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TIPTAP: Territorial Impact Package for Transport and Agricultural Policies

Applied Research Project 2013/1/6

Final Report – Part A and B

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This report presents the draft final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

The partnership behind the ESPON Programme consists of the EU Commission and the Member States of the EU27, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

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This basic report exists only in an electronic version.

Foreword

The Final Report of ESPON Project 2013/1/6 “Territorial Impact Assessment of Transport and Agricultural Policies: TIPTAP” is presented here.

An ex-ante Territorial Impact Assessment (TIA) is becoming a crucial priority in EU policy design and implementation. The ESPON engagement on this subject was strong since the beginning. Inside ESPON 2006 Project 3.2 a first pioneering proposal for an operational tool, TEQUILA, was provided by the Lead Partner team of the present TPG; and also this second project has to be considered, and is in fact considered by the ESPON MC, as a still “exploratory”, though fully developed, enterprise, applied to two relevant policy fields of the EU Commission.

The general goal of the project is to provide a robust and fully operational Territorial Impact Assessment (TIA) tool, with the following characteristics:

- methodological and scientific soundness,
- consistency with the indications of the EU concerning Impact Assessment Guidelines,
- operationality on the basis of available indicators at the right territorial scale, in order to provide territorial impacts on all European regions,
- structuring of the whole process into an *operational package* which should be easily manageable, interactive, transparent, supplying results which could be useful (and comprehensible) for policy makers: it should show where will the major impacts happen and why.

This project provides this exploratory test bed (i.e. the renovated and upgraded version of the TEQUILA model) applied to two specific policies, Transport Policies and Common Agricultural Policies (CAP). The application to CAP was never carried out before with the TEQUILA model; the application to transport considerably improves on previous application in several directions.

The engagement was huge, given the complexity of the task, the scarcity of relevant data in some specific fields, the multiplicity of aspects and measures implied by the two policies. An important cooperation and integration of the different partners was necessarily pursued and achieved, with an enhanced role of the Lead Partner as model builder and model applier to the two cases, especially concerning the highly complicated case of CAP.

It is this TPG’s opinion that the results achieved look convincing, solid and relevant from a policy point of view. The methodology developed up to now can represent a solid staring point for further elaborations and enlargements to other EU policies, provided that two conditions are met: a precise definition of the single policy measures that are inspected and of the policy intensity concerning each single region (location of projects and programmes, expenditure).

The Transnational Project Group (TPG) would like to take the opportunity to gratefully acknowledge the creative and constructive collaboration the ESPON Co-ordination Unit, the ESPON Monitoring Committee and Sounding Board.

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A Executive summary

1 ANALYSIS, KEY MESSAGES AND FINDINGS

1.1. The general goal of the TIPTAP project is to provide a robust and fully operational Territorial Impact Assessment (TIA) tool, which entails the following characteristics:

- methodological and scientific soundness,
- consistency with the indications of the EU concerning Impact Assessment Guidelines,
- operationality on the basis of available indicators at the right territorial scale, in order to provide territorial impact indicators for all European regions,
- structuring of the whole process into an *operational package* which should be easily manageable, interactive, transparent,
- supplying results which could be useful (and comprehensible) for policy makers: they should show where will the major impacts happen and why.

These goals have been achieved building upon the experience of the TEQUILA1 model, developed inside ESPON 2006 Project 3.2, through a completely renovated and improved model, tested by experts.

The model and its operational package are applied to two main policies of the European Union (EU): common agricultural policies (CAP) and transportation policies. The application to CAP was never carried out before with the TEQUILA model; the application to transport considerably improves on previous application of TEQUILA (inside ESPON 3.2 project) in several directions, which will be detailed below.

1.2. Definition and operationalization of territorial impacts are related to the concept of territorial cohesion, which is defined here as “the territorial dimension of sustainability” (adding to the other traditional dimensions: the technological dimension, the political/diplomatic dimension and the dimension of habits and behaviors). Therefore, in analytical terms, a TIA encompasses impacts on the economy and competitiveness, on environment and climate change, on society and on landscape, all defined through complex indicators.

1.3. In order to reach a synthetic, general assessment of different impacts, three “summative” macro-criteria are defined, namely: territorial efficiency, territorial quality, territorial identity (all adding up to the concept of territorial cohesion). Territorial efficiency refers to resource-efficiency with respect to energy, land and natural resources; competitiveness and attractiveness; internal and external accessibility of each territory. Territorial quality refers to the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge. Territorial identity refers to enhancing “social capital”; developing a shared vision of the future; safeguarding specificities, strengthening productive “vocations” and competitive advantage of each territory. On their turn, these macro-components can be further disaggregated into more precise and homogeneous elements, which supply the criteria and indicators on which impacts may be calculated (impacts on economy, competitiveness, environment, society, …).

1.4. The main hypotheses on cause-effect impact relationship are presented for each of the two policy cases. The impacts are assessed through quantitative modelling. In the case of transport policies, already explored in the past, the previous philosophy

and calibration methodologies were evaluated and re-confirmed with the necessary amendments and updating, together with an updating of EU policies. CAP policy is assessed in quantitative terms through composite statistical indicators.

More in details, the updated TEQUILA model (TEQUILA 2) provides impact assessment at two different levels:

a. As *single-dimension impact* (SDI), that is on single impact indicators of the policy examined;

b. As *summative impact* (SI), that is on three above defined macro-components of territorial cohesion - Territorial Efficiency, Territorial Quality and Territorial Identity - as well as on a generalized Summative Territorial Impact. This assessment implies comparison, averaging and compensation among different impacts.

Territorial impact (TIM) is defined as TIM = PIM . D . V , namely the product of a Potential Impact - PIM (defined for each region using statistical indicators or a simulation model) times an indicator of Desirability - D (in order to take into account the fact that, for example, a similar growth in employment has a different priority in advanced and lagging regions) times an indicator of Vulnerability – V (in order to take into consideration the higher vulnerability of urban areas to pollution or of natural areas to landscape fragmentation).

In case of Summative Impacts, the TIMs are calculated through a weighted sum of impacts (single-dimension TIMs) on different criteria (e.g.: impacts on regional GDP, jobs, accessibility, ….).

The general methodology – namely a Multicriteria analisis – and the criteria taken into consideration for calculating the territorial impacts are fully consistent with the recent EU Guidelines concerning Impact Assessment (SEC(2009)92). Of course, the attention to territorial elements is, by definition, higher in our study and, what really matters, the territorialisation of impacts is not limited to the EU or national level, but reaches the regional level, at a very detailed scale (1.327 regions at NUTS-3 level, for 28+4 countries, in the case of transport policies).

1.5. Three methodological aspects have been explored in depth and represent operational and methodological improvements with respect to the previous TEQUILA1 model:

i. *the weighting system*, which captures preferences on different policy priorities and goals as expressed by both policy makers and sectoral policy experts;

ii. *the value functions*, which translate impacts expressed in their own units into values ranging between 0 and 1, according to the form of the utility function. Sectoral policy experts have been consulted also to gather this specific knowledge;

iii. *the excessive impacts, not liable to compensation*. In order to take into consideration the fact that some very high negative impacts (e.g. on environment) cannot be compensated by some other positive impacts (for example on economy), an appropriate model was used, the FLAG model, and applied to three different kinds of impacts of transport policies (emissions, congestion, safety). In this case, for the regions in which an excessive impact is shown, compensation and weighted summation with other impacts is not allowed and the map shows a “flag”.

Also, the previous TEQUILA SIP Package (Interactive Simulation Package) has been reconsidered and enlarged in TEQUILA 2 in two main directions:

A. it considers both impacts on single dimensions (economy, society, environment and climate change, …) and summative impacts (on territorial efficiency, quality and identity);

B. it integrates mapping procedures directly inside the computational machine, in order to avoid transfer procedure from a statistical elaboration tool to the mapping tool. Results of the assessment procedure are fully automated and integrated into a unique software package, allowing instant simulations and mapping in a way that could be useful for direct interaction with scientists and policy makers.

1.6. The single criteria on which impacts are computed are, respectively for the two policies:
a. for CAP: Economic growth (E1), Unemployment (E2), Tourism diversification E3), Environmental quality (Q1), Community viability (Q2), Emissions (Q3), Risk of soil erosion (Q4), Landscape diversity (I1), Community identity (I2), Heritage products (I3);
b. for TRANSPORT: Productivity of inland infrastructure (E1), Productivity of airports (E2), Economic growth (E3), Congestion costs (E4), Traffic passing through (Q1), Emissions (Q2), Safety (Q3), Market opportunities (Q4), Landscape fragmentation (I1), Exposure to external visitors (I2), Regional integration (I3)

1.7. In operational terms, our methodology apparently supplies convincing results: interesting when they are confirmations of more or less known conditions and even more interesting when they are counterintuitive, but likely results. This outcome is particularly valuable because the assessment was made in quantitative terms – something necessary in presence of such a huge number of regions - in spite of the difficulties coming from lack of data, especially in the case of CAP policies.

In this last case, another difficulty was encountered: the lack of precise institutional definition of policy intensity (in terms of resources allocated) in each region, as many decisions for the period 2007-2013 are left to national and regional governments. Forcedly, we had to construct a policy hypothesis or scenario: it encompasses “modulation” of funds from Pillar 1 to Pillar 2, with an overall cut of resources distributed (differentiated between old and new Member States).

In the case of transport policies, on the other hand, more precise hypotheses on infrastructure and regulatory policies were very recently approved, and represent the starting point of our exercise. Three scenarios are built in this case: a baseline scenario at 2030, encompassing all investments which are carried out or already decided at present (scenario a); an infrastructure scenario, encompassing new infrastructure links (scenario b) and a pricing scenario, encompassing new regulatory tools such as rules on safety and road pricing with respect to the baseline scenario (scenario c).

Territorial impacts of transport policies are analysed at NUTS3 level, the most suitable for a truly territorial assessment, taking into consideration the geographical specificities of single regions. An econometric and simulation tool was available in this case, the Transtool built by DG Tren, allowing to perform impact forecasts at NUTS 3 level. Agricultural policies, however, have been assessed at NUTS2 level, due to the lack of necessary and consistent data at a more disaggregated level.

1.8. Main results on impacts of CAP policy, are the following.
1.8.a. Impacts on economy. The scenario that was hypothesized, concerning an unbalanced modulation out from Pillar 1 to Pillar 2 implies generally a reduction in

income and regional GDP (E1). Most countries, both in the western and in the eastern part of the EU, suffer from a slight reduction in GDP, ranging around 0,4% and 0,2% respectively of their GDP per capita (see PIM-E1 values in Annex). This reduction is more severe, or more severely felt, in some lagging regions as northern Greece and Estremadura, but also in some southern Italian regions, in Aragon and Sterea Ellada. On the other hand, some regions succeed in taking advantage of modulation, thanks to their ability in engaging in agri-environment schemes: Languedoc-Roussillon, Auvergne and Limousin in France, Cataluña, Navarra and Comunidad Valenciana in Spain, Ipeiros and Peloponnisos in Greece, Valle d'Aosta in Italy, West Midlands in United Kingdom.

A second impact indicator concerning the economic structure refers to capability of tourism diversification (E3). Here impacts are mainly positive, and the strongest conditions are found in Algarve, some Spanish regions along the Pyrenees, Auvergne and Franche-Comtée in France, in some Italian regions, in many regions along the Baltic Sea in Germany, Poland and Latvia and in many internal regions in southern Poland, Czech Republic, Slovakia and Romania. Eastern Countries regions on the Black and the Adriatic seas could also benefit strongly from such diversification in economic activities.

1.8.b. Impacts on society. The first and most important impact on society refers to unemployment (E2). In this case, as in impacts on GDP, the effects are in all cases negative, but eastern countries would suffer most – even if modulation in their case is less severe in terms of cut in public resources. This huge impact derives from many concomitant elements: the high share of employment in agriculture, high present unemployment rate, high priority of employment goals and high vulnerability to unemployment.

A second impact indicator is "community viability", an indicator of social deprivation (Q2). In this case, negative impacts will be felt in a number of scattered areas, both in the east and in the west. Too small farm size, ageing population and high share of agricultural employment make these regions sensitive to changes in EU support: the northern belt in Spain, Algarve, Marche, Abruzzo and Calabria in Italy; in eastern countries Estonia, Latvia, many regions in Poland and, to a lesser extent Czech Republic and Slovakia.

1.8.c. Impacts on environment and climate change. The main goal of modulation residing in enhancing environmental content of agricultural management, not surprisingly we find positive environmental impacts in all EU regions (Q1).

A more targeted indicator is represented by impacts on risks of soil erosion (Q4). In this case, the most important negative impacts are shown in southern Europe: Thessaly and Kentriki Makedonia in Greece, Calabria, Marche, Friuli and Abruzzo in Italy, Algarve in Portugal, as a consequence of risk of abandonment of agricultural land and present soil erosion risk.

As far as impacts on climate change are concerned, a direct indicator is represented by livestock emissions (Q3). Regions mainly concerned regard Dutch and to a lesser extent Danish regions. In all other cases, impacts are negative but of a lower intensity.

1.8.d. Impacts on landscape and territorial identity. In this case three indicators are available. First of all, landscape diversity (I1), which shows negative impacts

especially in the cases of: northern regions in the Iberian peninsula but also, to a lesser extent southern ones (Algarve, Andalucia, Murcia); the central and southern Adriatic coast in Italy, plus Calabria and Sicily; Thessaly and Kentriki Makedonia in Greece, in many regions in south-eastern and central Poland.

The second indicator refers to community identity, jeopardised by risk of outmigration (I2): here regions at risk are almost all those mentioned with regard to the previous indicator, but also Aragon and Navarra in Spain, Cyprus, Estonia and Latvia, almost all regions in eastern Germany, the region of Malmö and many internal regions in Poland, Slovakia and Romania.

The third indicator refers to the possibility of enhanced development of heritage products (I3). In this case availability of data is not assured in all countries. Interesting cases appear, nevertheless: all regions on the western coast of Greece and the Aegean islands show strong and positive impacts; the same happens in Norte and Algarve in Portugal, in central and eastern Slovakia, in a north-south eastern belt in Germany, in some regions like Cornwall, Wales, South East and the region of Edinburgh in Britain, a south-eastern belt in France.

1.9. Concerning summative territorial impacts of CAP, it is possible to affirm that, in spite of the important cut in transfer payments to farms that are implied by our policy scenario, with only partial compensation through modulation and increase in Pillar 2 expenditure, the general impact on Territorial Efficiency will not be negative. Only peripheral and rural regions in Scandinavia, eastern countries and Spain will suffer a negative impact, but the bulk of central European - together with British, Irish, Italian regions and many western regions in New Member Countries – will benefit from positive impacts, manly thanks to differentiation possibility to tourism (but also to other activities).

This condition changes if a different weighting system of the different single impacts (i.e.: a different ranking of priorities in terms of policy goals) is used. Using the preferences expressed by policy makers (interviewed through a questionnaire during the 2009 ESPON meeting in Prague), aggregate impact on territorial efficiency turns slightly into a negative sign (because the advantage of economic diversification is less appreciated).

Impacts on Territorial Quality will hit more severely peripheral and mainly rural countries and regions, with also Italian, Greek, Portuguese and some Spanish regions like Navarra, Aragon, Murcia and Andalucia equally touched. Countries and regions located more closely to the European barycentre, from Ireland to the Po valley, from Denmark to Austria, France and many central and eastern regions in Spain will show a slight but positive impact of these policies. On the average, the aggregate impact on the EU territory will be negative (with any weighting systems), and the same will happen concerning impacts on territorial Identity.

A generalised, Summative impact is difficult to draw as a consequence of many missing data in the Territorial Identity part; but territorial efficiency and quality, for which a wider and sufficient data availability is granted, sum up to almost 90% of it.

1.10. As to EU transport policy, key findings can be listed as follows:

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); the northern and western ring in Paris and La Havre; 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; 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.

2 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.

2.1. 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 already implemented 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 now 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 compensation among impacts (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 new 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 of other policy measures.

2.2. Suggestions for agricultural policies, coming from this project's results.
Policy suggestions concerning CAP refer to the following points:

2.2.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).
2.2.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 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;
2.2.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.

2.3. Suggestions for transport policies, coming from this project's results.
Main results in this case concern:

2.3.a. the positive overall impact of new network construction, especially for eastern countries;
2.3.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;
2.3.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). 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;
2.3.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;
2.3.e. a regulation and pricing strategy can bring relevant results: reducing emissions, but also reducing congestion in presently most congested metro areas;
2.3.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.

3 NEED FOR FURTHER ANALYSIS/RESEARCH

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

- 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.
- 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.
- 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.
- 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.
- 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.

- 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.
- 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.
- 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.
- 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:
a. The exploration of the possibility of modelling interregional spillover effects.
The TRANSTOOL model utilised here 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.
b. 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, on competitiveness, innovation, modernization in the food chain, on environmental quality and preservation such as biodiversity.

B Report

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INTRODUCTION

This report aims at detailing the results of the TIPTAP project. In particular, this report focuses on the following aspects:

1. The key results, trends and impacts pointed out by the project (Section 1).

2. The key analysis and findings of the project and the most relevant indicators and maps (Section 2).

3. The key options for policy development which can provide a basis for interventions and opportunities for improving European competitiveness and cohesion (Section 3).

