see Table. 7).

Impacts on territorial quality are generally positive in the baseline scenario (TQa) throughout the EU regions, with some exceptions along the entire eastern border of the Union. Also the synthetic impact (weighted average along all regions) is, counter-intuitively positive (+0,040): this result is mainly due to the very positive score of the safety indicator (+0,137) and the positive score of the market opportunity indicator (0,011) which counterbalance the negative scores reached in the through traffic and emissions criteria (Table 7). The Infrastructure scenario adds new positive impacts on territorial quality (+0,088), mainly located in eastern countries (TQb) still thanks to the increase in benefits on safety (+0,25), while the Pricing scenario shows a slightly negative impact with respect to the Baseline scenario mainly due to a slight negative (and counterintuitive) impact on safety (-0,022).

Impact of transport policy on territorial identity (TIa) looks negative (-0,029), mainly due to a relevant negative impact on landscape fragmentation (-0,056). This last effect remains somehow negative in the Infrastructure Scenario (TIb), but it is more than counterbalanced by a positive impact on intra-regional integration (+0,055), showing up mainly in Romania, Bulgaria and in some regions of Germany and the other eastern countries. Under the Pricing Scenario (TIc), no relevant impacts will be felt on the landscape criterion, but positive impacts are revealed on external visitors and regional integration; the general outcome on the territory is a widespread positive impact, especially visible in New Member countries and in northern and central Old Member countries.

Map 2.3.5.



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Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
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Legend

NA	-0.15 - -0.14	0.04 - 0.06	
	-0.13 - -0.12	0.07 - 0.09	
	-0.11 - -0.09	0.10 - 0.12	
	-0.08 - -0.06	0.13 - 0.14	
	-0.05 - -0.03	0.15 - 0.17	
	-0.02 - 0.00	0.18 - 0.20	
	0.01 - 0.03		

Table 7. Transport policy: Synthetic impacts on all regions by criterion and scenario

(Macro)-Criterion	Transport- Baseline	Transport- Infrastructure	Transport- Pricing
E1 – Productivity of inland transport infrastr.	0,0496	0,0252	-0,0412
E2 – Productivity of airports	0,0462	-0,0127	-0,0083
E3 – Economic growth	0,0277	0,0000	-0,0001
E4 – Congestion costs	-0,2191	0,0089	0,1744
Q1 – Traffic passing through	-0,0146	-0,0051	0,0019
Q2 – Emissions	-0,0308	0,0002	0,0005
Q3 – Safety	0,1372	0,2530	-0,0219
Q4 – Market opportunities	0,0114	0,0034	0,0002
I1 – Landscape fragmentation	-0,0563	-0,0154	0,0000
I2 – Exposure to external visitors	-0,0060	-0,0008	0,0241
I3 – Regional integration	-0,0123	0,0550	0,0272
TE – Territorial Efficiency	-0,0109	0,0049	0,0231
TQ – Territorial Quality	0,0407	0,0886	-0,0072
TI – Territorial identity	-0,0297	0,0021	0,0138
SI – Summative impact	-0,0005	0,0293	0,0115

Summative Impact, considering all the macro-criteria, shows a very weak negative sign in the Baseline Scenario, but the sign becomes visibly positive in the Pricing and more so in the Infrastructure Enhancement scenario. Looking at maps, the Baseline scenario (SIa) looks generally positive for eastern countries, northern Sweden and southern Italy, and for many northern and southern regions in Spain. In the other cases, the result is slightly negative. The Infrastructure scenario (SIb) adds robust positive impacts to almost all regions in eastern countries, plus the almost entire Germany, parts of Portugal and Denmark. The Pricing Scenario (SIc) enlarges further these positive impacts westward, particularly towards southern Sweden, Holland, England, northern and eastern France, the Po valley in Italy.

A different weighting system was prepared using the questionnaire delivered to attendants of the ESPON Prague seminar (49 responses). Table 8 below provides the weighting system of different professional groups (e.g. policy makers, civil servants, academics and practitioners). Interviewees were asked to provide us with their policy priorities by taking both a European and a national approach.

Table 8. Preferences concerning relevance of policy goals - TRANSPORT policies

	EXPERTS	Policy makers		Publi Officials		Academics		Practitioners	
		EU View	National View	EU	National View	EU	National View	EU	National View
TE[4]	47	45,00	42,50	49,16	46,66	39,75	36,50	39,00	39,00
TQ	30	30,00	33,75	31,31	33,81	36,75	38,00	34,00	34,00
TI	23	25,00	23,75	19,52	19,52	23,50	25,50	26,86	26,86
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
E1	18	27,50	31,25	28,08	28,57	27,50	28,50	26,67	30,83
E2	10	22,50	21,25	23,46	21,79	20,75	21,25	18,33	14,17
E3	54	28,75	28,75	32,69	30,36	31,75	31,75	35,00	35,00
E4	18	21,25	18,75	15,77	19,29	20,00	18,50	16,67	18,33
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Q1	16	23,75	22,50	23,46	27,86	22,75	25,50	20,83	23,33
Q2	25	23,75	26,25	29,23	24,29	32,00	28,75	35,00	33,33
Q3	35	27,50	25,00	20,77	22,50	20,75	19,75	18,33	20,00
Q4	24	25,00	26,25	26,54	26,07	24,00	25,50	25,83	23,33
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
I1	45	33,75	35,00	27,69	30,71	38,17	42,42	45,00	40,00
I2	38	28,75	27,50	23,08	23,93	24,92	25,42	24,17	27,50
I3	17	37,50	37,50	49,23	43,21	36,42	32,17	30,83	32,50
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

[4] The structure of the questionnaire was such that the interviewees were asked to assess the relative importance of TE, TQ and TI only once; the weight for the macro criteria are thus necessarily the same for Transport policies and CAP policies.

Concerning the weights of the macro-criteria, the preferences of policy makers (with a European point of view) are very similar and consistent with the experts view; they are also very similar across the different positions of the respondents. On the other hand, inside Territorial Efficiency our (transport) experts gave a much higher preference to impact on GDP (E3: 54%) than policy makers and other respondents (who indicated the interval 28%-32%); similarly they gave higher weights to safety (Q3) and to landscape fragmentation (I1), but the differences are lower in these cases.

Table 9 shows and compares the average summative impacts in the three scenarios obtained by adopting the policy makers' weighting system and those using the expert's weighting system. The results are quite similar, and this similarity is confirmed comparing previous Summative Impacts maps with the ones using policy makers weights (see Scientific Report) [5].