4. Conclusions, extensions and issues for further analytical work and research, data gaps to be overcome (Section 4).

1. MAIN RESULTS, TRENDS AND IMPACTS

The general goal of the TIPTAP project is to provide a robust and fully operational Territorial Impact Assessment (TIA) tool, with a sound scientific and methodological basis, to be used for the assessment of CAP and Transport policies of the Union. The main goals concerning the analytical tool are as follows:

- methodological and scientific soundness,
- consistency with the recent indications of the EU concerning Impact Assessment Guidelines (SEC(2009)92),
- operationality on the basis of available indicators at the right territorial scale, in order to provide territorial impact indicators for all European regions,
- structuring of the whole process into an *operational package* which should be easily manageable, interactive, transparent,
- supplying results which could be useful (and comprehensible) for policy makers: they should show where will the major impacts happen and why.

These goals have been achieved building upon the experience of the TEQUILA1 model, developed inside ESPON 2006 Project 3.2, through a completely renovated and improved model, tested by experts.

The model and its operational package are applied to two main policies of the European Union (EU): common agricultural policies (CAP) and transportation policies. The application to CAP was never carried out before with the TEQUILA model; the application to transport considerably improves on previous application of TEQUILA in several directions, which will be detailed below.

Definition and operationalization of territorial impacts are related to the usual dimensions of sustainability, namely economy, society and environment trough a number of complex indicators for each dimension. In order to underline the “territorial” nature of the estimated impacts and to supply further justification to the use of a TIA tool – beyond the ones given in the ESDP and in many documents of DG Regio - the territorial impacts are related to the EU goal of territorial cohesion (TC).

Interpreting in a synthetic way the wide array of elements and processes implied by this goal [1], and following the Commission's indication that the concept of TC "translates the goal of sustainable and balanced development into territorial terms"[2], territorial cohesion is defined here as "the territorial dimension of sustainability" (adding to the technological dimension, the political/diplomatic dimension and the dimension of habits and behaviors); it is declined in three macro-components, namely *territorial efficiency, territorial quality, territorial identity*.

Territorial efficiency refers to resource-efficiency with respect to energy, land and natural resources; competitiveness and attractiveness; internal and external accessibility of each territory. Territorial quality refers to the quality of the living and working environment; comparable living standards across territories; similar access to services of general interest and to knowledge. Territorial identity refers to enhancing "social capital"; capability of developing a shared vision of the future; safeguarding specificities, strengthening productive "vocations" and competitive advantage of each territory.

On their turn, these macro-components are further disaggregated into more precise and homogeneous elements, which supply the criteria and indicators on which impacts may be separately calculated (called "*single-dimension impacts*"), and then eventually aggregated into "*summative*" impacts. As a consequence of this conceptually wider and operationally precise perspective, other dimensions usually not considered by impact assessment or strategic environmental assessment procedures are included in the picture, namely cultural, landscape and territorial specificity dimensions [3].

The main hypotheses on cause-effect impact relationship are presented for each of the two policy cases. The impacts are assessed through *quantitative modelling* and *computing*. In the case of transport policies, already explored in the past, the previous philosophy and calibration methodologies were evaluated and re-confirmed with the necessary amendments and updating, new simulation models were used and EU policies updated. In the case of CAP, still a quantitative approach is followed in order to assign impacts to each single EU region, using composite statistical indicators.

In operational terms, our methodology apparently supplies convincing results: interesting results when they are confirmations of more or less known conditions and even more interesting when they are counterintuitive, but likely results. This outcome is particularly valuable because the assessment was made in quantitative terms – something necessary in presence of such a huge number of regions and wide array of impacts - in spite of the difficulties coming from lack of data, especially in the case of CAP policies. This last difficulty forced the TPG to work at a NUTS 2 level, a sub-optimal level if a truly "territorial" impact is pursued.

In this last case, another difficulty was encountered: the lack of precise institutional definition of policy intensity (in terms of resources allocated) in each region, as many decisions for the period 2007-2013 are left to national and regional governments. Forcedly, we had to construct a policy hypothesis or scenario: it encompasses

[1] Cfr. The recent *Green Paper on Territorial Cohesion* of DG Regio, October 2008.

[2] European Commission, "Interim Territorial Cohesion Report", 2004; this definition was confirmed in the subsequent Luxembourg Presidency Conclusions of the Ministerial Meeting, may 2005.

[3] The definition of the macro-dimensions of Territorial Efficiency, Quality and Identity as a way of summarising territorial impacts is unusual, and proposed specifically in the TEQUILA Impact Models. Anyhow, it does not force the results of the impact assessment, in that the relative importance of each criterion and of the macro-criteria themselves is subject to experts' and policy makers' judgement, and could be easily set to zero in case of uncertain relevance.

"modulation" of funds from Pillar 1 to Pillar 2, with an overall cut of resources distributed (differentiated between old and new Member States).

In the case of transport policies, on the other hand, more precise hypotheses on infrastructure and regulatory policies were very recently approved (February 2009), which represent the starting point of our exercise. Three scenarios are built in this case: *a baseline scenario at 2030*, encompassing all investments which are being carried out or already decided at present (scenario a); *an enhanced infrastructure scenario*, encompassing new infrastructure links (scenario b) and *a pricing scenario*, encompassing new regulatory tools such as rules on safety and road pricing with respect to the baseline scenario (scenario c)[4]. An econometric and simulation tool was available in this case, the Trans-tool, built by DG Tren, allowing us to perform impact forecasts at NUTS 3 level.

Concerning impacts of agricultural policy, overall it is possible to affirm that, in spite of the important cut in transfer payments to farms that are implied by our policy scenario, the general territorial impact will not be negative. In terms of impact on territorial efficiency – positive on the overall EU territory - only peripheral and rural regions in Scandinavia, many regions in eastern countries and Spain will suffer a negative impact, but the bulk of central European - together with British, Irish, Italian regions and many western regions in New Member Countries – will benefit from positive impacts, manly thanks to differentiation possibility to tourism and to other activities. Impacts on territorial quality will be overall negative, and still have a more severe impact on peripheral and mainly rural countries and regions, with also Italian, Greek, Portuguese and some Spanish regions like Navarra, Aragon, Murcia and Andalucia equally hit. Countries and regions located more closely to the European barycentre, from Ireland to the Po valley, from Denmark to Austria, France and many central and eastern regions in Spain will show a slight but positive impact of these policies. More precise indications in this field come from the impacts on single dimensions / criteria: a pervasively positive impact on environmental quality, thanks to new engagements by farmers in EU supported agri-environmental schemes, and a generally negative impact on risks of soil erosion, due to land abandonment, particularly high in some regions like Thessalia and Kentriki Makedonia in Greece, Calabria, Marche, Friuli and Abruzzo in Italy, Algarve in Portugal.

Impacts on a rural/urban typology of regions was also implemented and some correlation analyses performed.

Concerning transport policy, key findings 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.

[4] The lack of symmetry residing in a different number of scenarios in the two cases is easily explained: in the case of transport policy, we are facing a baseline, trend scenario and two groups of measures – new physical links and new rules – whose impact is worth to keep separate. In the case of CAP, the scenario is fictitious with respect to the general policy intensity, and any other hypothesis on policy intensity would have generated proportional impacts.

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 rank-two and three.
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. 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.
e. Increase in safety will, to a great extent, be secured in the baseline scenario, and enhanced in the Infrastructure one, especially in eastern countries.
f. 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.
g. Among impacts on territorial identity, landscape fragmentation scores first and will particularly hit countries and regions where new infrastructure will or is being built.
h. 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.
i. Impacts on territorial quality are generally positive in the baseline scenario throughout the EU regions, 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.
j. 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.
k. 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, that appear very instructive for devising policy countermeasures.

2. KEY ANALYSIS AND FINDINGS

The two sectoral policies considered in the TIPTAP project are ARICULTURAL and TRANSPORT policies. For both of them this section details the following points:

1. The policy scenarios to be assessed.
2. The policy intensity in each region, either actual or forecasted.
3. Impact criteria and the logical chain from policy measure to regional impact
4. The impact indicators for each criterion and the source of data.
5. The description and implementation of the methodology for calculating impacts on single dimensions.

6. The description and implementation of the methodology for calculating summative territorial impacts.
7. Key results and maps.

Before presenting the two applications, a section (2.1) is devoted to methodological improvements with respect to the previous work carried out inside ESPON 2006 Project 3.2.

2.1. Methodological improvements

The updated TEQUILA model (TEQUILA 2) provides impact assessment at two different levels:

1. As *single-dimension impact* (SDI), that is on single impact indicators of the policy examined, ranging from economic growth to environment to social elements;
2. As *summative impact* (SI), that is on three above-defined macro-components of territorial cohesion - Territorial Efficiency, Territorial Quality and Territorial Identity - as well as on a generalized Summative Territorial Impact. This assessment implies comparison, averaging and compensation among different impacts.

For each Single-dimension impact, Territorial impact (TIM) on each region *r* is defined as the product of a Potential Impact - PIM (defined for each region using statistical indicators or a simulation model) times an indicator of Desirability - D (in order to take into account the fact that, for example, the same employment growth has a different priority in advanced and lagging regions) and an indicator of Vulnerability – V (in order to take into consideration the higher vulnerability of urban areas to pollution or of natural areas to landscape fragmentation).

In case of Summative Impacts, the TIMs are averaged through a weighted sum of impacts on different criteria (e.g.: impacts on regional GDP, jobs, accessibility, …). This procedure is carried out in two steps: single-dimension impacts are summarized first into the three macro-dimensions (T-Efficiency, T-Quality and T-Identity) and then summed up into the general Summative Impact SI.

Two methodological aspects have been explored in depth and represent operational and methodological improvements with respect to the previous TEQUILA1 model:

1. the weighting system, which captures preferences on different policy priorities and goals. It represents a crucial part of any Multi-criteria analysis as refers to values and political priorities felt by the concerned populations. It was built addressing both policy makers and sectoral policy experts [5]; Tables 1 and 2 show the preferences assigned to the single-dimension and summative impacts as expressed by different panels of experts interviewed for both policies [6].
2. the translation of impacts expressed in their own units into values ranging between 0 and 1, through a “value function”. Sectoral policy experts have been consulted also to gather this specific knowledge.

[5] Weights to be attributed to each impact criterion and macro-criterion can be interpreted as relative preferences and priorities. Sectoral experts have been consulted in specific meetings and policy-makers through a questionnaire delivered at the ESPON Prague Conference in June 2009.

[6] It is evident that experts assign a much lower relevance to the Identity dimension, especially for what concerns CAP policies where the economic and efficiency goals prevail.

Table 1. CAP Policies –preferences concerning priority goals (weights)

Summative Impact	Sectoral Experts Preference	Single Dimension Impact: criteria	Sectoral Experts Preference
Territorial Efficiency	58	Economic growth	21
		Unemployment	34
		Tourism diversification	45
			100
Territorial Quality	30	Environmental quality	38
		Community viability	8
		Emissions	1
		Risk of soil erosion	53
			100
Territorial Identity	12	Landscape diversity	19
		Community identity	49
		Heritage products	32
	100		**100**

Table 2. Transport Policies - preferences concerning priority goals

Summative Impact	Sectoral Experts Preference	Single Dimension Impacts: criteria	Sectoral Experts Preference
Territorial Efficiency	43	Productivity of inland infrastructure	18
		Productivity of airports	10
		Economic growth	54
		Congestion costs	18
			100
Territorial Quality	30	Traffic passing through	16
		Emissions	25
		Safety	35
		Market opportunities	24
			100
Territorial Identity	27	Landscape fragmentation	45
		Exposure to external visitors	38
		Regional integration	17
	100		**100**

Territorial impacts of transport policies are analysed at NUTS-3 level, the most suitable for a truly territorial assessment, taking into consideration the geographical specificities of single regions. Agricultural policies, however, have been assessed at NUTS-2 level, due to the lack of necessary and consistent data at a more disaggregated level.

The previous TEQUILA SIP Package (Interactive Simulation Package) has been reconsidered and enlarged in TEQUILA 2 in order to consider both impacts on single dimensions (economy, society, environment and climate change, …) and summative impacts (on territorial efficiency, quality and identity).

A last very important innovation was included in the new model. In order to take into consideration the fact that some very high negative impacts (e.g. on environment) cannot be compensated by some other positive impacts, for example on economy, an appropriate model was used, the FLAG model, and applied to three different kinds of impacts of transport policies (emissions, congestion, safety). In this case, for the regions in which an excessive impact is shown, compensation and weighted summation with other impacts is not allowed and the map shows a “flag”.

Concerning the general methodology, a necessary and useful comparison looked necessary with the approach proposed by the Commission for its Impact Assessment of EU policy measures and directives (SEC(2009) 92). Keeping in mind that in this latter case the main interest of the Commission is for generalized impacts and not for territorialized impacts (else than in case of hypothesized unequal impacts on regions), the comparison indicates very many similarities and convergences, namely:

- in the choice of the analytical method: Multi-criteria analysis is proposed whenever more accurate but less general tools are unavailable or unfit (like Cost-Benefit analysis, requiring monetary evaluations of impacts) (sect. 8.4);
- in the definitions of the impact dimensions and criteria: economic, social and environmental impacts, declined on their turn into more precise criteria;
- in the necessity of a careful cause-effect analysis in order to device expected and potentially unexpected impacts;
- in the importance attributed to the "political acceptability" of impacts (p. 13), something that we call more generally "desirability";
- in the necessity to work on well defined policy measures, alternative policy options, with clear goals, using appropriate data bases that are not always present (especially with a spatial breakdown);
- in the indication of the relevance of "outliers", i.e. of excessive impacts on some aspects, population classes or regions: "When a single Member State or region is disproportionately affected (so-called "outlier" impact), this should be mentioned. Where such disparities appear to be significant, they should be analyzed as they may be a reason to adapt the initiative, for instance to offer mitigating or transitional measures for the "outlier"" (sect. 8.3, p. 41).

An important suggestion concerns the possibility of indicating the likelihood of the expected impacts.

A comparison of the Tequila methodology with other existing approaches looks difficult, as no other experiences exist bearing the same characteristics: addressing *territorial* impacts, in a *quantitative* way, on *all* EU regions, on a wide spectrum of impacts, potentially usable for any policy measure (see final considerations).

2.2. Impact of the Common Agricultural Policy

2.2.1. The policy scenario to be assessed

The CAP is structured in two Pillars: Pillar 1 supporting farm incomes through direct payments to farmers and market support measures and Pillar 2 supporting agri-environment and rural development objectives. Following the 2003 CAP reform, the majority of direct payments paid to farmers under Pillar 1 are made as Single Farm Payments (SFP), in return for which farmers must comply with fairly minimal environmental and production standards. The SFP is significant in decoupling the level of direct support from the level of output, with a clear break with respect to the past.

Under Pillar 2, payments are available to farmers (and some other rural actors) in support of the production of conservation, amenity, recreation and environmental goods (CARE) and for rural development. Aggregate expenditure under Pillar 1 far exceeds that under Pillar 2. However, within EU-15 countries, a small but increasing percentage of the Pillar 1 budget is compulsorily transferred to Pillar 2, through the process of modulation, permitting a small shift in emphasis within the CAP budgetary discipline.

Modulation (also known as degressive reduction of direct aid) is an instrument that permits the transfer of funds for direct aid and market payments to farmers under Pillar 1 to be transferred to rural development activities under Pillar 2. Modulation is not a new idea and voluntary modulation was included in the Agenda 2000 CAP reforms though subsequently the mechanism was used by only a few member states. Compulsory modulation was introduced by the 2003 reforms where it had to be

applied to all farmers in the EU apart from the very smallest. The rationale behind modulation is that an examination of the distribution of direct income support among farmers reveals that a relatively small number of farms receive a high proportion of the payments. In fact, EC (2007) suggested that in the EU-25 20% of the farms received 80% of the payments. Thus, a proportionately higher reduction in direct aid to these often larger farms should not compromise the objective of income support and at the same time should free up significant funds to support rural development activities and to meet new challenges faced by society - climate change, better water management and investment in bio-energy (EC, 2009).

Among the measures approved under the recent CAP Health Check were increases in the level of compulsory modulation. According to Council Regulation (EC) No 73/2009 the level of modulation should be applied in relation to the magnitude of the payments made to individual farms. Modulation will also increase over time until it reaches a set threshold. Modulation will not apply to the EU-12 until 2012.

Up to now, the new amount of EU expenditure for CAP policy for the period 2007-13 is established and allocated among Member States, but the regional allocation and the decisions concerning distribution to the different axes of Pillar 2 are left to the national and regional authorities. As a consequence, no sound basis for defining policy intensity and resource allocation to the single regions exists at present, on which to build a territorial impact assessment of presently forecasted policies.

Therefore, the policy scenario chosen for assessing a territorial impact is concerned with *increasing the level of modulation of funds from Pillar 1 to Pillar 2 of the CAP.* In fact, levels of modulation were introduced in the 2008 Health Check were substantially lower than had been originally proposed. The original plan was for a more radical introduction of Progressive Modulation; it form the basis for this study to use TEQUILA2 to investigate the impacts of a greater than proposed reduction in Pillar 1 payments. However, unlike the progressive modulation suggested under the Health Check this exercise investigates a more radical scenario where rather than modulation alone, significant levels of funding are withdrawn from Pillar 1 and only a proportion are transferred to Pillar 2 (i.e. a reduction in the overall CAP budget but with an increase to the Pillar 2 budget). In particular, the elements which have been included are as follows:

1. Compared with the baseline year of 2006, there will be a 20% reduction in the SFP received by farms in the EU-15;
2. at the same time, an increase in funding for Pillar 2 of one fourth this amount will occur, composed of modulated SFP funds plus a similar sum made available by individual member states through the process of co-financing. It is important to note that farmers do not automatically receive Pillar 2 funds in place of SFP; in order to receive them they must agree to undertake certain forms of land management or diversify their business, and in some cases they must compete with other farmers for funds. The remaining unmodulated part of the SFP reduction will result in a reduction in the CAP's overall budget. It is postulated that this transfer will occur in EU-15.
3. As far as EU-12 New Member States are concerned, their condition is different, as they are still far from a similar availability of the CAP resources with respect to Old Member States. Therefore it is assumed only a 10% reduction in the SFP and a parallel increase in funding for Pillar 2 of half this amount.