Table 9. Average summative impacts according to policy makers' and experts' weights

	EXPERTS' WEIGHTS			POLICY MAKERS' WEIGHTS		
	BASELINE	INFRASTRUCTURE	PRICING	BASELINE	INFRASTRUCTURE	PRICING
TE	-0,0109	0,0049	0,0231	-0,0146	0,0060	0,0238
TQ	0,0407	0,0886	-0,0072	0,0298	0,0693	-0,0054
TI	-0,0297	0,0021	0,0138	-0,0254	0,0152	0,0172
SI	-0,0005	0,0293	0,0115	-0,0039	0,0273	0,0134

2.3.7. Calculating impacts at national and European level

Following the 3-level approach proposed by ESPON, the TEQUILA 2 model also enables to compute single dimension and summative impacts both at the national and European level, as averages of regional impacts. Table 10 provides these figures, in the case of the Baseline Scenario and the experts weighting pattern.

Within Territorial efficiency, single dimension impacts E1, E2 and E3 (productivity of infrastructure and economic growth) are positive in all countries (with just a few minor exceptions) and, thus, also at the EU level. Differently, E4 (congestion) is negative and in general takes on values of rather high magnitude, somehow counter-balancing the effect of the others: in fact, summative TE shows positive values only in a few countries, mainly New Members, but negative in all western countries. As already said, the impact on TE in the EU is negative.

Within Territorial quality, single dimension impacts Q1 and Q2 (through traffic and emissions) are generally negative in all countries while Q3 and Q4 (safety and market opportunities) are positive in all countries, and the respective EU impact values behave accordingly. As a consequence of this, TQ shows positive values in several countries as well as at the EU level.

Within Territorial identity, single dimension impacts I3 and I2 (internal integration and exposure to external visitors) are negative in several countries and at the EU level; I1 (landscape fragmentation) is negative in all countries and the EU levels. As a

[5] Also stastistical analysis shows almost perfect correlation (see Scientific Report).

consequence, TI shows negative values in almost all countries as well as at the EU level.

Finally, as of SI, all Old Member countries are negatively affected by the policy scenario considered, while all New Member countries are positively affected mainly thanks to both a positive impact on Territorial Efficiency and on Territorial Quality. Given the different demographic and economic weight of the two types of countries, the SI shows a negative sign at the EU level.

2.3.8. Calculating impacts on urban and rural areas

Different types of regions are differently affected by the policy scenario considered in this study. Considering as usual the Rural/Intermediate/Urban typology, in most cases the signs of the single-dimension impacts do not change across the three classes, and impacts on urban and rural regions are pretty similar. On the other hand, impacts on intermediate regions almost invariably show much higher (absolute) values of the impacts.

These and other analytic results ultimately suggest that no remarkable differences in impacts can be detected between different types of regions (rural/urban but also rich/poor, central/peripheral) (see the Scientific report).

Table 10. Transport policy: Average impacts by country (Baseline scenario)

	E1	E2	E3	E4	Q1	Q2	Q3	Q4	I1	I2	I3	TE	TQ	TI	SI
EU	0,049	0,046	0,027	-0,218	-0,014	-0,031	0,134	0,012	-0,056	-0,006	-0,013	-0,011	0,040	-0,030	-0,001
AT	0,037	0,008	0,008	-0,214	-0,026	-0,003	0,012	0,007	-0,191	-0,053	-0,006	-0,027	0,001	-0,107	-0,040
BE	0,078	0,051	0,008	-0,289	-0,029	-0,001	0,012	0,016	0,000	-0,065	-0,003	-0,028	0,003	-0,025	-0,018
BG	0,053	0,010	0,058	-0,012	0,108	-0,067	0,309	0,030	-0,122	0,036	-0,066	0,040	0,116	-0,053	0,038
CH	0,016	0,091	0,004	-0,279	-0,011	-0,001	0,004	0,007	-0,044	-0,001	-0,003	-0,036	0,001	-0,021	-0,021
CY	0,000	0,048	0,003	-0,377	0,000	0,000	0,000	0,000	0,000	0,000	0,000	-0,062	0,000	0,000	-0,026
CZ	0,044	0,021	0,093	-0,323	-0,004	-0,059	0,465	0,044	-0,024	0,024	-0,019	0,002	0,158	-0,005	0,047
DE	0,058	0,022	0,010	-0,213	-0,005	0,000	0,023	0,009	-0,077	-0,017	-0,004	-0,020	0,009	-0,042	-0,017
DK	0,005	0,015	0,006	-0,464	-0,001	0,000	0,000	0,026	-0,005	-0,003	0,003	-0,078	0,006	-0,003	-0,032
EE	0,167	-0,038	0,270	-0,060	-0,001	-0,044	0,000	0,013	0,000	0,007	-0,067	0,161	-0,008	-0,009	0,065
ES	0,007	0,033	0,008	-0,099	-0,002	-0,086	0,144	0,004	-0,057	-0,044	0,009	-0,009	0,030	-0,041	-0,006
FI	0,003	0,188	0,011	-0,416	-0,007	-0,008	0,024	0,003	-0,033	-0,002	0,000	-0,049	0,006	-0,015	-0,024
FR	0,010	0,120	0,002	-0,264	-0,001	-0,003	0,008	0,004	-0,019	-0,020	-0,003	-0,032	0,003	-0,017	-0,018
GR	0,009	0,010	0,012	-0,126	-0,017	-0,007	0,157	0,002	-0,137	-0,017	0,004	-0,014	0,051	-0,068	-0,009
HU	0,038	0,001	0,072	-0,227	-0,015	-0,033	0,328	0,023	-0,084	0,105	-0,031	0,005	0,109	-0,003	0,034
IE	0,018	0,019	0,003	-0,164	-0,001	-0,013	0,009	0,003	-0,021	-0,008	-0,014	-0,023	0,000	-0,015	-0,014
IS	0,012	0,021	0,009	-0,088	-0,001	-0,004	0,026	0,006	-0,016	-0,004	0,000	-0,007	0,009	-0,009	-0,002
IT	0,000	0,014	0,002	-0,046	0,000	0,000	0,000	0,001	0,000	-0,002	0,000	-0,006	0,000	-0,001	-0,003
LI	0,002	0,107	0,016	-0,345	0,000	0,000	0,000	0,001	0,000	0,000	0,000	-0,043	0,000	0,000	-0,018
LT	0,162	-0,004	0,172	-0,006	-0,018	-0,125	0,256	0,016	-0,012	0,034	0,005	0,120	0,059	0,008	0,072
LU	0,011	0,099	0,004	-0,468	0,000	-0,028	-0,001	0,006	-0,031	-0,004	0,000	-0,070	-0,006	-0,015	-0,036
LV	0,452	-0,024	0,206	-0,013	-0,005	-0,041	-0,009	0,051	0,000	0,011	-0,055	0,188	-0,002	-0,005	0,079
MT	0,000	0,003	0,023	-0,018	0,000	0,000	0,000	0,005	0,000	-0,005	0,000	0,009	0,001	-0,002	0,004
NL	0,025	0,068	0,004	-0,303	-0,003	0,000	0,001	0,014	-0,027	-0,020	0,001	-0,041	0,003	-0,020	-0,022
NO	0,002	-0,199	0,066	-0,379	0,001	-0,047	0,002	0,005	-0,050	-0,052	-0,033	-0,052	-0,010	-0,048	-0,038
PL	0,174	0,025	0,104	-0,114	-0,024	-0,166	0,707	0,041	-0,072	0,048	-0,048	0,070	0,212	-0,022	0,088
PT	0,024	0,009	0,017	-0,071	-0,006	-0,004	0,052	0,004	-0,124	-0,046	0,014	0,002	0,017	-0,071	-0,013
RO	0,072	0,039	0,079	-0,050	-0,005	-0,069	0,621	0,012	-0,110	0,052	-0,094	0,050	0,202	-0,046	0,070
SE	0,001	0,052	0,035	-0,198	-0,656	-0,023	0,022	0,009	-0,067	-0,047	0,012	-0,011	-0,101	-0,046	-0,047
SI	0,147	0,164	0,160	-0,173	-0,058	-0,019	0,045	0,048	-0,109	0,071	-0,052	0,098	0,014	-0,031	0,038
SK	0,081	0,035	0,100	-0,123	-0,007	-0,062	0,243	0,025	-0,042	0,068	-0,014	0,050	0,074	0,004	0,045
UK	0,064	0,089	0,007	-0,485	-0,001	-0,008	0,017	0,005	-0,059	-0,014	-0,015	-0,063	0,005	-0,034	-0,035

2.3.9. The FLAG model

The main purpose of the Flag Model, developed by Nijkamp, Ouwersloot and Vreeker (Nijkamp and Ouwersloot, 1997; Nijkamp and Vreeker, 2000), is to analyse whether one or more policy alternatives can be classified as acceptable/sustainable or not, in terms of their regional impact. Its use inside the Tequila 2 model concerns the possibility of computing "summative" impacts of some policy, allowing a weighted averaging and consequently compensation among impacts on different criteria. If (negative) impact on one criterion exceeds a certain threshold, compensation with a more favourable impact on another criterion should be excluded. The Flag Model does so by comparing impact values with a set of reference values (labelled as Critical Threshold Values in the model).

The FLAG model is applied to the Transport policy for a subset of indicators, namely concerning impacts on Congestion, Safety and Emissions. For each indicator a critical threshold value (benchmark value) was established[6] through experts' consultation. Thresholds are determined as follows:

a. Congestion: when the number of hours driving under congestion conditions is greater than 3,5 hours per day, this is not considered acceptable. Regions exceeding this threshold are accordingly 'flagged';
b. Safety: when it worsens as a consequence of policy interventions, this is not considered tolerable. The threshold value is thus stability at the present level (0% decrease); regions exceeding this threshold are accordingly 'flagged';
c. Emissions: the limit to emissions is defined once again in the absence of increases compared with the present condition. This limit is strict (but looser with respect to the Kyoto engagement on reductions), and partly unfair with respect to regions with low present emissions (as a consequence of virtuous behaviour or low car ownership rate). Therefore it was decided to establish three levels of "flagging": yellow flag, with increases between 0 and 50%, orange flag with increases between 50% and 100%, and red flag with increases beyond 100%.

In the case of congestion, as the threshold is defined in physical terms (hours), the impact values that were used are the PIMs – potential impacts – translated into "levels" (while in the model they are expressed as "increases"). Also in the other two cases, the PIMs were used, with no consideration of desirability or vulnerability elements, in order to keep the analysis more neutral and based only on forecasts of physical elements.

Map 2.3.6 shows the 'flagged' regions in the case of congestion indicator in the baseline scenario. Alert situations are primarily clustered in a few regions: inside the Greater London area, in some areas in Wales (Bristol and Cardiff), in Greater Manchester, Liverpool and Merseyside in UK; in the Stuttgart and Tübingen areas in the Baden-Württemberg Land in Germany; in the Bergamo, Treviso and Venice provinces along the main transportation axis in Northern Italy plus in the Bologna-Florence link; in the wider Budapest metro area, and in the Goriska-Koper area in Slovenia.

Another map (2.3.7) shows the 'flagged' regions in the case of the Safety indicator in the baseline scenario. The main alert situations concern a large part of central

[6] An important problem faced in practice is the fact that a benchmark value is not always unambiguous; in different areas and under certain circumstances different experts and decision-makers may have different perspectives on the precise level of a CTV.

England, from London along the main western and northern corridors, and southern Scotland; many regions in Holland and Germany (Munich, Frankfurt, Bremen, many cities in Nordrhein-Westfalen like Köln and Bonn); the Paris rings and Le Havre; Stockholm and some other regions in Sweden; many regions in Switzerland (Bern, Neuchâtel and Zürich); the Porto area in Portugal; some scattered regions in the Eastern European Countries.

In all these cases, a summative territorial impact allowing compensations among different impacts should not be allowed.