The logic of this policy scenario runs as follows. It implies a reduction in farm income resulting from the reduction in SFP. Some farm managers may accept the income

reduction; others will respond by allocating the farm's resources differently in an effort to maintain the original income level. The nature of the shift in resources will depend on the relative profitability of the various options available and the farmer's own preferences. The available options for food production in poor agricultural areas (for example those designated Less Favoured Areas) are often very limited and are often confined to extensive livestock rearing methods. By contrast, in fertile lowland areas there is much greater flexibility of land use allowing switching between livestock and arable activities.

One particular change which farmers might make is to enter agri-environment agreements under Pillar 2 by which they will receive direct payments in return for adopting extensive land management practices or making other positive improvements to the environment. Under the policy scenario it is envisaged that additional funds will be made available for such agreements. Entry to these schemes is most attractive to farmers when returns from commodity production are comparatively poor or volatile, in which case diversification into a guaranteed revenue stream is attractive. Such schemes will be most attractive to LFA farmers who have few options to intensify production. Non-LFA farmers will find them most attractive in the event of a decrease in the value of commodity sales. In non-LFA areas, extensification of production would be expected under agri-environment schemes, resulting in fewer livestock (see PIM_Q3 below), lower yields and lower use of external inputs such as agrochemicals.

Another important strategy will be to reduce average costs by reducing labour or by gaining economies of scale through farm expansion, or through capital investment (e.g. in new buildings) to increase intensity and efficiency. These strategies will typically lead to less labour use and increased farm size.

Some farm managers will be unable to adapt their activities to compensate for the income loss, and marginal farms will no longer be viable. Factors contributing to the lack of viability will be small physical area, lack of capital, and a lack of human capital (management skills). Typically the farms affected will be very small and occupied by elderly farmers and the land will either be abandoned or incorporated into another farm. Stereotypically, the agricultural land which is least valued for its landscape quality is intensively farmed, has large fields and is lacking in diversity and small scale features. The loss of small farms through amalgamation is hypothesised to contribute to a reduction in landscape diversity.

The loss of land and the shedding of labour in an effort to reduce costs imply partial or total loss of livelihoods for affected individuals. In locations with high employment rates, alternative employment might be found. However in some localities individuals may remain unemployed, especially in areas of sparse population (few businesses) or high unemployment rates.

In areas with a strong dependency on agriculture for employment provision, the decline of employment in agriculture is associated with population decline as younger people out-migrate to find work. This results in a smaller population and an age structure biased towards the older age groups. This has important implications for community viability. The quality of life experienced by residents may gradually deteriorate as businesses (e.g. shops) and services (such as schools, health centres) cease operating due to insufficient demand.

The attractiveness of other options to farmers can be enhanced by the provision of financial incentives, and measures exist under P2 to encourage the development of

new revenue streams. These include the extension of the farmer's activities along the supply chain to capture a greater share of the value added, for example by the processing and selling of food directly to end-customers. Farm resources can also be diverted into alternative uses, for example converting buildings for use as business premises or tourist accommodation. By means of branding, these activities can be intrinsically linked with the resources of the particular territory.

2.2.2. Policy intensity in regions

The policy intensity (PI) in each EU region in the period 2007-13 is determined by expenditure changes. More in detail, PI in EU15 is computed as 20% reduction in regional P1 expenditures, one-fourth of which is redistributed through P2. PI in EU12 is computed as a 10% reduction in P1 half of which is redistributed through P2. Although current (and future) regional expenditures on P1 and P2 are not available, for EU-15 P1 and P2 regional shares were computed by making use of ESPON 2006 database[7]. Assumptions were made of constant regional shares of P1 and P2 over time inside each country and regional P1 and P2 expenditures were computed as share of average annual P1 and P2 expenditures in each country agreed for the period 2007-2013.

As far as EU12 is concerned, a different strategy for computing PI was implemented, as the ESPON 2006 database does not provide information on regional allocation of P1 and P2 expenditures for EU12 countries. Therefore, data on P1 and P2 at NUTS2 level have been estimated as regional shares of national average annual P1 and P2 expenditures in the period 2007-2013 on the basis of the number of farms in each NUTS2 region.

2.2.3. Impact typologies and the logical chain from policy to regional impact

As said before, firstly single impacts (SDI) are computed (impact on GDP, on emissions, etc.: see Tab. 1), and subsequently they are summarized into the three macro-components of territorial cohesion, namely territorial efficiency, territorial quality and territorial identity and into a generalized "summative" impact (SI). For each criterion, its relevance and its logical link to the policy measure being examined is explained below[8].

Territorial efficiency

•*Impact on Economic growth (PIM_E1)*

Due to the assumptions made in the retained scenario, impacts on regional GDP will be mainly negative, as a decrease in income transfers to farmers will mainly take place, except for those regions which are highly performing in catching Pillar 2 resources. The assumption is made here that reduction in income support to farmers will generate a parallel reduction in GDP, partly as a consequence of lower agricultural

[7] ESPON 2006 database provides P1 and P2 expenditures for the year 1999 at NUTS3 level which have been next aggregated at NUTS2 level by researchers at DIG – Politecnico of Milan within ESPON 3.2 project. Future expenditure in regions is calculated utilizing expenditures institutionally agreed for the period 2007-13 and allocating them among regions as in the past.

[8] Impact indicators were firstly indicated by sectoral experts and next discussed by the TPG through extensive interactions and discussions. 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.

activity and abandonment, partly as a consequence of reduced spending of farmers on intermediate goods and consumption goods.

• *Impact on Unemployment (PIM_E2)*
Impact on unemployment will depend, first of all on the general impact on farmers income, and secondly on the presence of different job opportunities in the single regions.

• *Impact on Local asset use for tourism (Tourism diversification) (PIM_E3)*
Economic activity utilising local assets is regarded as an effective way of boosting regional economic performance because of its local embeddedness. Tourism is one such activity and is regarded as an important and appropriate activity in rural areas. It is connected to agricultural policy which, through influencing land management practices, affects the infrastructure such as landscape, which supports tourism. In this context, the diversification by farmers of their activities (e.g. into tourism) can also be regarded as an indirect indicator of innovation or entrepreneurship.

Territorial quality, encompassing both environmental and socio-economic factors.
• *Impact on Environmental quality (PIM_Q1)*
Attributes of a high-quality physical environment include: absence of pollution, high levels of biodiversity, and careful land management that conserves natural resources. The incidence of these attributes is subject to change as agricultural management practices change, in response to policy.

• *Impact on Community viability (PIM_Q2)*
Census statistics have long shown declining population sizes in areas highly dependent on agricultural employment. This is commonly conceptualised as a vicious circle whereby farm labour is replaced by capital and, due to a lack of alternative employment opportunities, there is out-migration, especially by young people. This leads to a diminishing population size with an age structure biased towards older age groups. The implications for the quality of life experienced in such localities are that minimum population thresholds to support service provision may no longer be reached, and there may be an unbalanced age distribution.

• *Impact on Emissions and Climate Change (PIM_Q3)*
Global warming is recognised as one of the most serious challenges facing the world's population. Agriculture makes a significant contribution to the level of greenhouse gases (GHG), and the level of emissions is partly dependent on agricultural practice, which is in turn influenced by policy.

• *Impact on Risk of Soil Erosion (PIM_Q4)*
Risk of soil erosion depends on various hydro-geological and climate factors, and may greatly increase due to trends in agricultural exploitation of land, and namely on land abandonment. In fact, the asset base on which agriculture depends, namely land, can be maintained, improved or degraded as a result of agricultural practice. Thus agricultural policy which alters land management practices directly influences the future sustainability of farming.

Territorial identity
• *Impact on Landscape diversity (PIM_I1)*
Agriculture is a multifunctional activity which produces a range of environmental and recreational goods as well as food and fibre. Farmed landscapes are the product of the particular agricultural production methods employed. They may be quite distinctive to

single localities and therefore contribute to their territorial identity. Specialisation and intensification in agriculture result in landscape changes by reducing its diversity.

• *Impact on Community identity (PIM_I2)*
Strong community identities may develop in localities, shaped by factors including the predominant occupational activities of residents. The decline in a predominant sector would slowly lead to a weakening of this identity which may be further diluted by out-migration. The character of distinct communities and cultures may be used as a driver in promoting tourism.

• *Impact on Heritage Products (PIM_I3)*
The territory in which food is produced may give rise to the production of locally distinct specialties and products. These result from the particular crops, farming methods and food processing techniques which have evolved locally. The drive for technical efficiency in both agriculture and food distribution has led to greater homogeneity in the food outputs produced but also a contrary strategy is followed, enhancing local specificities, which may both increase income and strengthen regional identity.

2.2.4. Summary of Indicators: description and calculation

The TEQUILA methodology potentially provides a means of visualising and synthesizing impacts on a broad range of indicators, wider than other current tools in agricultural policy analysis, available for territorial assessments. Its use requires data for a wide range of variables with comprehensive coverage of EU-27 at a detailed territorial level.

In the absence of satisfactory modelling and simulation tools [9], spreadsheet statistical calculations have been employed to generate estimated values of impacts. Such calculations have heavily relied upon a number of simplifying assumptions. These relate to, inter alia, the income level at which farmers will exit and sell their land; re-employment rates of redundant farm labour; out-migration rates, and propensity of farmers to engage in new tourism or supply chain activities.

Indicators for each criterion described in section 2.2.3 are listed in Table 3 below. A brief description of each indicator is provided in the full Scientific Report.

2.2.5. Calculating impacts on single dimensions / criteria

Impacts on single criteria may be analysed separately, giving answer to a series of general questions: a) which impact on the economy? b) Which impact on society? c) Which impacts on environment? d) Which impacts on climate change? e) Which impacts on landscape and territorial identity? [10] In the maps, the border EU15-EU12 is emphasized, due to the difference in the scenario conditions in the two areas (different cut in P1 resources; 1/4 modulation in EU15; ½ modulation in EU12). In

[9] Although there are several models capturing the multifunctional nature of agriculture, as detailed in the Interim Report, it appears that currently none is capable of generating the necessary data at the relatively low spatial level of aggregation as required to run TEQUILA.
[10] Possible impacts on competitiveness are not inspected, as competitiveness does not represent any explicit goal of CAP in the present scenario.

Table 3. Impact criteria in territorial impact assessment - CAP policies[11]

Macro-Criteria		Criteria	Definition	Measurement	Type
Territorial Efficiency (TE)	PIM_E1	**Economic growth**	Modulation/Total GDP; modulation = [(regional increase in P2) – (regional cut in P1)][12]	**% change in GDP**	Benefit
	PIM_E2	**Unemploy-ment**	(Present unemployment rate)*(Share of agricultural employment)*(PIM_E1 normalised)	**% change in unemployment rate**	Cost
	PIM_E3	**Tourism diversification**	(Number of beds in rural areas/Km2 in agricultural areas)*(PIM_E2 normalised)	**New tourism beds per Km2**	Benefit
Territorial Quality (TQ)	PIM_Q1	**Environmental quality**	((Total agricultural area entered into agri-environment schemes under Pillar2 of Cap)/Total agricultural area)*100	**% of agricult. areas into agricultural schemes**	Benefit
	PIM_Q2	**Community viability**	[((Share of areas occupied by farms<10ha)+(share of population aged >65)+(share of employment in agriculture))*(PIM_E1 normalised)]/3	**Indicator of social deprivation**	Cost
	PIM_Q3	**Emissions**	Variation in livestock emissions (Tons CH4 per year)	**Emissions**	Cost
	PIM_Q4	**Risk of soil erosion**	Areas at risk of soil erosion (ton/ha/year)*(5% of areas with farms <10ha / total agricultural areas)*100	**% of abandon. areas weighted by erosion probability**	Cost
Territorial Identity (TI)	PIM_I1	**Landscape diversity**	(5% of areas with farms <10ha / total agricultural areas)*100	**% of abandon. /incorporated agricultural areas**	Cost
	PIM_I2	**Community identity**	[(0,1*(Share of people aged >15 and <65) + (share of employment in agriculture)+(unemployment rate))*(PIM_E1 normalised)]*100/3	**Outmigration possibility (%)**	Cost
	PIM_I3	**Heritage products**	[(Employment in agriculture/ Gross Fixed Capital Formation in agriculture)*(PIM_E1 normalised)]/Max value	**Indicator of product diversification and innovation**	Benefit

maps the TIMs are presented, namely adding experts judgement on regional Desirability and Vulnerability to the PIMs already mentioned (see Scientific Report).

2.2.5.a. Impacts on economy

The scenario that was hypothesized, concerning an unbalanced modulation out from Pillar 1 to Pillar 2 implies generally a reduction in income an regional GDP. As shown in Map 2.2.1 (E1), most countries both in the western and in the eastern part of the EU, suffer from a slight reduction in GDP, ranging around 0,4% and 0,2% respectively of their GDP per capita (see PIM-E1 values in Annex). This reduction is more severe, or more severely felt, in some lagging regions as northern Greece and Estremadura, but also in some southern Italian regions, in Aragon and Sterea Ellada. On the other hand, some regions succeed in taking advantage of modulation, thanks to their ability in engaging in agri-environment schemes: Languedoc-Roussillon, Auvergne and Limousin in France, Cataluña, Navarra and Comunidad Valenciana in Spain, Ipeiros and Peloponnisos in Greece, Valle d'Aosta in Italy, West Midlands in United Kingdom.

A second impact indicator concerning the economic structure refers to capability of tourism diversification (Map 2.2.2., E3). Here impacts are mainly positive, and the

[11] The main source exploited to build impact indicators are ESPON DATABASE, Eurostat and DG Agri.

[12] Regional cut in P1 = 0,2*0,4*Share of regional P1 expenditure*Average Annual (2007-2013) National P1 budget. Regional increase in P2= (0,25*National P1 CUT)*(Share of regional P2 expenditure on national total). Data on P1 and P2 regional shares are derived from ESPON DATABASE 2007, ESPON Project 2.1.3.

strongest conditions are found in Algarve, some Spanish regions along the Pyrenees, Auvergne and Franche-Comtée in France, Trentino-Alto Adige, Friuli, Marche, Abruzzo and Calabria in Italy, in many regions along the Baltic Sea in Germany, Poland and Latvia and in many internal regions in New Member countries like southern Poland, Czech Republic, Slovakia and Romania. Eastern Countries regions on the Black and the Adriatic seas could also benefit strongly from such diversification in economic activities.

2.2.5.b. Impacts on society

The first and most important impact on society refers to unemployment (E2). In this case, as in impacts on GDP, the effects are in all cases negative, but eastern countries would suffer most – even if modulation in their case is less severe in terms of cut in public resources. Poland will suffer in almost all regions, with the exception of the Warsaw region, but also many regions in Slovakia, Romania and Bulgaria. In all these cases the huge impact derives from many concomitant elements: the high share of employment in agriculture, high present unemployment rate, high priority of employment goals and high vulnerability to unemployment.

A second impact indicator is “community viability”, an indicator of social deprivation (Q2). In this case, negative impacts will be felt in a number of scattered areas, both in the east and in the west. Too small farm size, ageing population and high share of agri employmentmake these regions sensitive to changes in EU support: the northern belt in Spain, Algarve, Marche, Abruzzo and Calabria in Italy (but also more productive regions like Trentino-Alto Adige and Friuli, where a tradition of cooperation in fruit and wine production may help overcoming difficulties); in eastern countries Estonia, Latvia, many regions in Poland and, to a lesser extent Czech Republic and Slovakia.

2.2.5.c. Impacts on environment

The main goal of modulation residing in enhancing environmental content of agricultural management, not surprisingly we find positive environmental impacts in all EU regions (Map 2.2.3., Q1). Positive outcomes are mainly visible in southern and western European regions, with strong country effects due to the national management of funds allocation among axes of Pillar 2. Most important impacts are forecasted in Southern Ireland, southern and western Austria and Attiki, but very good performances are shown by mainly all regions in Spain, France, UK, Italy and Greece. The lowest impacts are visible on New Member Countries.

A more targeted indicator is represented by impacts on risks of soil erosion (Map 2.2.4., Q4). In this case, the most important negative impacts are shown in southern Europe: Thessaly and Kentriki Makedonia in Greece, Calabria, Marche, Friuli and Abruzzo in Italy, Algarve in Portugal, as a consequence of risk of abandonment of agricultural land and present soil erosion risk.