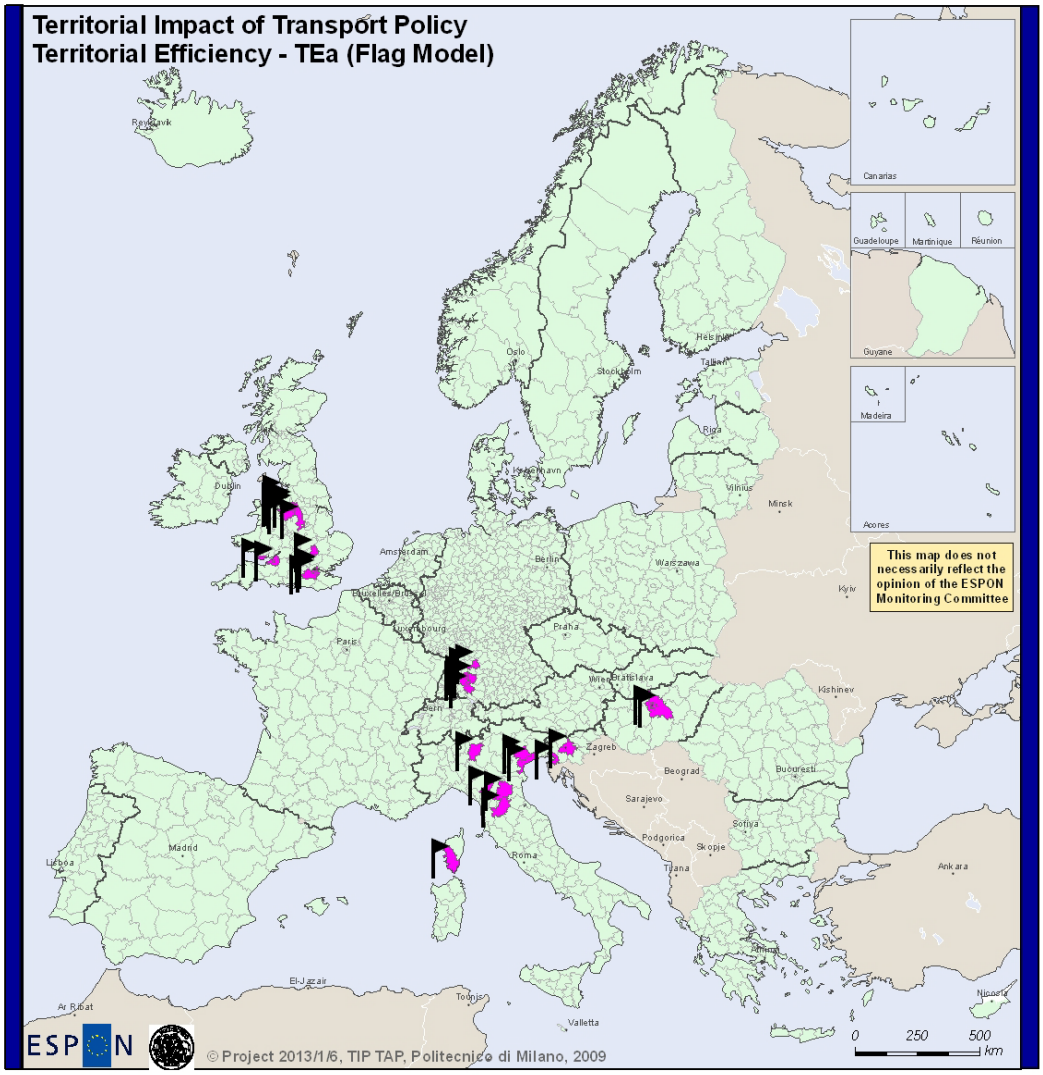
We kept the emissions case separated, due to the peculiar situation which is showing up. In fact, almost all European regions – with just a few exceptions in central Germany and southern Italy – will overcome the threshold assumed, namely the present condition, in the baseline scenario (Map. 2.3.8). Main western countries, together with Czechia, Slovakia, Slovenia and Hungary, will remain inside the limit of +50%, but Poland and the Baltic Republics will go beyond this limit and especially Romanian and Bulgarian regions will overcome the 100% increase. Critical conditions are also apparent in Dublin and southern Ireland, in South-western Sweden from Malmö to Gothenburg, and in northern Greece.

It is important to underline the fact that only trend improvements in engine technologies is considered in the statistical modelling exercise, but no breakthrough discontinuities that could come from hybrid or hydrogen technologies. Furthermore, no policy intervention is included in the scenario, beyond what already decided by the EU or national Governments.

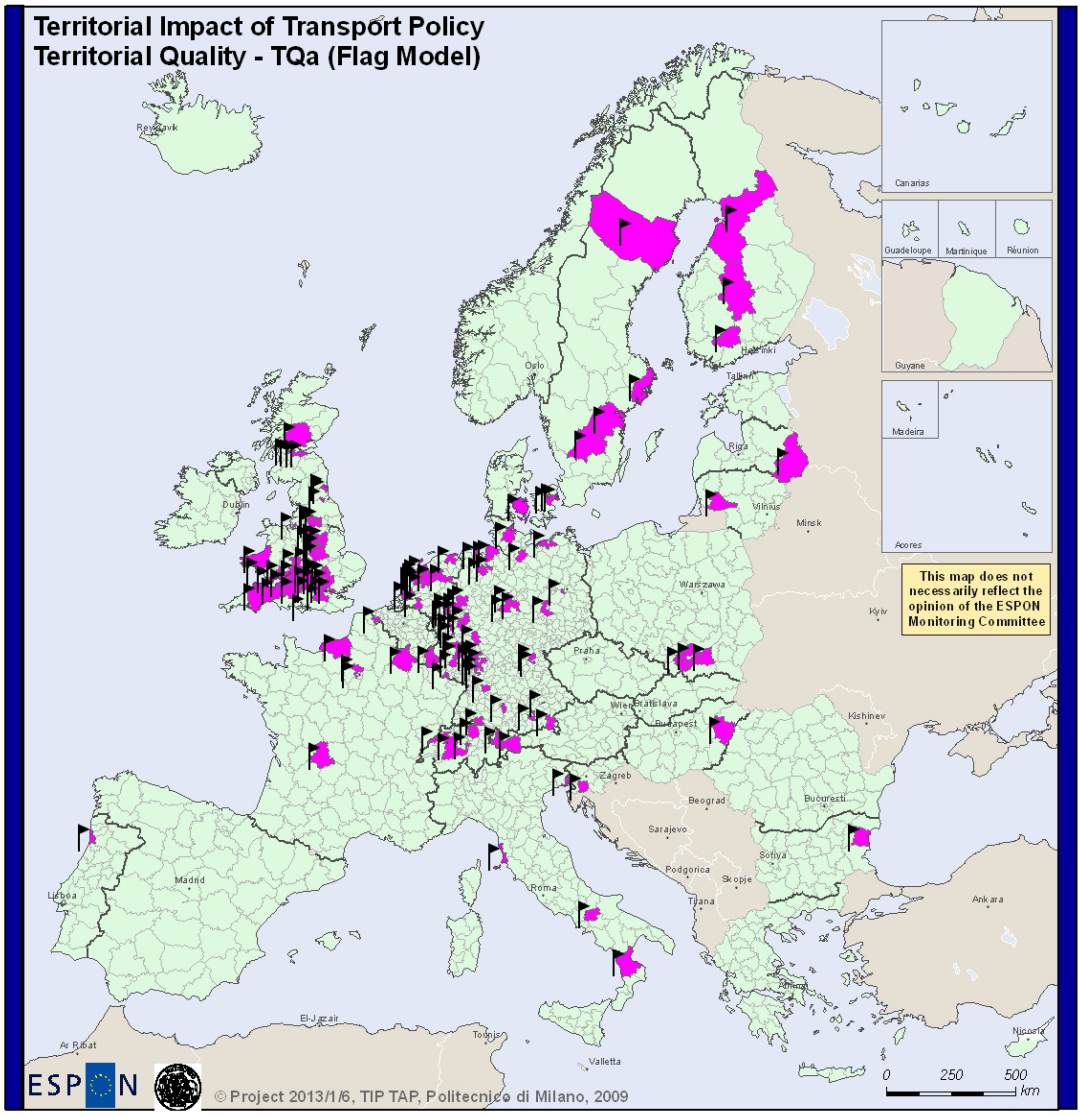
Taking up pro-active policies and regulatory countermeasures, the picture is due to change. In the “infrastructure” scenario in fact (Map 2.3.9.), the number of “flagged” regions decreases (meaning a lower relevance of the preceding conditions) and main problems would concern Eastern European countries (Poland, Romania and Bulgaria in particular), Spain, Ireland, northern Greece and some specific areas like the central north-Italian axis from Brescia to Trieste. In the third, “pricing” scenario (Map not shown here), the number of “flagged” regions reduces even more, the flags being visible only in Romania and Bulgaria (countries with a relatively low present level of emissions), northern Greece and some other scattered regions.