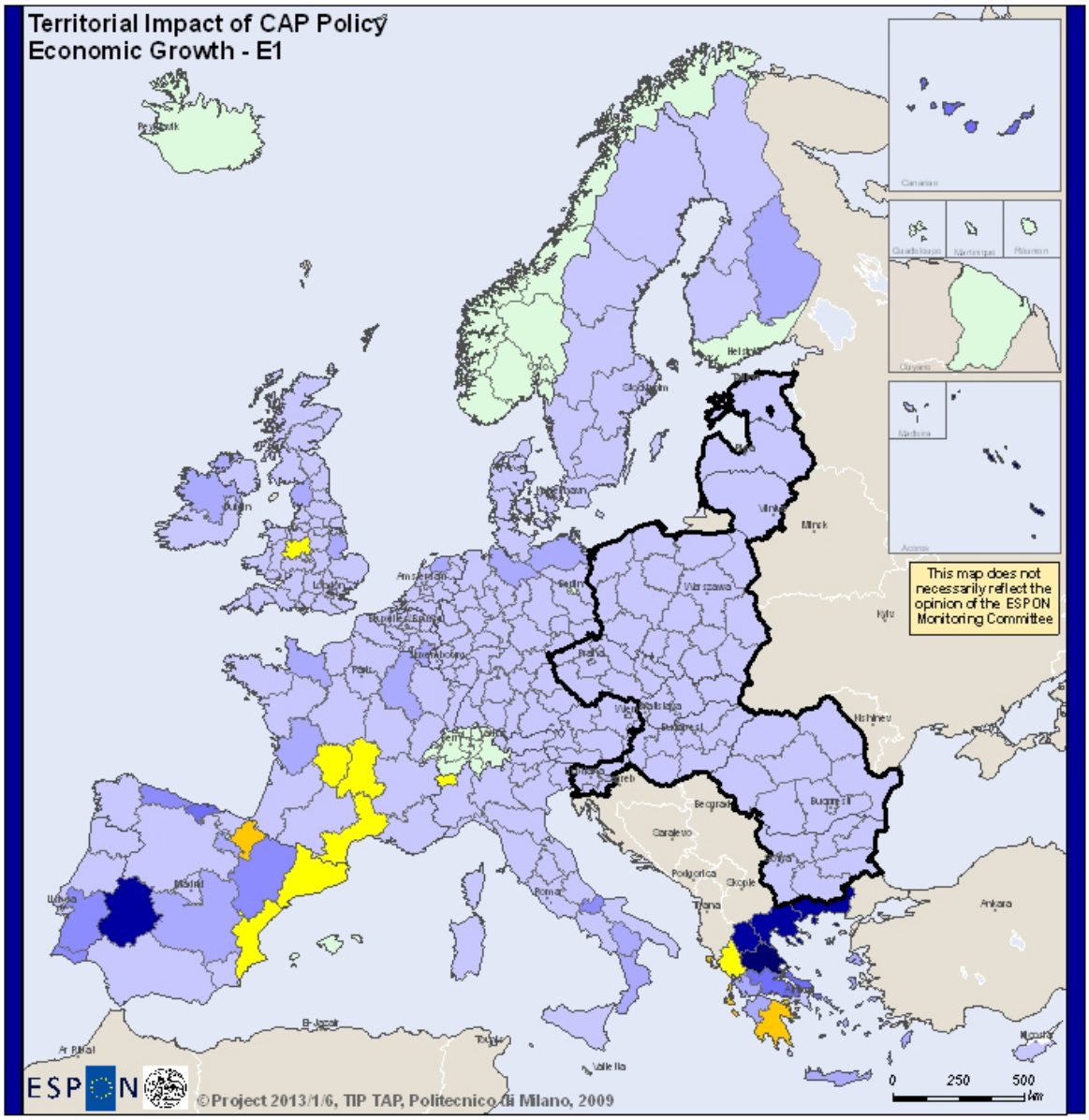
2.2.5.d. Impacts on climate change

As far as impacts on climate change are concerned, a direct indicator is represented by livestock emissions (Q3). Regions mainly concerned regard Dutch and to a lesser extent Danish regions. In all other cases, impacts are negative but of a lower intensity.

2.2.5.e. Impacts on landscape and territorial identity

In this case three indicators are available. First of all, landscape diversity (I1), which shows negative impacts especially in the cases of: northern regions in the Iberian

Map 2.2.1.



EUROPEAN UNION
Co-financed by the European Regional Development Fund

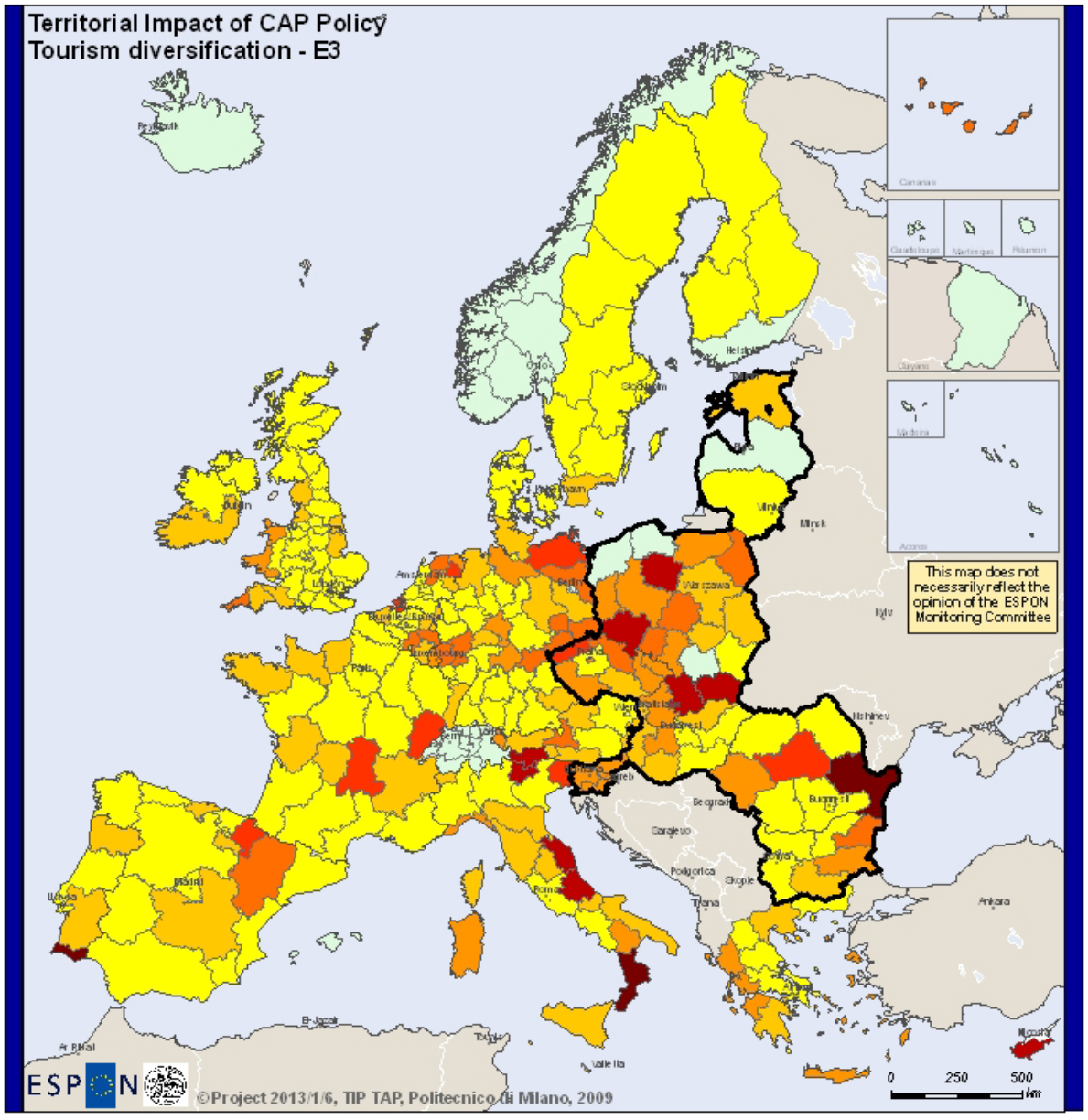
Regional level: NUTS2 (2006)
Source: Eurostat, ESPON database
Origin of data: own calculation
© EuroGeographics Association for administrative boundaries

Legend

- New Member States
- NA
- -0,66 - -0,56
- -0,55 - -0,47
- -0,46 - -0,37
- -0,36 - -0,28
- -0,27 - -0,19
- -0,18 - -0,09
- -0,08 - 0,00
- 0,01 - 0,09
- 0,10 - 0,19

Scenarios for Old Member States and New Member States are different

Map 2.2.2.



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Regional level: NUTS2 (2006)
Source: Eurostat, ESPON database
Origin of data: own calculation
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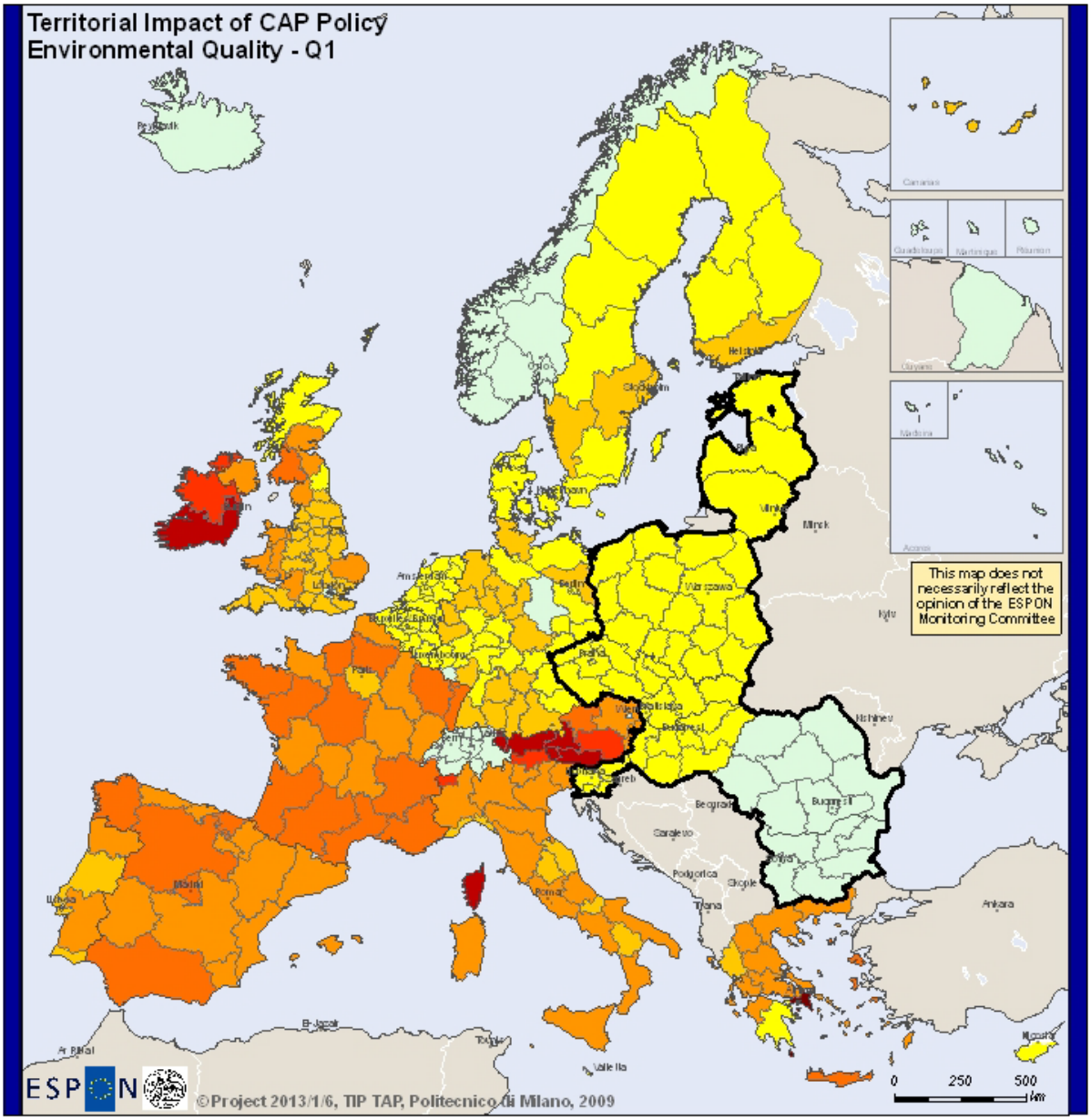
Legend

- New Member States
- NA
- 0,00 - 0,38
- 0,39 - 0,75
- 0,76 - 1,13
- 1,14 - 1,51
- 1,52 - 1,89
- 1,90 - 2,26
- 2,27 - 2,64

Scenarios for Old Member States and New Member States are different

Map2.2.3.



EUROPEAN UNION
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Regional level: NUTS2 (2006)
Source: Eurostat, ESPON database
Origin of data: own calculation
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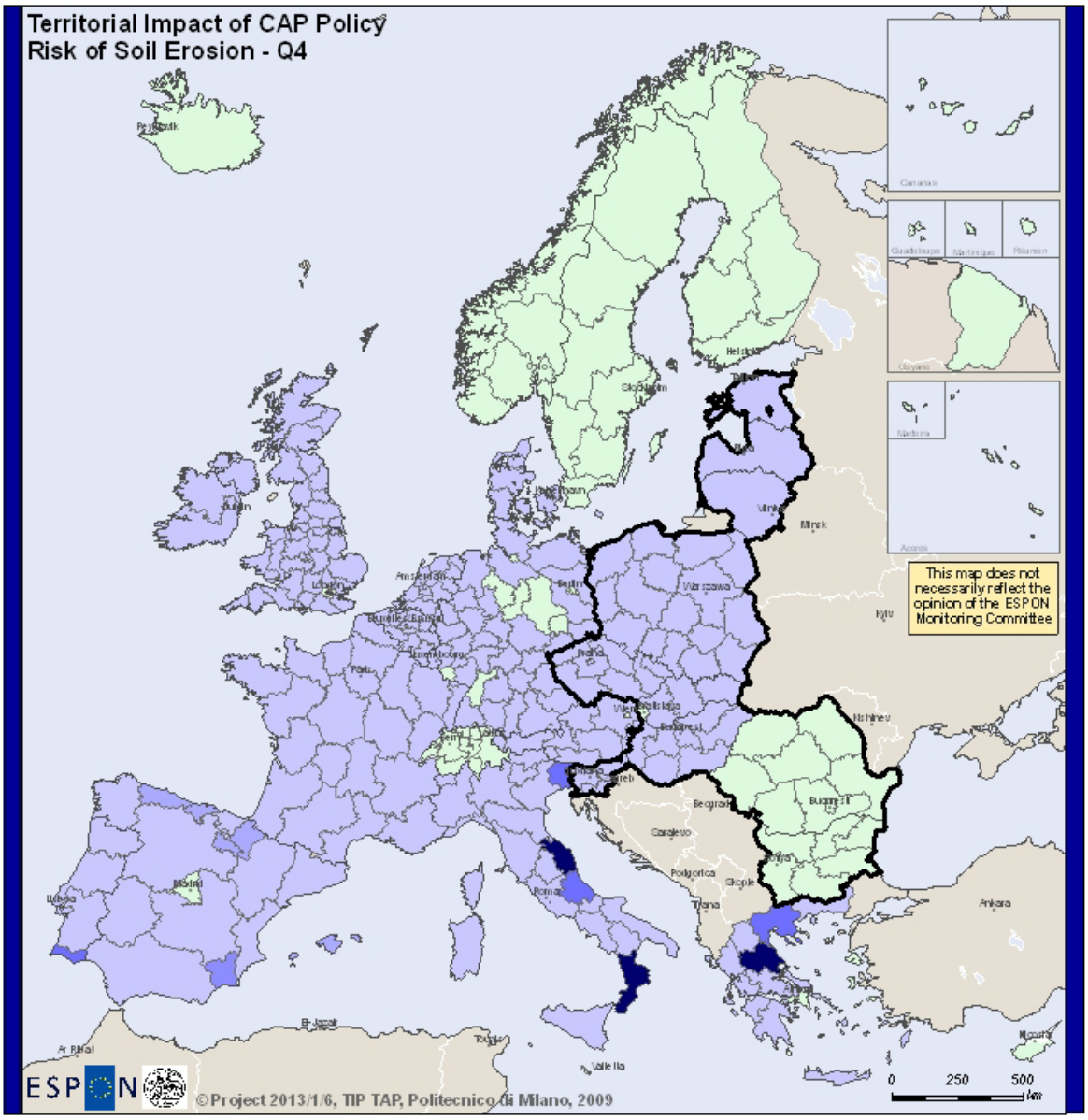
Legend

- New Member States
- NA
- 0,00 - 0,12
- 0,13 - 0,24
- 0,25 - 0,37
- 0,38 - 0,49
- 0,50 - 0,61
- 0,62 - 0,73
- 0,74 - 0,86

Scenarios for Old Member States and New Member States are different

Map 2.2.4.



EUROPEAN UNION
Part-financed by the European Regional Development Fund

Regional level: NUTS2 (2006)
Source: Eurostat, ESPON database
Origin of data: own calculation
© EuroGeographics Association for administrative boundaries

Legend

- New Member States
- NA
- -22,70 - -19,46
- -19,45 - -16,22
- -16,21 - -12,97
- -12,96 - -9,73
- -9,72 - -6,49
- -6,48 - -3,24
- -3,23 - 0,00

Scenarios for Old Member States and New Member States are different

peninsula (Cantabria, Asturias, Galicia, Norte of Portugal), but also, to a lesser extent southern ones (Algarve, Andalucia, Murcia), in the central and southern Adriatic coast in Italy, plus Calabria and Sicily, in Thessaly and Kentriki Makedonia in Greece, in many regions in south-eastern and central Poland.

The second indicator refers to community identity, jeopardised by risk of outmigration (I2): here regions at risk are almost all those mentioned with regard to the previous indicator, but also Aragon and Navarra in Spain, Cyprus, Estonia and Latvia, almost all regions in eastern Germany, the region of Malmö and many internal regions in Poland, Slovakia and Romania.