Therefore, the conclusion on traffic emissions is straightforward: in a trend scenario, the conditions of emissions are clearly non-sustainable. A mix of policy measures are therefore urgently needed: strong support to technological change and innovation in energy efficiency of engines and emission control; important efforts on modal choice, favouring the rail, mass transit in cities and environment-friendly modes, through regulations, taxations, road pricing and cultural campaigns; new infrastructure investments in order to increase accessibility and energy saving in remote and least accessible areas and solve the most acute congestion problems.

Map 2.3.6.
The Flag model: warnings about overcoming of congestion thresholds



Map 2.3.7.
The Flag model: warnings about overcoming of safety thresholds



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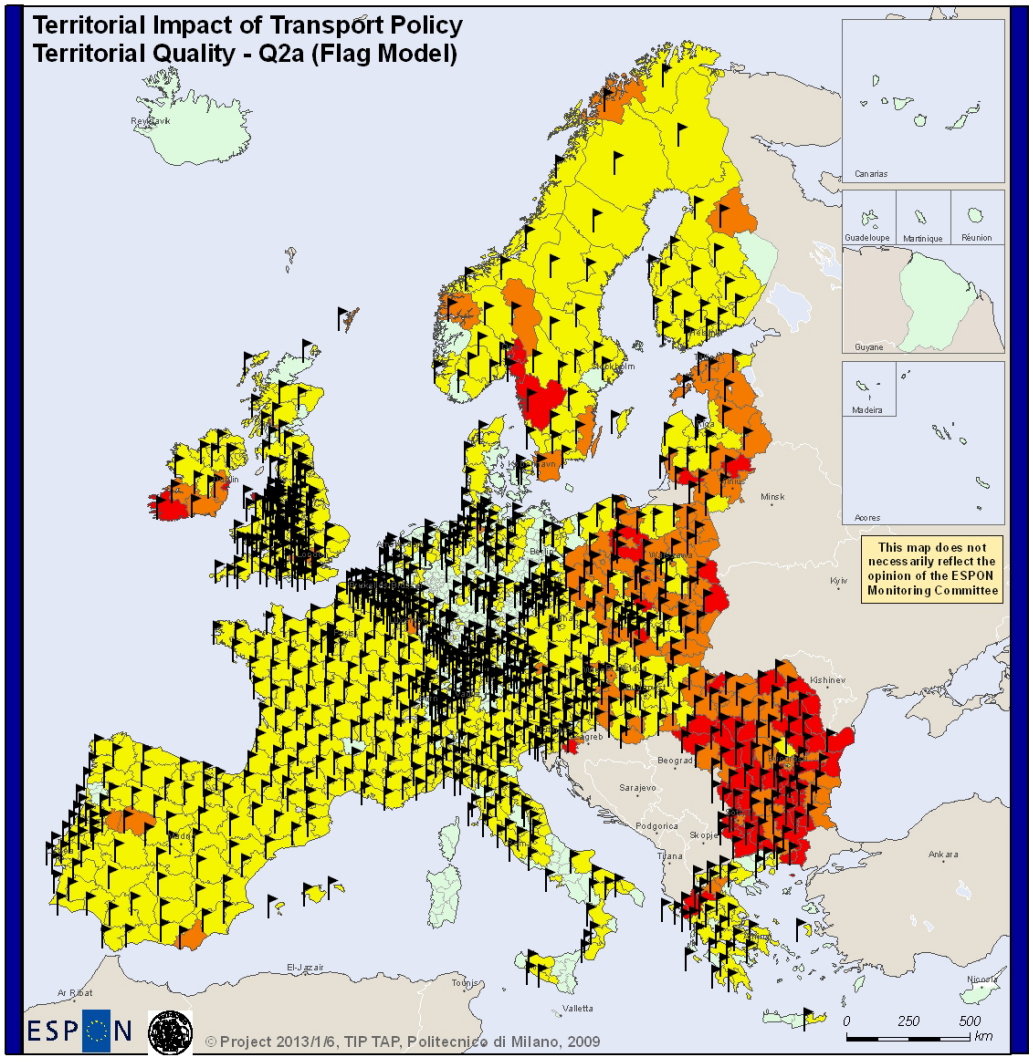
Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
© EuroGeographics Association for administrative boundaries

Legend

NA

Flagged Regions

Map 2.3.8
The Flag model: warnings about emissions in the baseline scenario (a)