The third indicator refers to the possibility of enhanced development of heritage products (I3). In this case availability of data is not assured in all countries. Interesting cases appear, nevertheless: all regions on the western coast of Greece and the Aegean islands show strong and positive impacts; the same happens in Norte and Algarve in Portugal, in central and eastern Slovakia, in a north-south eastern belt in Germany, in some regions like Cornwall, Wales, South East and the region of Edinburgh in Britain, a south-eastern belt in France, from Alsace to Provence-Alpes-Côte d'Azur plus Haute Normandie in France.

In synthesis, our methodology apparently supplies convincing results – interesting when they are confirmations of more or less known conditions and even more interesting when they are counterintuitive, but likely results - in the analysis in case, in spite of the difficulties coming from lack of data, territorial detail and absence of a precise institutional breakdown of policy interventions by regions.

2.2.6. Calculating summative territorial impacts on regions, according to different preference systems (weights)

An appropriate confrontation and weighted mixing of the previous impact indicators supplies us with possible synthetic indicators of territorial impacts of CAP policy. Here we refer to the three macro-criteria of territorial impact, namely territorial efficiency, quality and identity, and to the summative, general territorial impact.

The weighting system, allowing the definition of the relative importance of the single impacts[13], is crucial in order to perform this operation, and a wide attention was devoted to it throughout the project. The initial weighting system employed in Tequila 1 – equal weights, taken as an initial step - was abandoned, and a new system was elaborated through:

- internal experts judgement (see the previous Table 1);
- questionnaire inquiry with policy makers and top national and regional officials.

The weighting system defined in the first way (experts) implies:

- among the three macro-criteria, territorial efficiency ranks first, with a relative weight as high as 58%, territorial quality ranks second, 30%, and territorial identity third, with only 12%;

[13] And, implicitly, the compensation rate between criteria. In the case of CAP policies, no limits to single impacts are defined institutionally; therefore, the Flag model is not utilised here.

- inside territorial efficiency, a low importance of impacts on economic growth, namely 21%, a greater importance of impacts on unemployment, 34%, and the highest importance of impacts on diversification capability, 45%;
- inside territorial quality, the highest importance is assigned to environmental impacts, namely risk of soil erosion and environmental quality;
- inside territorial identity, the highest importance is assigned to community identity, the lowest to landscape diversity.

Impacts on territorial efficiency (Map 2.2.5, TE) show that main disadvantages will hit more peripheral, mainly rural areas: eastern countries in particular (Lithuania, almost all Polish regions with the exception of the Warsaw, Stettin and Dantzig regions, eastern Hungarian regions, almost all Romanian and Bulgarian regions with the exception of capital regions, all central and northern regions in Sweden and Finland, Castilla y Leon, Estremadura and Andalucia in Spain, Kentriki Makedonia, Thessalia and Sterea Ellada in Greece. On the other hand, the positive performance on the diversification indicator allow all central European countries, together with Britain, Italy, Czekia, Slovenia, Slovakia and western Hungary to show positive impacts. These impacts are particularly favourable to some regions: Algarve, Pais Vasco, Navarra and Aragon, Auvergne and Franche-Comté, Trentino-Alto Adige, Marche Abruzzi and Calabria, Cyprus, Latvia, an horizontal belt of German regions going from Aachen to Türingen and Dresden and a northern belt of marine regions going from Noord-Nederland to Mecklemburg (and continuing eastward in two Polish regions).

Impacts on territorial quality (TQ) suffer from some lack of data concerning mainly soil erosion. Nevertheless some relevant results appear. Negative impacts show up mainly in peripheral countries, this time with the inclusion of many Italian, Portuguese and Greek regions. Also Scotland and Dutch regions belong to this group. On the other hand, a positive, even if slightly, impact is shown by all France, southern Germany and Austria, Ireland and Northern Ireland, and central Spain.

Impacts on territorial identity (TI) is highly hit by lack of data. Nevertheless a negative impact is visible in all French regions, with the exception of Ile-de-France, Britain with the exception of Greater London area and Scotland, Austria and Czechia, with the exception once again of capital regions, Slovenia and Slovakia.

The same blank areas appear by consequence in the global territorial impact (SI), but the signs are now mainly positive. Main exceptions, with a negative sign, are almost all Greek regions, Algarve and Norte in Portugal, Lithuania and some regions in Czechia and Slovakia.

The second weighting system was prepared using a questionnaire delivered to attendants of the ESPON Prague seminar in June 2009 (42 respondents on CAP policies). Table 4 below provides the weighting system of different professional groups (e.g. policy makers, public officials, academics and practitioners). Interviewees were asked to provide us with their policy priorities by taking both a European and a national point of view.

In all groups, Territorial efficiency is considered the most relevant macro criterion with reference to Territorial Cohesion goals, Territorial Quality coming second, regardless the view taken, either European or national. Nevertheless, there are some differences among the professional groups: Policy makers and Public Officials assign even a greater relevance to Territorial efficiency as compared Academics and Practitioners. On the other hand, Academics assign greater importance to Territorial quality. Territorial identity comes third as a macro-criterion, and – interestingly enough - is

considered relatively more important by Policy makers, Practitioners and Academics than by Public Officials. The general ranking is consistent with the previous, experts' one (first column in Table 4), but the general view of all respondents to the questionnaire is much more equilibrated among the three macro-criteria, and in particular it shows more interest to the "novel" criterion of Territorial Identity (from 19% to 26% of relative importance) than the internal experts did (only 12%).[14]

Table 4. Preferences concerning relevance of policy goals - CAP policies

Criteria	EXPERTS	Policy makers		Public officials		Academics		Practitioners	
		EU view	National view	EU view	National view	EU view	National view	EU view	National view
TE[15]	58	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	12	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	21	40,00	37,50	38,18	42,92	38,82	38,53	37,14	35,00
E2	34	36,25	33,75	35,00	29,17	37,35	37,94	40,00	37,14
E3	45	23,75	28,75	26,82	28,33	23,82	23,53	22,86	27,86
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
Q1	38	33,75	32,50	40,45	41,25	34,12	34,71	32,14	35,71
Q2	8	26,25	25,00	22,27	28,33	24,71	25,88	30,00	32,86
Q3	1	23,75	23,75	18,18	15,42	23,53	20,00	22,14	17,14
Q4	53	16,25	18,75	19,09	15,00	17,65	19,41	16,43	11,43
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
I1	19	33,75	32,50	46,66	42,78	42,94	36,94	32,86	32,14
I2	49	41,25	40,00	23,03	23,61	31,47	36,65	40,00	37,14
I3	32	25,00	27,50	30,30	34,03	25,59	26,41	27,14	30,71
	100	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

Each weighting system may give rise to different maps. In this Report we assumed that the most important weighting system, alternative to the one given by internal experts, is the weighting system resulting from the preferences of policy makers, assuming a European view. Maps produced refer to this case.

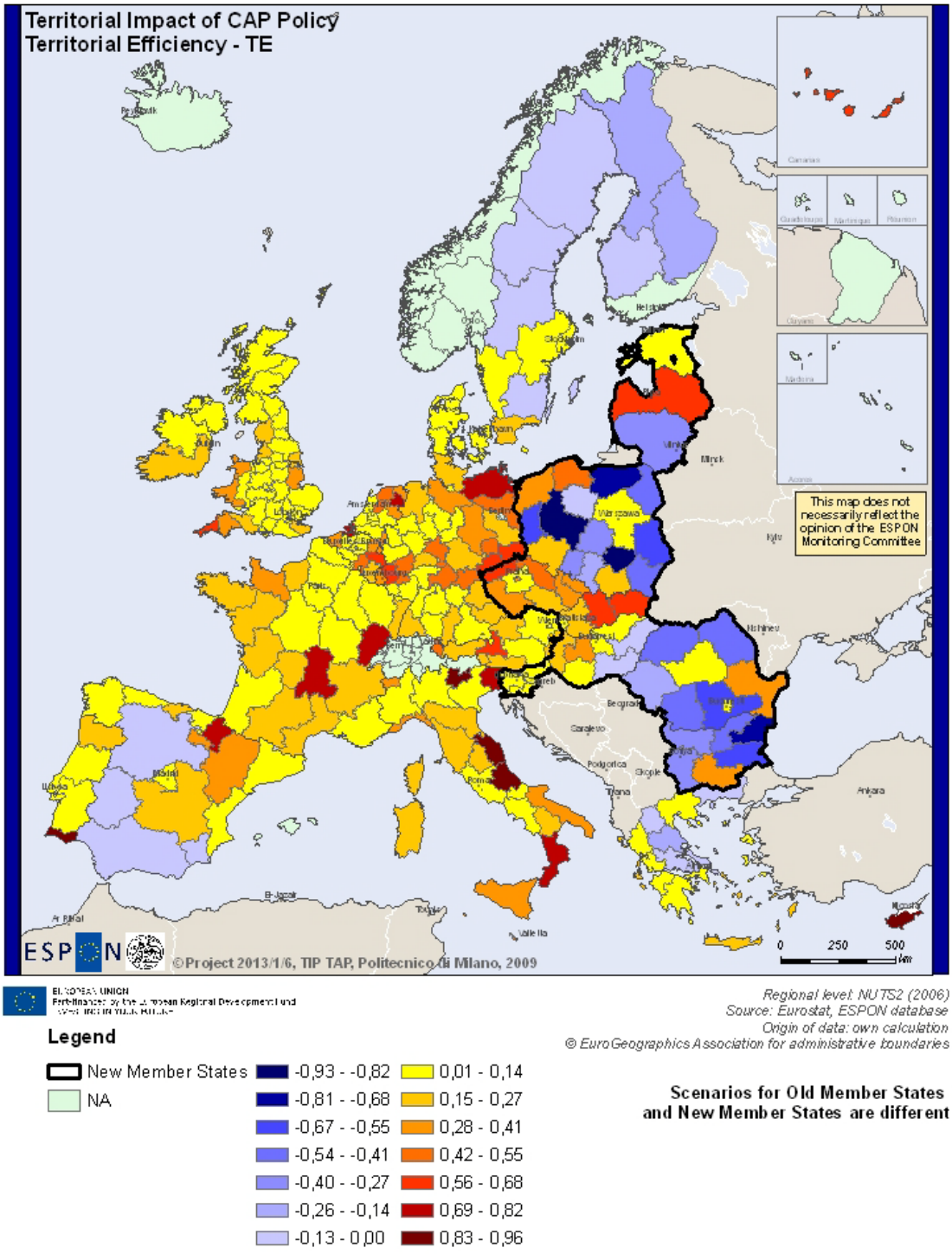
The comparison between Map 2.2.5 and the corresponding map which uses policy makers preference for TE, provides a quick outlook on how different weighting systems can affect territorial impacts: impacts are much less favourable to regions. In fact, correlation between the TE impacts on each region in the two weighting systems is high but not perfect (R2 = 0,78: see Scientific report).

[14] Concerning single dimension impact indicators inside Territorial Efficiency, E1 ranks first in all groups, followed by E2 and E3 respectively: economic growth and unemployment are considered of greater relevance as compared to Tourism diversification. This contrasts with experts' weights that assign greater relevance to Tourism diversification as compared to Unemployment and Economic growth, which ranks last.
Concerning single dimension impact indicators inside Territorial Quality, in all groups Q1 (environmental quality) ranks first, followed by Q2 (Community viability), Q3 (emissions) (but not for Officials) and Q4 (soil erosion) respectively. This sharply contrasts with, and somehow reverses, experts' weights that assign the greatest relevance to Q4 as compared to Q1 and assign very little role to Q2 and a marginal one to Q3.
Concerning single dimension impact indicators inside Territorial Identity, I1 (landscape diversity) ranks first for the Academics and Officials groups while it ranks second in the others. The opposite occurs as far as I2 (community identity) is concerned. I3 (heritage products) ranks last for all groups, but for Officials. Again, this is partly consistent with experts' weights that assign the greatest relevance to I2, next to I3 and finally to I1.

[15] 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.

The comprehensive impact on the EU (summing impacts on all European regions) concerning the three macro-criteria are shown in the front spreadsheet of the TEQUILA2 model. presented in Figure 2.2.1. The weights assigned by experts are

Map 2.2.5.



shown in the first column, while the weights assigned by policy makers are shown in the second column. The results of the four summative impacts are presented as "TIMs weighted mean", both for present run (experts' weighting) and previously saved run (policy makers' weighting): the value is aggregated for all the EU regions, but also the disaggregated values are shown in the lower part of the spreadsheet for each NUTS2 region.

The comprehensive, aggregate European impact on each summative macro-criterion according to experts' judgement is as follows:
TE: 0,0981; TQ: -0,2996; TI: -0,2480; SI: 0,0267.
Adopting the policy makers' weighting system, the same impacts are as follows:
TE: -0,216; TQ: -0,231; TI: -0,267; SI: -0,068.

The most important change refers to the value of impacts on Territorial Efficiency, which turns from a positive sign to a negative sign, pushing the Summative Impact SI in the same direction. In fact, policy maker assign a lower importance to a generally positive criterion like diversification capability and a wider importance to a generally negative criterion like unemployment impact, with respect to what experts do.

More relevant appears the fact that in both cases impacts on Territorial Quality and Identity look negative, as a consequence of the effects of the policy scenario on land abandonment, consequent soil erosion risk and community viability.

2.2.7. Calculating impacts at national and European level

Following the 3-level approach proposed by ESPON, the TEQUILA 2 model enables to compute single dimension and summative impacts both at the national and European level as (weighted) averages of regional impacts. Table 5 below provides these figures (according to the usual weights assigned by experts).

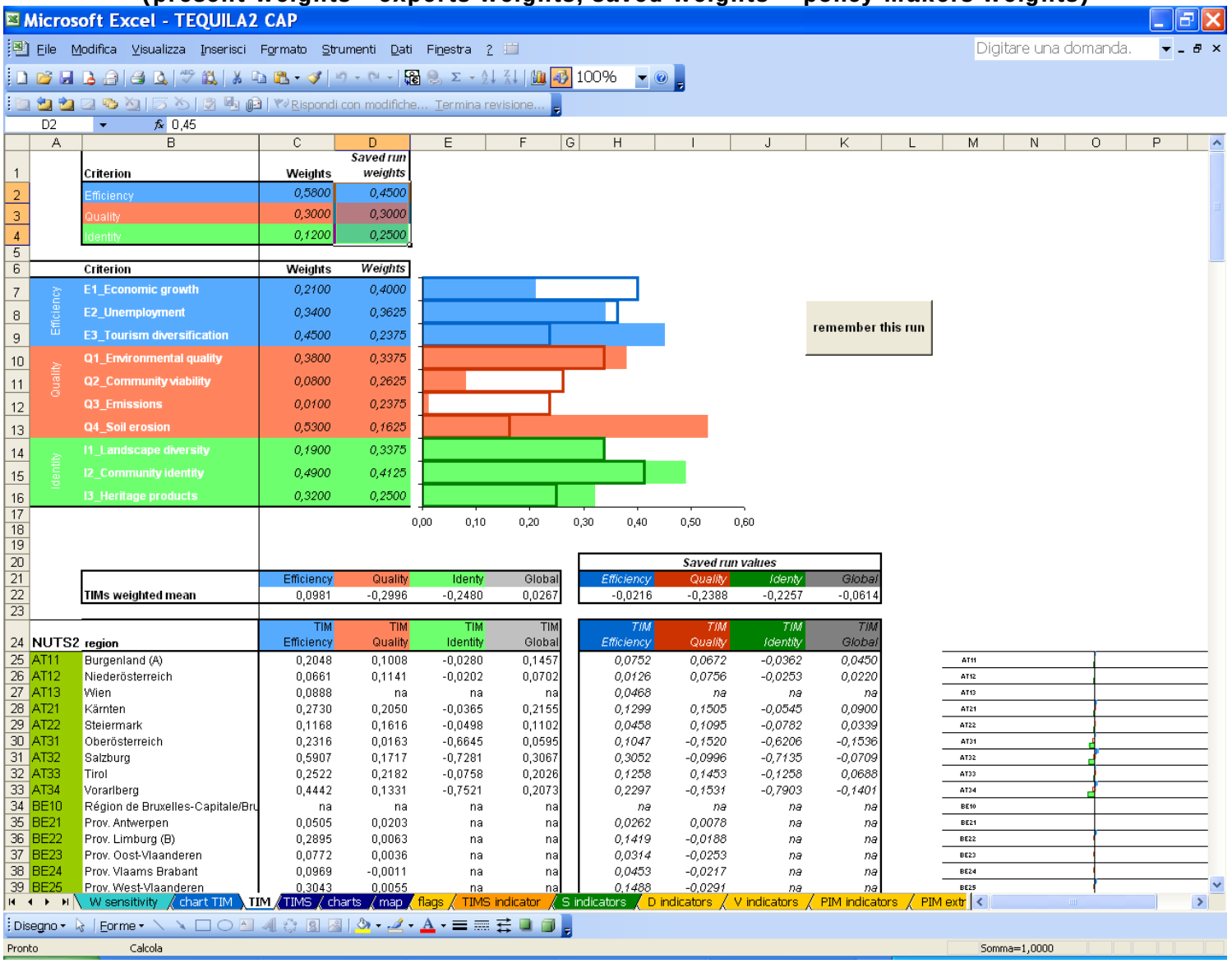
Inside Territorial efficiency, single dimension impacts E1 (GDP) and E2 (employment) are negative in all countries and, thus, also at the EU level. Differently, E3 (diversification capability towards tourism) is positive, somehow balancing the effect of E1 and E2. By consequence, summative TE impact shows positive values in several countries and in the EU (as said before).