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Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
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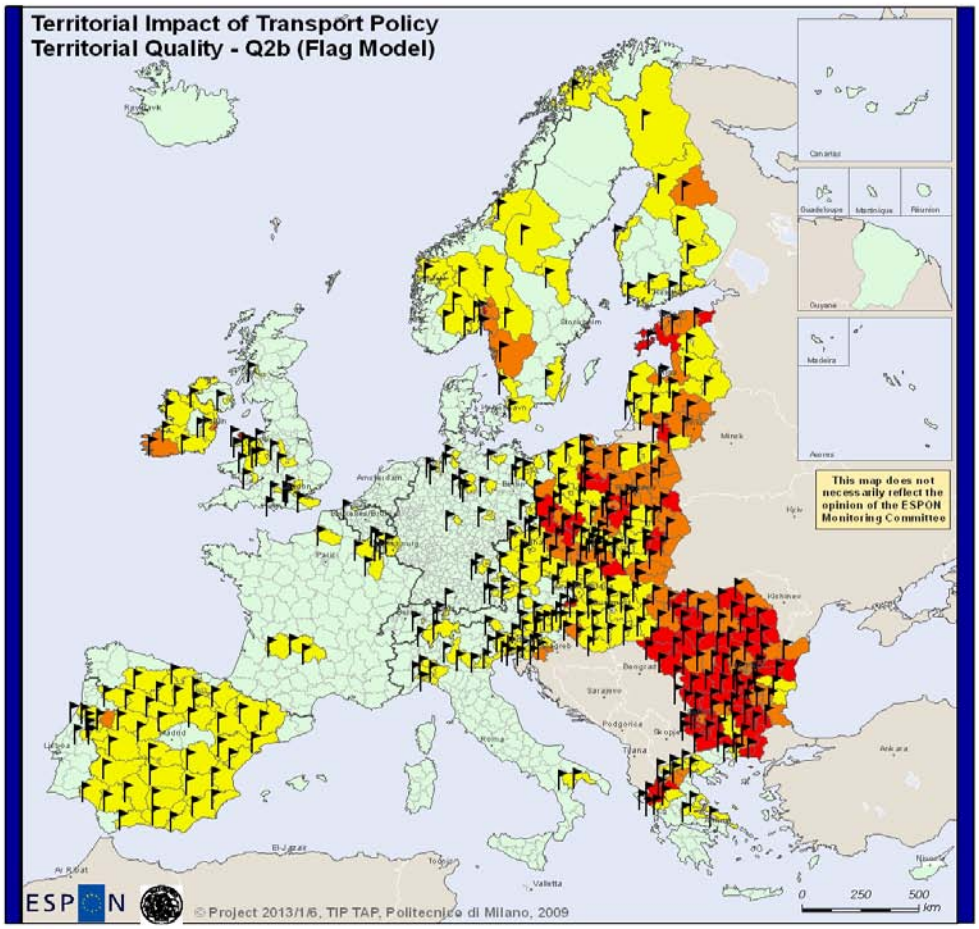
Legend

Not Flagged

Flagged Regions
Over the Threshold
More than 50%
More than 100%

Map 2.3.9
The Flag model: warnings about emissions in the infrastructure scenario (b)



2.3.10. Key findings

The analytical calculation of impacts of EU transport policy has produced a high number of maps. In fact 11 impact criteria were defined, on which 3 scenarios were elaborated (33 maps, with one case in which no impact was found, referring to the landscape impact in the pricing scenario I1c). Beyond that, 3+1 summative impacts were mapped, still for the three scenarios (12 maps) and possibly other summative impacts using alternative weighting systems (which did not prove to determine really different outcomes). Of course, only a selection of the most important ones was included here, while a wider selection is presented in the Scientific Report, and the full array of 45 maps is put on the Espon website.

Key findings concerning transport policy regard:
a. A generalized economic benefit of ongoing infrastructure provision (baseline scenario) and the particular advantage of eastern countries in the Enhanced Infrastructure scenario. Per capita GDP and market potential will increase, and also productivity of the network will increase, adding to territorial competitiveness.
b. The emergence of a new economic growth area in central Europe, eastward with respect to the "European Pentagon", defined by the "New Quadrangle" between Praha – Krakow – Budapest – Vienna.
c. Increasing intra-regional integration is visible inside countries particularly engaged in ongoing infrastructure construction (Spain, Germany), but is going to spread towards new countries and regions in the Enhanced Infrastructure scenario, particularly towards New Member Countries. This last element looks crucial: increased internal integration is highly relevant in these countries in order to allow development to spread out of the major centres in the direction of cities of second and third rank.
d. In the baseline scenario, increased congestion is pervasive throughout the territory and particularly in large northern metropolitan areas: ongoing infrastructure looks insufficient to accommodate new forecasted mobility. In aggregate terms, the average impact on the EU will show the highest negative sign among all impacts, all countries scoring negatively – from the highest negative impacts in UK and Denmark to the lowest in Romania and Bulgaria. However, congestion is due to reduce itself, especially in eastern countries, according to the second scenario of new infrastructure provision and even more according to the pricing scenario, especially in most congested areas. Second and third rank airports would substitute for increased inland mobility.
e. Similar results with respect to economic impact on GDP and productivity of networks will show up concerning impacts on new market potentials of regions: the emergence of a central-eastern European "quadrangle" is confirmed.
f. Increase in safety will, to a great extent, be secured in the Baseline scenario, and enhanced in the Infrastructure one, especially in eastern countries.
g. Traffic emissions, on the other hand, will expand, pervasively in the Baseline and mainly in eastern countries in the Infrastructure scenario: this result has to raise political concern. Hopefully, emissions would be slightly reduced in the Pricing scenario in a pervasive way, underlining the relevance of control and regulatory policies on road traffic.
h. Among impacts on territorial identity, all showing negative signs at the EU level, landscape fragmentation scores first and will particularly hit countries and regions where new infrastructure will or is being built.
i. Summative impact on Territorial Efficiency in the baseline scenario show up negative on the average in the EU, in all western countries and in regions where congestion is higher; on the other hand, it scores positive in all eastern countries. The picture changes in the Pricing scenario where many punctual strong positive impacts