Inside Territorial quality, single dimension impact Q1 (environmental quality) is positive in all countries (and consequently in the EU), while the other three are negative or nil at maximum. Summative TQ impact shows negative values in several countries as well as at the EU level.

Inside Territorial identity, single dimension impacts I1 (landscape) and I2 community identity) are negative in all countries and at the EU level, while I3 is positive both at each country and the EU level. Summative TI impact shows negative values in several countries as well as at the EU level. Finally, as of SI, a few countries are negatively affected by the policy scenario considered, namely Greece, Latvia, and Portugal. However, SI shows a positive value at the EU level, mainly because the high importance attributed to TE largely balances the negative values of TQ and TI[16].

[16] As seen before, this general result is not achieved using the policy makers' preference system.

Figure 2.2.1. Spreadsheet of TEQUILA2 on CAP policy: weights and summative impacts. (present weights= experts weights; saved weights = policy makers weights)



Criterion	Weights	Saved run weights
Efficiency	0,5800	0,4500
Quality	0,3000	0,3000
Identity	0,1200	0,2500

	Criterion	Weights	Weights
Efficiency	E1_Economic growth	0,2100	0,4000
Efficiency	E2_Unemployment	0,3400	0,3625
Efficiency	E3_Tourism diversification	0,4500	0,2375
Quality	Q1_Environmental quality	0,3800	0,3375
Quality	Q2_Community viability	0,0800	0,2625
Quality	Q3_Emissions	0,0100	0,2375
Quality	Q4_Soil erosion	0,5300	0,1625
Identity	I1_Landscape diversity	0,1900	0,3375
Identity	I2_Community identity	0,4900	0,4125
Identity	I3_Heritage products	0,3200	0,2500

	Efficiency	Quality	Identy	Global	Saved run values: Efficiency	Quality	Identy	Global
TIMs weighted mean	0,0981	-0,2996	-0,2480	0,0267	-0,0216	-0,2388	-0,2257	-0,0614

NUTS2	region	TIM Efficiency	TIM Quality	TIM Identity	TIM Global	*TIM Efficiency*	*TIM Quality*	*TIM Identity*	*TIM Global*
AT11	Burgenland (A)	0,2048	0,1008	-0,0280	0,1457	*0,0752*	*0,0672*	*-0,0362*	*0,0450*
AT12	Niederösterreich	0,0661	0,1141	-0,0202	0,0702	*0,0126*	*0,0756*	*-0,0253*	*0,0220*
AT13	Wien	0,0888	na	na	na	*0,0468*	*na*	*na*	*na*
AT21	Kärnten	0,2730	0,2050	-0,0365	0,2155	*0,1299*	*0,1505*	*-0,0545*	*0,0900*
AT22	Steiermark	0,1168	0,1616	-0,0498	0,1102	*0,0458*	*0,1095*	*-0,0782*	*0,0339*
AT31	Oberösterreich	0,2316	0,0163	-0,6645	0,0595	*0,1047*	*-0,1520*	*-0,6206*	*-0,1536*
AT32	Salzburg	0,5907	0,1717	-0,7281	0,3067	*0,3052*	*-0,0996*	*-0,7135*	*-0,0709*
AT33	Tirol	0,2522	0,2182	-0,0758	0,2026	*0,1258*	*0,1453*	*-0,1258*	*0,0688*
AT34	Vorarlberg	0,4442	0,1331	-0,7521	0,2073	*0,2297*	*-0,1531*	*-0,7903*	*-0,1401*
BE10	Région de Bruxelles-Capitale/Bru	na	na	na	na	*na*	*na*	*na*	*na*
BE21	Prov. Antwerpen	0,0505	0,0203	na	na	*0,0262*	*0,0078*	*na*	*na*
BE22	Prov. Limburg (B)	0,2895	0,0063	na	na	*0,1419*	*-0,0188*	*na*	*na*
BE23	Prov. Oost-Vlaanderen	0,0772	0,0036	na	na	*0,0314*	*-0,0253*	*na*	*na*
BE24	Prov. Vlaams Brabant	0,0969	-0,0011	na	na	*0,0453*	*-0,0217*	*na*	*na*
BE25	Prov. West-Vlaanderen	0,3043	0,0055	na	na	*0,1488*	*-0,0291*	*na*	*na*

Table 5. CAP policy: Average impacts by country

	TE	TQ	TI	SI	E1	E2	E3	Q1	Q2	Q3	Q4	I1	I2	I3
EU	0,191	0,101	-0,213	0,105	-0,027	-0,028	0,458	0,563	-0,426	0,000	-0,027	-0,204	-0,420	0,138
AT	0,180	-0,007	0,000	0,000	-0,019	-0,024	0,428	0,059	-0,189	-0,008	-0,025	-0,041	-0,307	0,000
BE	-0,314	0,000	0,000	0,000	-0,015	-1,502	0,445	0,000	0,000	0,000	0,000	0,000	-0,496	0,000
BG	0,851	na	-2,212	na	-0,001	-0,172	2,022	0,000	-4,398	0,000	na	-0,302	-4,510	0,171
CY	0,337	-0,194	-0,552	0,046	-0,007	-0,290	0,971	0,000	-1,676	0,000	-0,113	-0,024	-1,163	0,061
CZ	0,168	0,009	-0,159	0,049	-0,013	-0,016	0,392	0,123	-0,213	0,000	-0,026	-0,049	-0,606	0,129
DE	0,117	0,003	-0,167	0,049	-0,007	-0,011	0,271	0,053	-0,111	-0,205	-0,011	-0,029	-0,345	0,023
DK	0,010	-0,247	na	na	-0,007	-0,637	0,506	0,000	-2,850	0,000	-0,036	-0,104	-1,602	na
EE	0,099	-0,336	0,000	0,000	-0,060	-0,044	0,282	0,353	-0,761	-0,032	-0,818	-0,154	-0,868	0,000
ES	-0,081	0,000	-0,013	0,000	-0,038	-0,289	0,055	0,122	-0,036	0,000	0,000	-0,012	-0,029	0,009
FI	0,136	0,098	-0,237	0,080	-0,015	-0,016	0,323	0,327	-0,213	0,000	-0,017	-0,049	-0,561	0,149
FR	0,065	-2,042	-0,116	-0,618	-0,219	-0,254	0,438	0,460	-0,544	0,000	-3,908	-0,324	-0,346	0,359
GR	0,071	-0,098	0,000	0,000	-0,012	-0,218	0,329	0,000	-0,916	0,000	-0,046	-0,067	-0,356	0,000
HU	0,003	0,004	0,000	0,000	-0,001	-0,002	0,007	0,012	-0,004	0,000	0,000	-0,001	-0,012	0,000
IE	0,237	-1,124	0,000	0,000	-0,016	-0,074	0,591	0,292	-1,277	0,000	-2,136	-0,293	-1,032	0,000
IT	-0,283	-0,022	-0,031	-0,175	-0,017	-0,953	0,098	0,000	-0,240	0,000	-0,005	-0,078	-0,046	0,019
LT	0,379	-0,031	-0,583	0,141	-0,013	-0,009	0,855	0,107	-0,619	0,000	-0,042	-0,053	-1,215	0,070
LU	0,632	-0,265	-0,878	0,182	-0,005	-1,631	2,639	0,000	-3,300	0,000	-0,002	-0,196	-1,784	0,104
LV	0,431	na	na	na	0,000	-0,070	1,011	0,000	-0,828	0,000	na	-0,401	-0,182	na
MT	0,177	-0,018	-0,108	0,084	-0,009	-0,009	0,405	0,000	-0,142	-0,620	-0,001	-0,038	-0,235	0,045
NL	-0,196	-0,432	0,000	0,000	-0,007	-2,322	1,322	0,000	-2,429	0,000	-0,449	-0,334	-0,969	0,000
PL	0,134	-0,712	-0,280	-0,169	-0,060	-0,058	0,362	0,228	-0,945	0,000	-1,364	-0,288	-0,849	0,482
PT	-0,258	0,000	0,000	0,000	-0,013	-1,768	0,768	0,000	0,000	0,000	0,000	0,000	-0,667	0,000
RO	0,032	0,000	0,000	0,000	-0,015	-0,079	0,138	0,122	-0,117	0,000	0,000	-0,017	-0,231	0,000
SE	0,076	-0,092	-0,062	0,009	-0,003	-0,975	0,906	0,000	-0,780	0,000	-0,055	-0,157	-0,080	0,023
SI	0,423	-0,206	-0,647	0,098	-0,009	-0,817	1,562	0,000	-1,528	0,000	-0,162	-0,038	-1,509	0,311
SK	0,067	0,049	-0,133	0,037	-0,013	-0,005	0,158	0,189	-0,224	0,000	-0,009	-0,032	-0,337	0,145
UK	0,191	0,101	-0,213	0,105	-0,027	-0,028	0,458	0,563	-0,426	0,000	-0,027	-0,204	-0,420	0,138

2.2.8. Calculating impacts on urban and rural areas

Different typologies of regions are differently affected by the policy scenario considered in this study; the differentiation between urban and rural regions looks as the most relevant in our case. In particular (see Table in the Scientific Report), using the OECD classification also used by the EU, rural regions experience the greatest negative impact on economic growth and unemployment (E1 and E2, respectively) while intermediate regions are those that benefit most from tourism diversification (E3). All types of regions benefit equally from improvements in environmental quality (Q1), while intermediate regions are especially affected by negative impacts on community viability (Q2), on landscape diversity (I1) and community identity (I2), as well as on risk of soil erosion (Q4) and on heritage products (I3) together with rural regions. Turning to Summative impacts, intermediate regions are those which will benefit most in terms of Territorial Efficiency, but also suffer most in terms of Territorial Quality and Identity.

2.2.9. Key findings

All the previous findings are summarized in 10 single-dimension impact maps, plus 3+1 summative maps drawn on the basis of our experts weighting pattern, plus 3+1 summative maps drawn on the basis of policy makers stated preferences. All maps

that have been developed in this project will be made available on the ESPON website. In this shorter Report, a selection of 5 + 2 + 1 maps is chosen, namely:
- single dimensional impacts on economic growth (E1), tourism diversification (E3), environmental quality (Q1), risk of soil erosion (Q4), community identity (I2);
- summative impacts on territorial efficiency and territorial quality (experts weighting);
- summative impacts on territorial efficiency (policy makers weighting).
The selection is made on the basis of the revealed importance of the single impacts and on the completeness of data available.

All tables concerning the impact indexes computations are also uploaded as requested on ESPON INTRANET website, and in particular (in the form of vectors of regional observations):
- the PIMs (potential impacts), referring to the value of impact indexes in their unit of measure; these indexes are the statistical starting points of all subsequent elaborations;
- the Normalized PIMs, or the PIMs translated in the +1/-1 scale by means of the value functions derived from the experts judgement;
- the TIMs, or Territorial Impacts, consisting on the normalised PIMs multiplied by the S (sensitivity of regions to impacts, where S = D x V - desirability of impacts for each region times vulnerability to impacts of each region). These are the final impacts analysed;
- the Ds and Vs used in the previous point;
- the four summative TIMs: for Territorial Efficiency, Territorial Quality, Territorial Identity and for the general Summative Impact;
- the same summative TIMSs in the case of policy makers weighting system.

Since the scenario considered entails a net budgetary reduction, *ceteris paribus* one would expect there to be more negative territorial impacts than positive, and indeed this is the case in several regions.

However, in spite of the important cut in transfer payments to farms that are implied by our policy scenario, with only partial recuperation through modulation and increase in Pillar 2 expenditure, the general impact on territorial efficiency will not be negative. Only peripheral and rural regions in Scandinavia, eastern countries and Spain will suffer a negative impact, but the bulk of central European - together with British, Irish, Italian regions and many western regions in New Member Countries – will benefit from positive impacts, manly thanks to differentiation possibility to tourism (but also to other activities). Impacts on environmental and territorial quality will still have a more severe impact on peripheral and mainly rural countries and regions, with also Italian, Greek, Portuguese and some Spanish regions like Pais Vasco and Andalucia equally hit. Countries and regions located more closely to the European barycentre, from Ireland to the Po valley, from Denmark to Austria, France and many central and eastern regions in Spain will show a slight but positive impact of these policies.

Overall, summing up in a weighted way impacts on all European regions (see Figure 2.2.1), impact on territorial efficiency is slightly positive, while impact on territorial quality is negative with a higher value. It is interesting to note that the global SI is still positive given the high weight assigned by experts to the macro-criterion of territorial efficiency – differently from what would happen if policy makers weight system were used.

Generalised territorial impact is difficult to draw as a consequence of many missing data; but territorial efficiency and quality, for which a wider and sufficient data availability is granted, sum up to almost 90% of it.

The calculated impacts can be summarised statistically, and tested for significance. This analysis reveals that the only statistically significant correlations are as follows:

- The impact on territorial efficiency hits areas of high unemployment especially.
- The impact on territorial identity favours richer areas with higher GDP/head.
- The impact on territorial efficiency is highly negatively correlated with the impacts on territorial quality and territorial identity – in other words these impacts offset one another, and this is the reason for the rather slight overall territorial impacts.

These results may be compared only loosely with the earlier study of the Territorial Impact of the CAP (ESPON 2.1.3), which assessed the geographical distribution or "incidence" of CAP support and the extent to which changes in the CAP have been associated with observable changes in the economic, social and environmental conditions in areas at the NUTS 3 level or equivalent. It did include assessment of the potential territorial impact of the CEC's Mid-Term Review (MTR) proposals of 2003, but this was a quite different policy scenario from that considered by TIPTAP.

Summarising the results of the earlier study, total Pillar 1 support was found to be distributed in such a way that it tends to benefit richer regions with lower unemployment rates and higher than average population growth. The pattern differed, though, between the two policy instruments that comprise Pillar 1 – market price support and direct income payments. While market price support (like total Pillar 1 support) was distributed in 1999 in favour of richer regions, direct income payments were found to be generally higher in areas with a low GDP per capita and with high unemployment rates, more in accordance with cohesion objectives.

Simple correlation analysis also showed that at the EU level the incidence of Pillar 2 support was also not consistent with cohesion objectives, favouring the more economically viable and growing areas of the EU. This was mainly because the richer regions made more use of these measures, especially agri-environmental measures, as well as reflecting the difficulties poorer regions had in co-financing these Pillar 2 measures.

Clearly, these results are not easily comparable to the TIPTAP results since they modelled the impact of a different policy proposal/ scenario, and the earlier study excluded the NMS which appear to be more affected by the impacts studied in TIPTAP. In both studies, however, the impacts of the proposed changes are rather small, with few overall winners or losers, and little change to the overall pattern of CAP expenditure favouring richer, core regions of Europe.

2.3. Impact of the new Transport Policy

2.3.1. Policy scenarios to be assessed

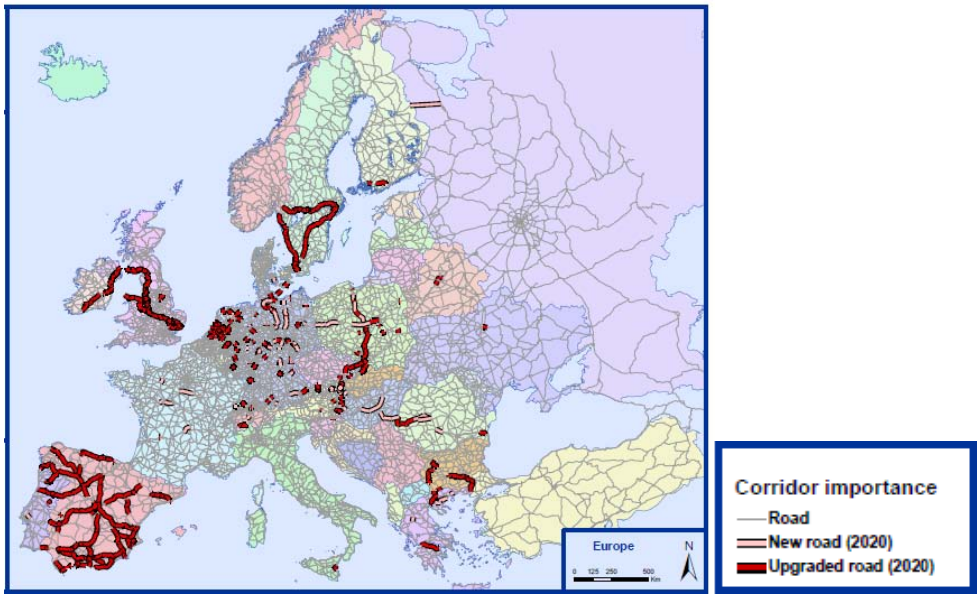
In this project, we focus on two types of measures inside the new transport policy: infrastructure and regulatory policies (i.e. “transport pricing”).

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)[17]. 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.

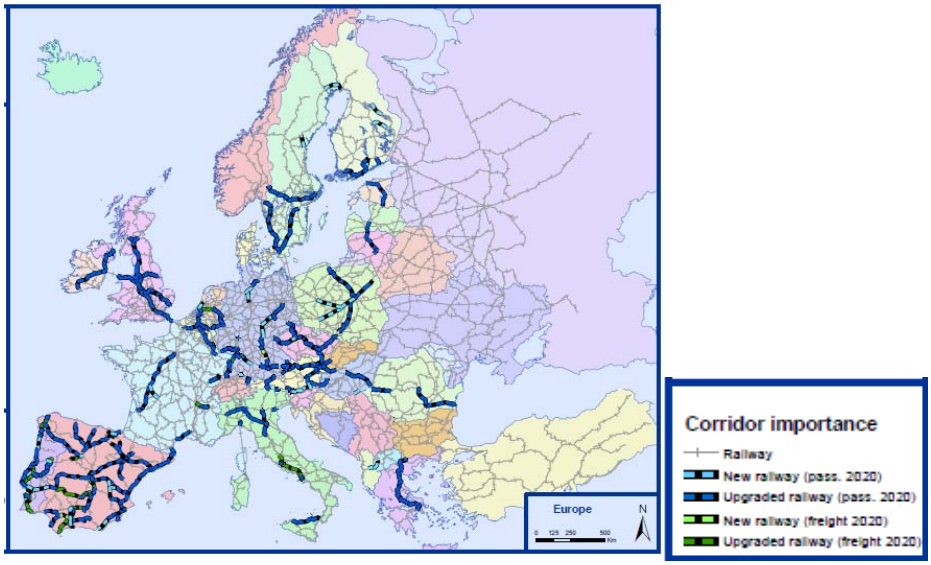
In the *Baseline Scenario* (scenario a in impact maps) links which have been constructed between 2005 and 2008 and links, which are currently under construction or already planned for construction are considered. Therefore, the baseline is a conservative estimate of what could be accomplished. The roads 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



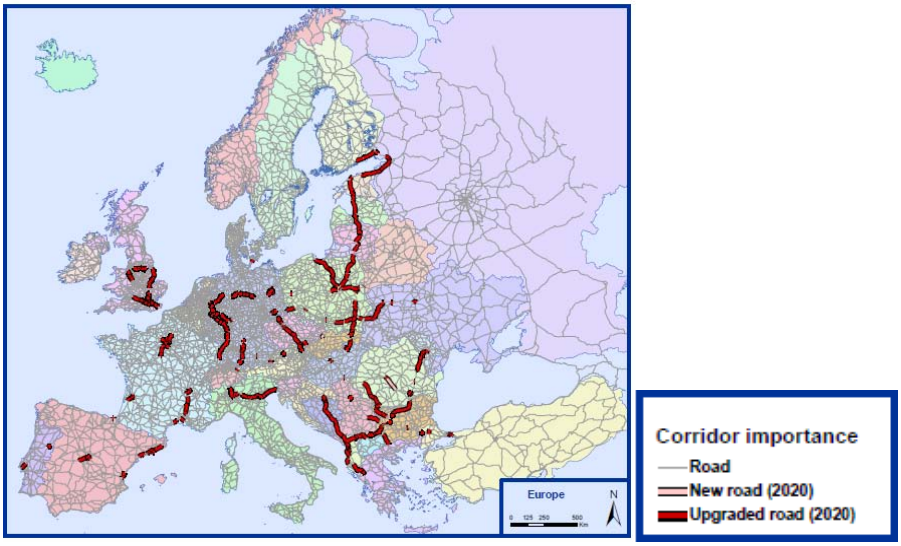
[17] The baseline scenario refers to year 2030; it is developed by exploiting the TRANSTOOLS model within the policy framework of the Revision of Transport White Book 2010-2020 and the Green Book on TENs revision.

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

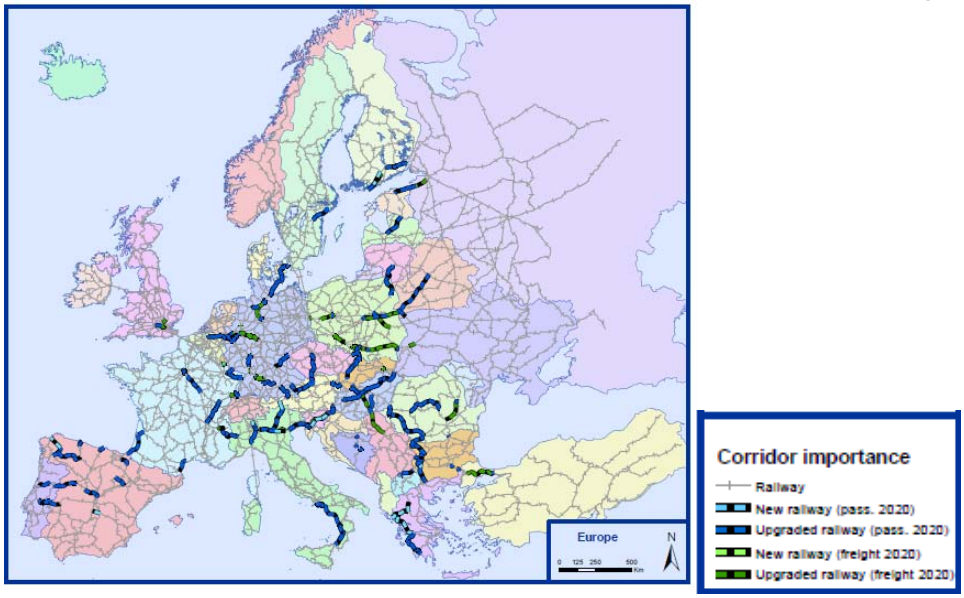


The second scenario is a *Infrastructure Enhancement* one (scenario b in impact maps), where policies are oriented towards new infrastructure provision. It is based on a High Growth 2030 scenario as defined in TRANSVisions study. In this case, a more comprehensive infrastructure development than foreseen 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) [18].

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.

[18] 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[19]

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.

[19] 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.

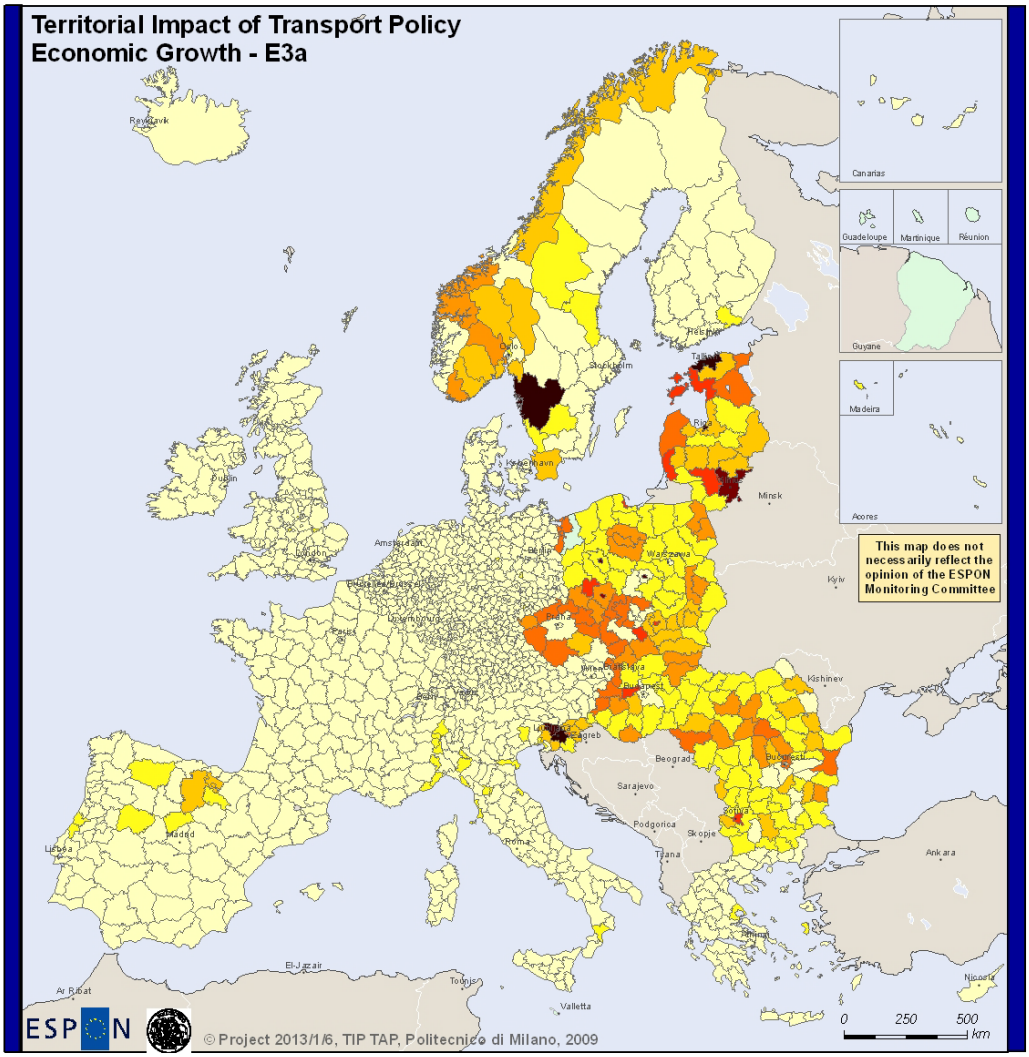
Interesting results come also from the Pricing scenario. Regulatory and pricing measures will overall reduce traffic per km on the entire network (E1c), increase air traffic (E2c) in areas characterized by congested transport networks (western German regions and Dutch regions, London, Milan, Rome) or 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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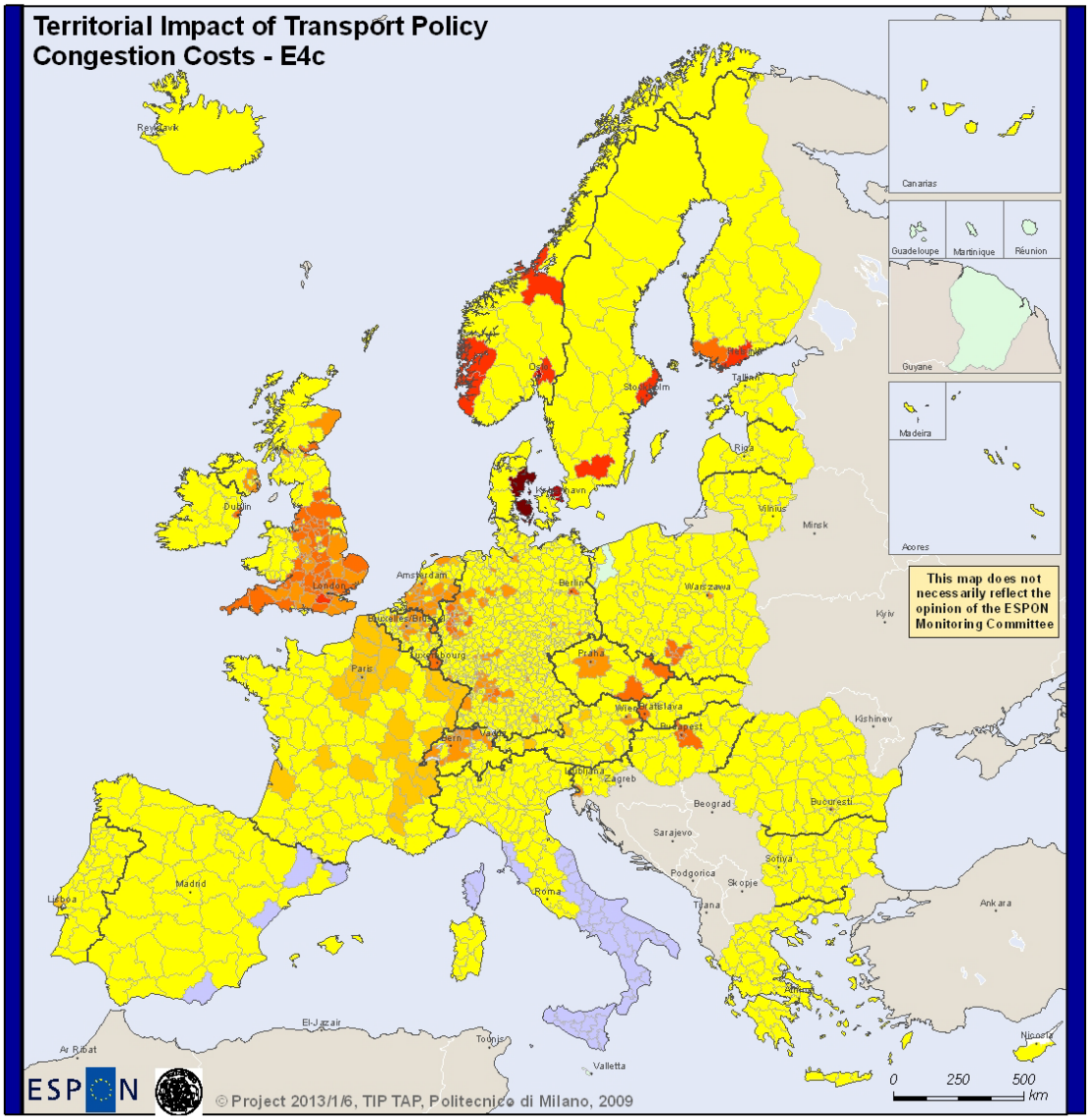
Legend

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).

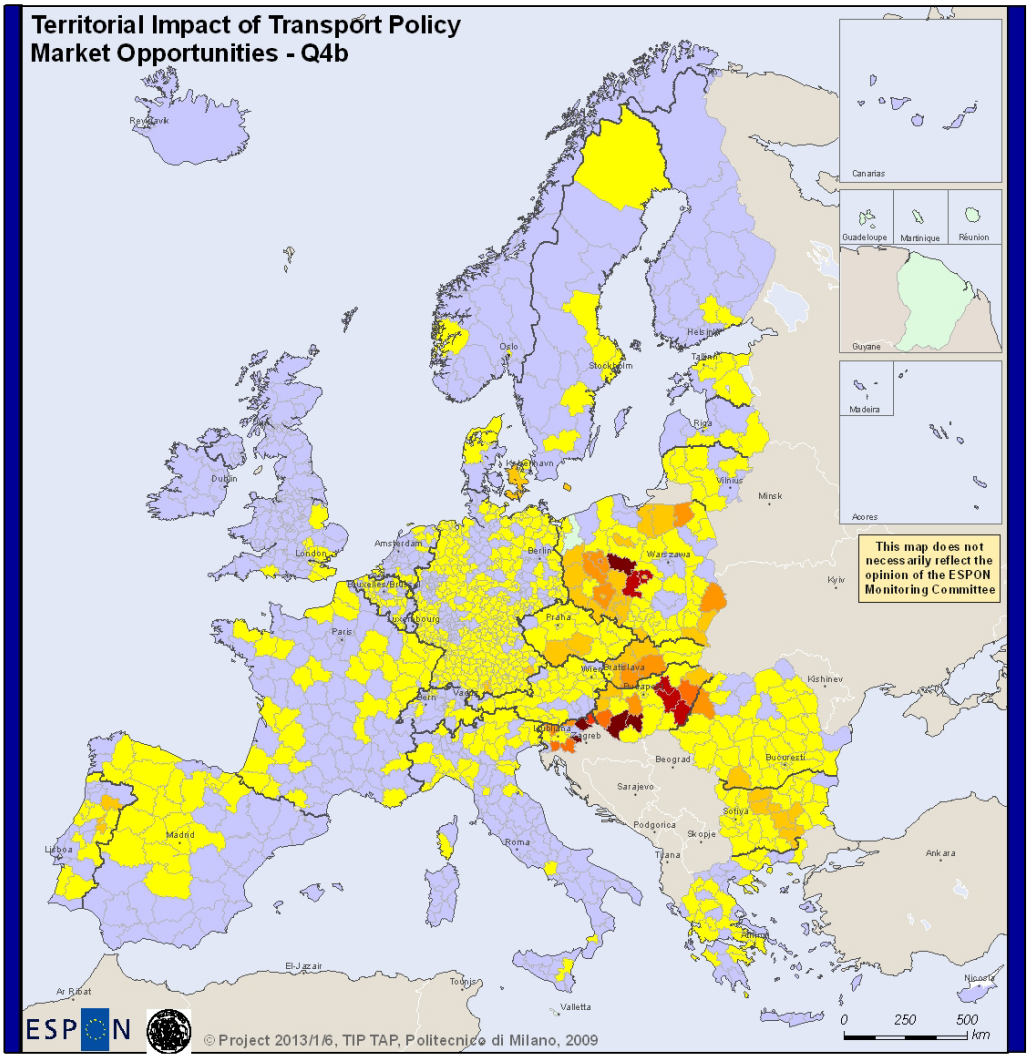
2.3.5. Impacts on landscape and local identities.
Landscape fragmentation and exposure to external visitors (I1 and I2) are the main impact indicators in this case. An increase in landscape fragmentation in the Baseline Scenario (I1a) will mainly happen in countries where most infrastructure will be 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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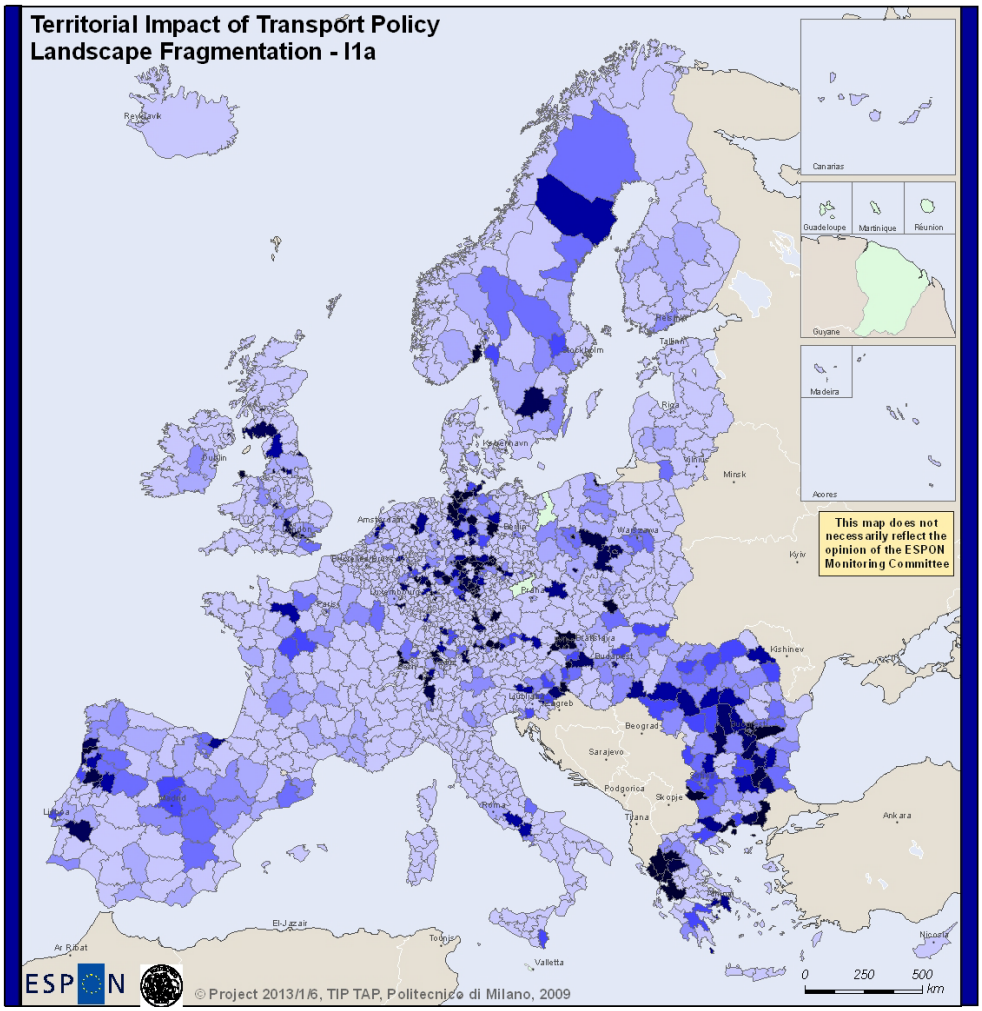
Map 2.3.4.