show up, particularly in UK and in more congested areas like the capitals and big city regions, once again showing the relevance of regulatory policies.
j. Impacts on territorial quality are generally positive in the baseline scenario throughout the EU regions. This counter-intuitive result is mainly due to the very positive score of the safety indicator and the positive score of the market opportunity indicator, which counterbalance the negative scores generally reached in the through traffic and emissions criteria.
k. Impacts on territorial identity are generally speaking and synthetically negative, as a consequence of the expected negative impacts of network construction on landscape fragmentation in all countries and the limited positive effects on regional integration.
l. The use of the FLAG model in order to convey strong warnings when some critical thresholds in physical indicators on congestion, safety and emissions are attained or overcome, supplied very interesting results. Concerning congestion levels, alert situations are primarily clustered in a few regions: inside the Greater London area, in some areas in Wales (Bristol and Cardiff) and in Greater Manchester, Liverpool and Merseyside in UK; in the Bergamo, Treviso and Venice provinces along the main transportation axis in Northern Italy plus in the Bologna-Florence link; in the wider Budapest metro area and in some areas inside the Baden-Württemberg Land (Stuttgart and Tübingen).
m. Concerning Safety, the main alert situations concern a large part of central England, from London along the main western and northern corridors, and southern Scotland (Edinburgh and Glasgow); many regions in Holland (mainly Amsterdam and Rotterdam) and Germany (Munich, Frankfurt, Bremen, many areas in Nordrhein-Westfalen like Köln and Bonn); Stockholm and some other regions in Sweden; most regions in Switzerland (Neuchâtel, Zürich and Bern); the Porto area in Portugal; some scattered regions in the Eastern European Countries.
n. The forecasted condition concerning emissions is crucial: almost all European regions will overcome the threshold assumed, namely the present emission condition, in the baseline scenario. Main western countries, together with Czechia, Slovakia, Slovenia and Hungary, will remain inside the limit of +50%, but Poland, the Baltic Republics, Romania, Bulgaria will go abundantly beyond this limit. Critical conditions are also apparent in Dublin and southern Ireland, in South-western Sweden and in northern Greece. Taking up pro-active policies and regulatory countermeasures, the picture is due to change. In the “infrastructure” scenario in fact the number of “flagged” regions decreases (indicating an improvement with respect to the previous condition) and main problems would concern some Eastern European countries (Poland, Romania and Bulgaria), Spain, Ireland, northern Greece and some specific areas like the central north-Italian axis from Brescia to Trieste. In the third, “pricing” scenario, the number of “flagged” regions reduces even more, the flags being visible only in Romania and Bulgaria (countries with a relatively low present level of emissions), northern Greece and some other scattered regions.

3. OPTIONS FOR POLICY DEVELOPMENT

In the case of this project, options for policy development - which may form the basis for interventions for improving European competitiveness and cohesion - can be articulated in three main groups:
- utilization of territorial impact assessment methodologies and tools,
- suggestions for policies concerning agriculture, coming from this project’s results,
- suggestions for policies concerning transports, coming from this project’s results.

3.1. Utilization of territorial impact assessment methodologies and tools.

The results of the present "exploratory" application of a renewed TIA methodology look convincing in our opinion. Results as synthesized on single dimension and summative maps look widely reasonable and robust, and often even counter-intuitive results appear interesting and convincing. One of the weakness points of the previous Tequila utilisation, namely the presentation of only summative impacts, is overcome here through the definition of single-dimension impacts on single criteria and explicitly on economy, competitiveness, society, environment, climate change, etc. The summative elaborations can help only in case that compensations among different impacts look acceptable and rightly managed through the weighting system.

In this last case, two improvements look crucial: the use of two weighting systems (addressed to compare impacts on different criteria), one coming from internal experts and one coming from policy makers, and the use of the FLAG model. In the first case, possible doubts concerning the relevance of some single criteria or summative criteria – as the triad of territorial efficiency, quality and identity- are easily overcome, as some of them could have received a zero weight. This was not the case, and especially policy makers indicated a precise interest not just on traditional economic or environmental impacts but on more innovative, territorial impacts like the ones on landscape, community viability and identity, intra-regional integration. In the second case, the use of the FLAG model gave relevant warnings when certain impact thresholds were overcome, forbidding the process of inter-impact compensation (and therefore, the computation of summative impacts).

Besides this, another interesting feature of the TEQUILA models might be useful, namely the possibility of recalculating summative impacts during a meeting or a public presentation, considering new, proposed weighting systems and comparing the results with the internal ones.

Given the sensitivity of single-dimension impacts to the desirability element and of summative results to the weighting system, some more thorough reflection on what we call the "territorial utility functions" will be useful, enlarging the scope of the analysis towards national and regional preferences.

Consistency with the analytical tools and suggestions of the Commission concerning Impact Assessment procedures was also inspected, and the result looks positive. The general philosophy is very similar and the spectrum of impacts even wider in our case. The advantage or our methodology consists in the fact that impacts are defined by region, in a transparent and easily comparable way, showing where excessive or "outlier" impacts locate – provided that also the policy measures are sufficiently detailed by region.

This last consideration looks crucial for any impact assessment exercise, and not just for the utilisation of the present model. In fact, a sound TIA exercise on any policy requires that:
- *policy measures* to be inspected are *clearly* and carefully defined,
- *policy intensity in each EU region* is also defined, as it constitutes the logical starting point of any elaboration,
- data concerning the expected impacts are available,

- possibly some quantitative tools (econometric models, simulation models, impact models) concerning the specific field are already available, at least for some typologies of impacts (environmental, economic, social, …).

The availability of a modelling tool in order to forecast and simulate impacts generates an important trade-off, highly visible in the present Project. This availability in fact, as it is the case for transport policies, allows a more precise definition of impacts and, most importantly, allows to take care of the multiple interactions among the different impact dimensions; but on the other hand, the results are less transparent in terms of easy justification for particular results. The opposite condition happened concerning CAP impact assessment: the definition of impacts was less solid, but the resulting maps were more easily interpretable on the basis of the proposed logical chains.

For all these reasons, we think that assessment of territorial impacts of EU policy measures, directives and regulations is both crucial and attainable on solid scientific grounds and that the tool provided in this Research Project looks appropriate for utilisation in the analysis of territorial impacts other policy measures.

3.2. Suggestions for agricultural policies, coming from this project's results.

Policy suggestions concerning CAP refer to the following points:

3.2.a. even if cuts in resources deterministically produce a reduction in incomes and consequently in GDPs, total impacts on territorial efficiency may not be negative, if farmers are indirectly pushed towards alternative production strategies, both inside the sector (product diversification, quality upgrading, product marketing, new philosophies in distribution as "zero km" one) and outside it (agri-tourism, local networking with operators in the tourism sector).

3.2.b. there are clear implications for discussions of modulation in the CAP reform debates, though, and these support the findings of earlier ESPON studies. One of the recommendations made by the previous study of the Territorial Impact of the CAP was that that "the Pillar 2 budget should be *increased progressively*, as anticipated in the Agenda 2000 and MTR agreements and in the Commission's proposals for the RDR 2007-13. This might be achieved either through continuing increases in the rate of compulsory modulation or preferably through the more substantial realignment of EAGGF towards Pillar 2". The TIPTAP study has shown that substantial rates of modulation would have a broadly neutral impact on rural areas where only 25% of the funds cut from Pillar 1 are added to the Pillar 2 budget. Even without sensitivity analysis having been undertaken, it would be expected that the impacts would be positive in most rural areas if all of the funding cut from Pillar 1 were diverted to Pillar 2 through modulation, and this therefore supports the recommendation made in the earlier study. This is highly relevant to the policy debates surrounding CAP reform.

Also, the advantages of a modulation strategy are quite evident in terms of impacts on environmental quality;

3.2.c. on the other hand, reductions in public resource distribution may end up not only in income reductions and land abandonment by weaker farms, but also in homologation of landscapes and reduction of their diversification, risks of soil erosions, reduction of community viability if alternative job opportunities are not available in the regions. All these elements are quantitatively defined and mapped in this Project.

3.3. Suggestions for transport policies, coming from this project's results.

Main results in this case concern:

3.3.a. the positive overall impact of new network construction, especially for eastern countries;
3.3.b. the condition of congestion of the entire EU network at 2030 in the baseline scenario, i.e. also in case all the already decided infrastructure is built; improvements would come as a consequence of the implementation of new infrastructure, especially for eastern countries;
3.3.c. the necessary attention to be paid to improvements in *internal* accessibility in New Member Countries - a goal that does not appear as a priority one in the ongoing policy (baseline scenario), as confirmed by our results. In fact, improved internal accessibility looks as a precondition for diffusing development outside the present concentration areas (capital cities and their surroundings, western border) and proves to be reached and very effective in the Enhanced Infrastructure scenario;
3.3.d. the critical condition of emissions revealed in the baseline scenario and by the Flag model calls for a mix of countermeasures and renewed engagement by policy makers: incentives to technological change and to alternative modes out of road mobility; new regulations and road pricing policies, cultural campaigns and selected new infrastructure provision;
3.3.e. a regulation and pricing strategy can bring relevant results: reducing emissions, but also reducing congestion in presently most congested metro areas;
3.3.f. safety looks as an important goal achieved already in the present (baseline) strategy, and further improved in the Infrastructure scenario: it represents a second, but not secondary, outcome of EU transport policy, beyond the natural one of increasing accessibility.

4. FURTHER EXTENSIONS OF ANALYTICAL WORK AND RESEARCH

Extension of analytical work that look indispensable for any systematic application of any TIA tool refers to the following items:

a. the necessity of a specific project concerning territorial values and priorities of regional and urban communities, expanding the regional part of the existing European Value Survey. Alternatively, each new study on territorial assessment of policies should be accompanied by a pervasive inspection of these values and priorities through expert judgement.
b. The Tequila model provides a methodology particularly fit for *territorial comparisons* of impacts: the *relative* value of impacts with respect to other regions or surrounding territories is the main added value of the model, rather than the absolute value of the single impact on single regions. Therefore, it should be utilised always with a comparative goal, and applied to policy alternatives.
c. The definition of European thresholds and benchmarks for impacts (e.g. in the environmental sphere) has to be made at the institutional level. Once the decision taken, this could be easily included in the FLAG model and operationalized as said before. But this is mainly a task for policy makers.
d. The availability of data for impact assessment is crucial; in the absence of it, only abstract reflections on logical chains and very general qualitative judgements are

possible. Data should be available at NUTS 3 level (or a mix of NUTS3 and 2 level, for Germany and Belgium), the most appropriate for a really “territorial” inspection.
e. Data should refer to the typology of impacts that the Commission looks willing to monitor, as for example, the ones listed in the recent Guidelines for Impact Assessment (SEC(2009)92). In these cases in fact a sound knowledge of the present condition in European regions looks propaedeutical for any trend inspection, foresight and possibly forecast. Particular attention should be devoted to a translation at NUTS-2 and -3 of data on farming, crops, productivities and incomes which are collected on different spatial breakdowns.
f. A suggestion coming from the TEQUILA models that looks relevant concerns a new attention to be devoted to information concerning regional social and identity aspects, ranging from poverty to gender, from landscape to cultural heritage, from cultural attitudes (e.g. concerning the private/public relationships) to citizens participation and governance styles. These elements may concern policy goals in themselves or supply conditions for a differentiated territorial receptivity and local response capability to EU directives and policy measures.
g. More attention should be paid, perhaps inside ESPON, to the construction of - even simplified - econometric models allowing the empirical estimation of specific, measurable impacts of specific, measurable policy actions. The availability of a vast array of impact coefficients (like the ones used in transport simulations, concerning emissions, congestion etc.) could highly support the improvement of more general territorial impact assessment tools.
h. By the same token, more scientific reflections are needed concerning future expected and unexpected outcomes of specific policy measures, specified in territorial terms. In this case, a good cooperation could come between scientific works acting at the aggregate, national or EU, level and works acting on territorial specificities.
i. Most interesting fields in which TIA tools, of the kind of Tequila Model, could be used are: specific measures in regional development policies, specific excellence policies (R&D, innovation), some possible regulatory policies concerning spatial policies (housing, anti-sprawl measures, taxation of greenfield developments), alternative measures in CAP policies (always at the condition of a clear definition of policy characteristics and policy intensity in regions).

Further extensions of the TIA project line could envisage:
j. The exploration of the possibility of modelling interregional spillover effects.
The TRANSTOOL model partly embeds in its methodology spillovers treatment (for instance the GDP impact of transport policies), but, unfortunately, broader examination of spillover effects was not possible in this Project due to time and resource limitations. Other interregional specific and ad-hoc types of models could be exploited to take them into account:

- economic spillovers (for instance, through macroeconomic regional models like the MASST model – developed inside ESPON 3.2. Project, and now under exploratory reshaping towards a NUTS-3 utilisation);
- demographic spillovers (for instance, through demographic migration models),
- environmental spillovers, through the appropriate territorial models for each type of emissions (air and water principally).

This ultimately requires to build an interregional spillover model for each kind of impact, according to EU priorities.
k. The identification of further typologies of regions which are similarly affected by the policies under examination. This typology exercise could complement the assessment of average impacts on specific geographical typologies of regions, such as the one on rural and urban areas that was developed here, and use the results of the Espon Typology Compilation Project underway.

c. Data extensions. Data constraint was a major challenge of the Project, especially as far as the CAP case is concerned, mainly because of the lack of consisted data at NUTS-3 level with adequate coverage of all EU27 and the ESPON countries network. It would be extremely valuable to access data on:

- share of ex-post P1 and P2 expenditures (and their sub-division among different priority axes) on a time series basis;
- indicators on competitiveness, for instance on knowledge transfer, innovation, modernization in the food chain, as well as on entrepreneurship,
- indicators on environmental quality and preservation such as on biodiversity available at NUTS2 level and consistently across countries,
- indicators of governance, as proxy of endogenous development capabilities of rural regions.