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Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
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:

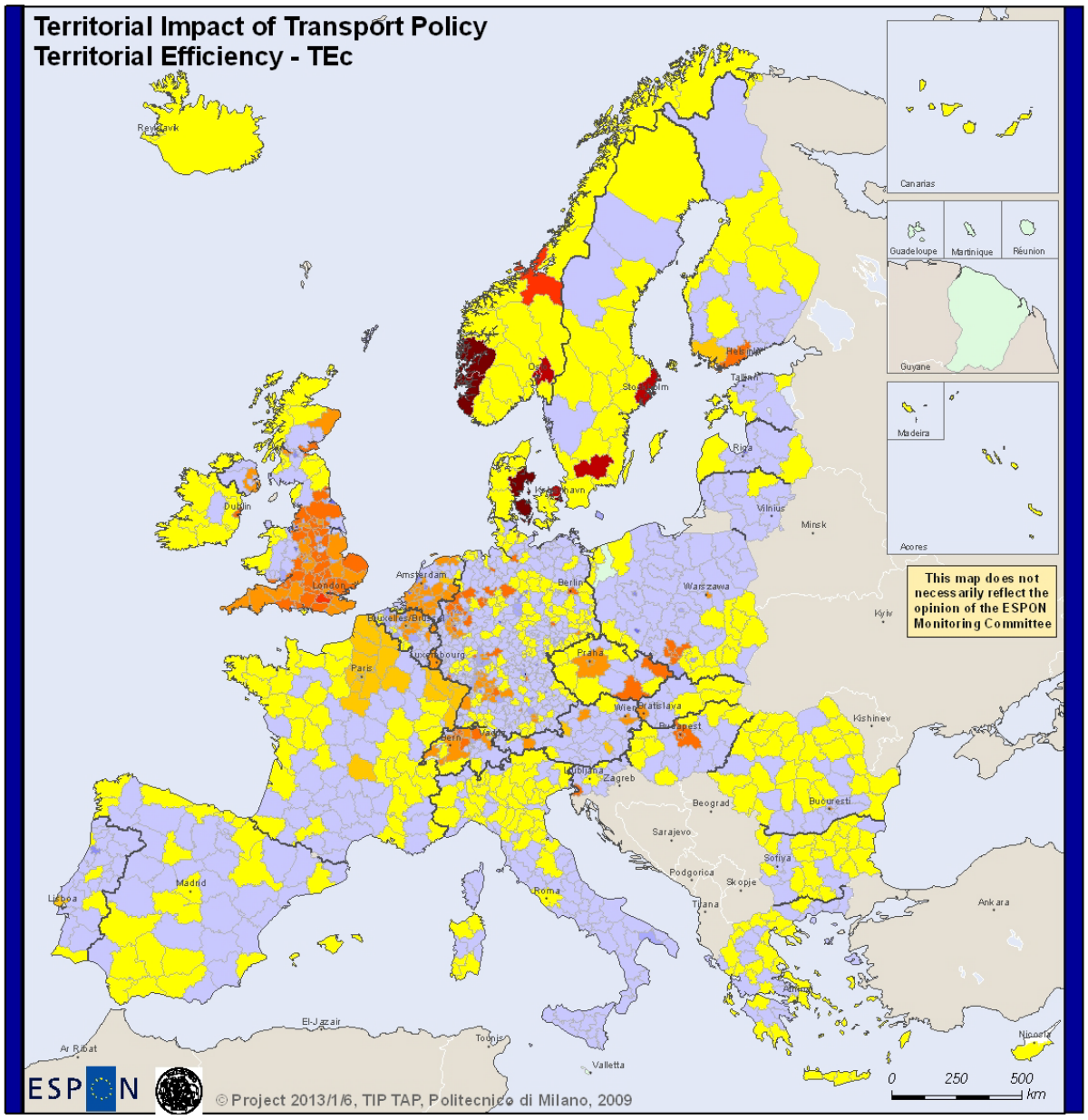
- concerning the weight of the three macro-criteria, territorial efficiency scores 43% (still the highest, but with a lower weight with respect to CAP policy), territorial identity comes second with 30% and territorial quality third with 27%;
- inside territorial efficiency, the most important score 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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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[20]	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

[20] 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) [21].

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

[21] 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[22] 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

[22] 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.

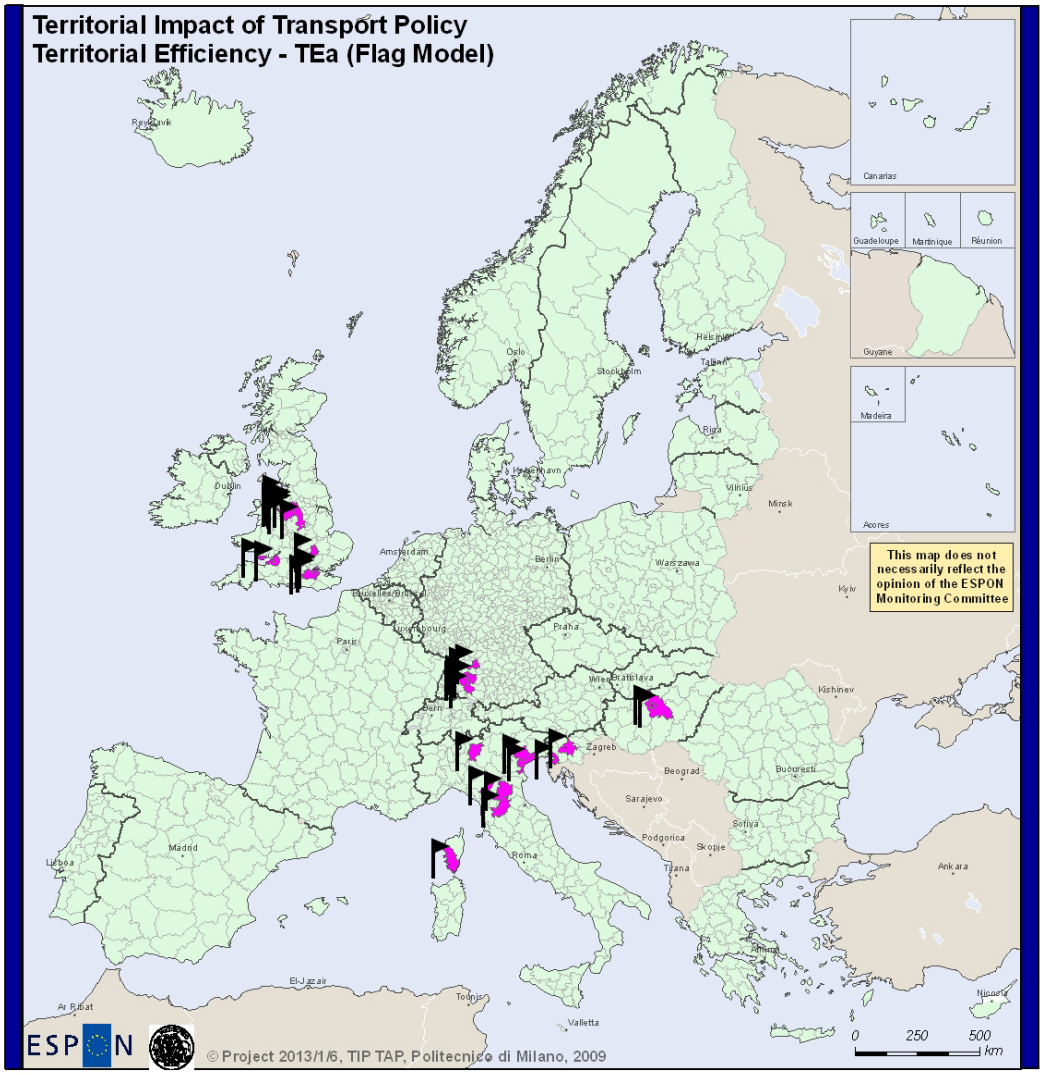
We kept the emissions case separated, due to the peculiar situation which is showing up. In fact, almost all European regions – with just a few exceptions in central Germany and southern Italy – will overcome the threshold assumed, namely the present condition, in the baseline scenario (Map. 2.3.8). 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



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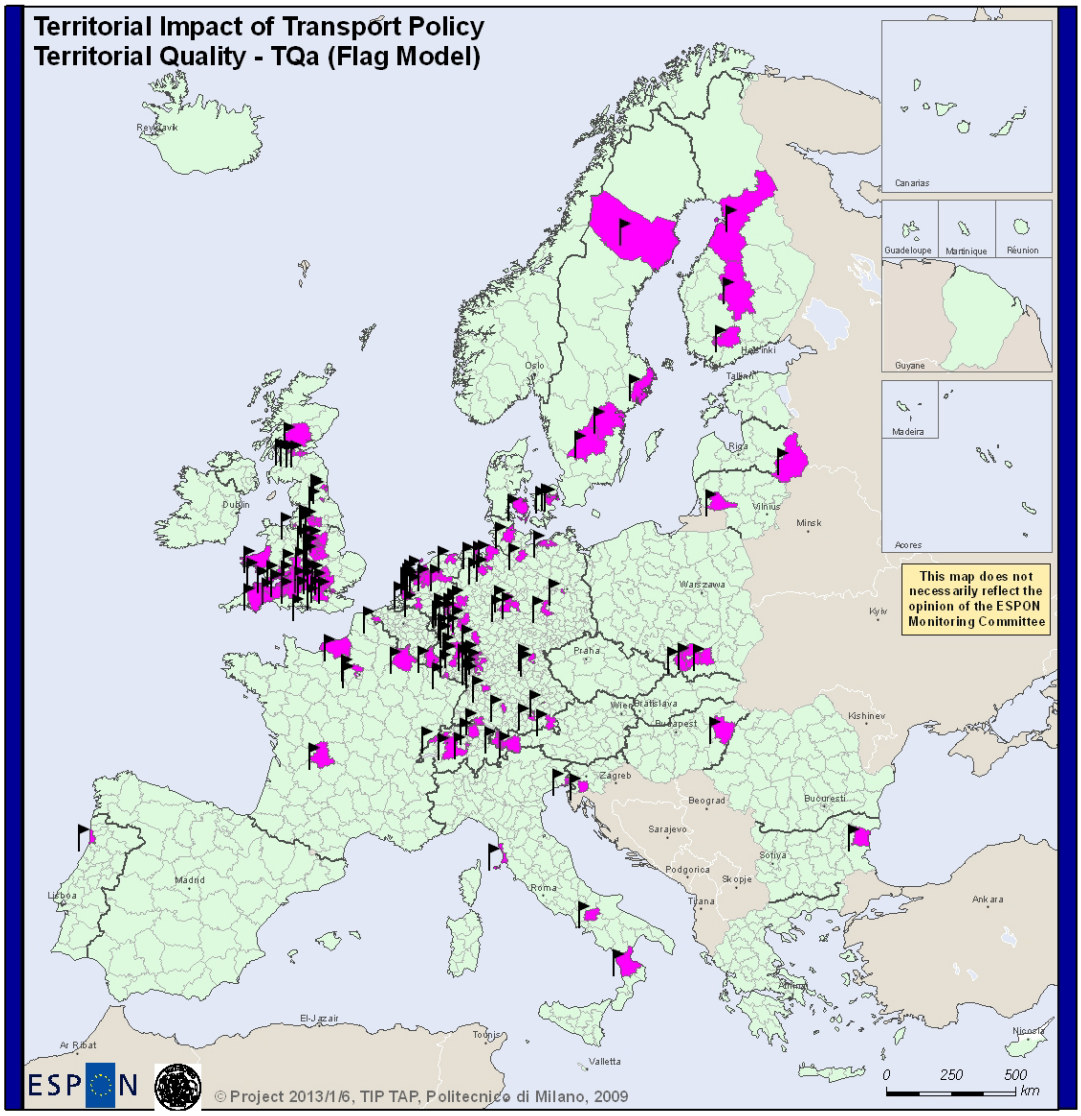
Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation

Legend

NA

Flagged Regions

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



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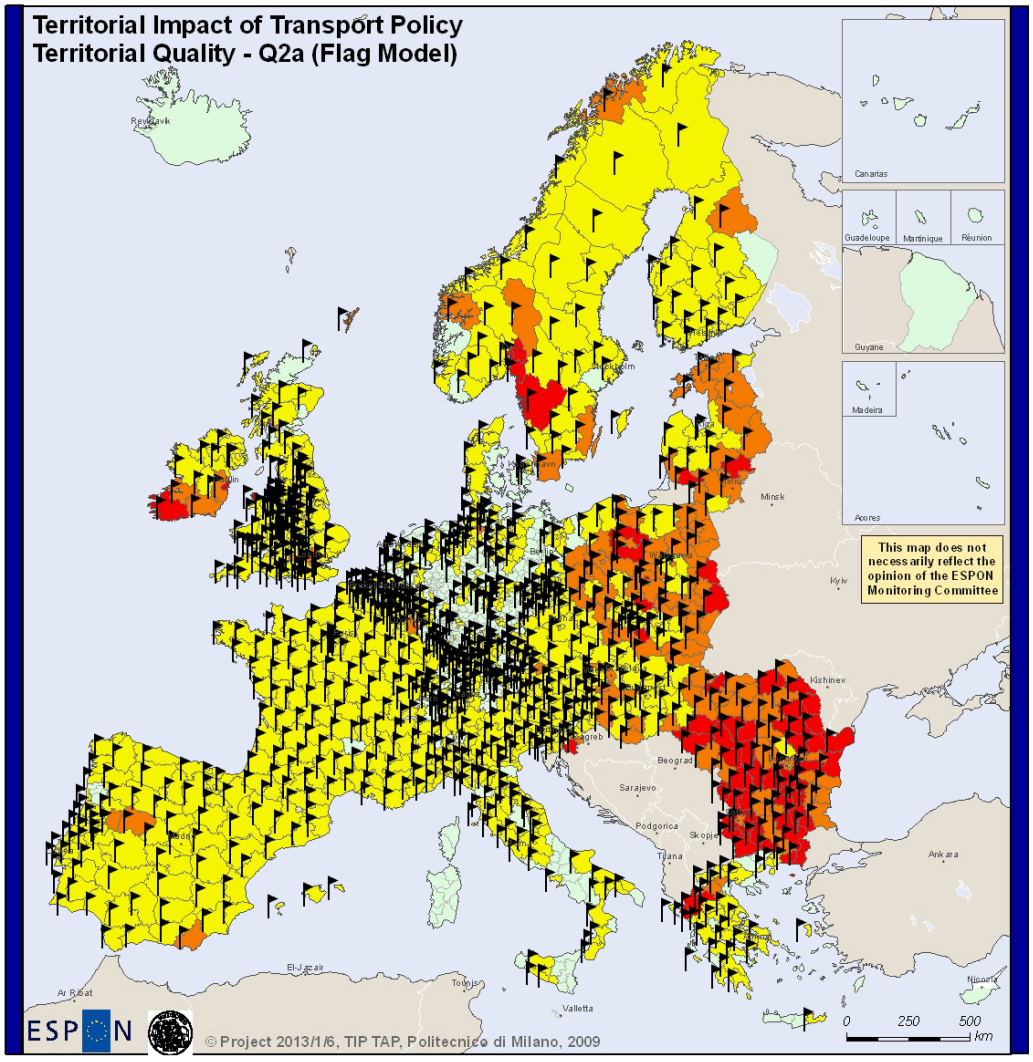
Regional level: NUTS3 (2006)
Source: EUROSTAT, ESPON database
Origin of data: own calculation
© EuroGeographics Association for administrative boundaries

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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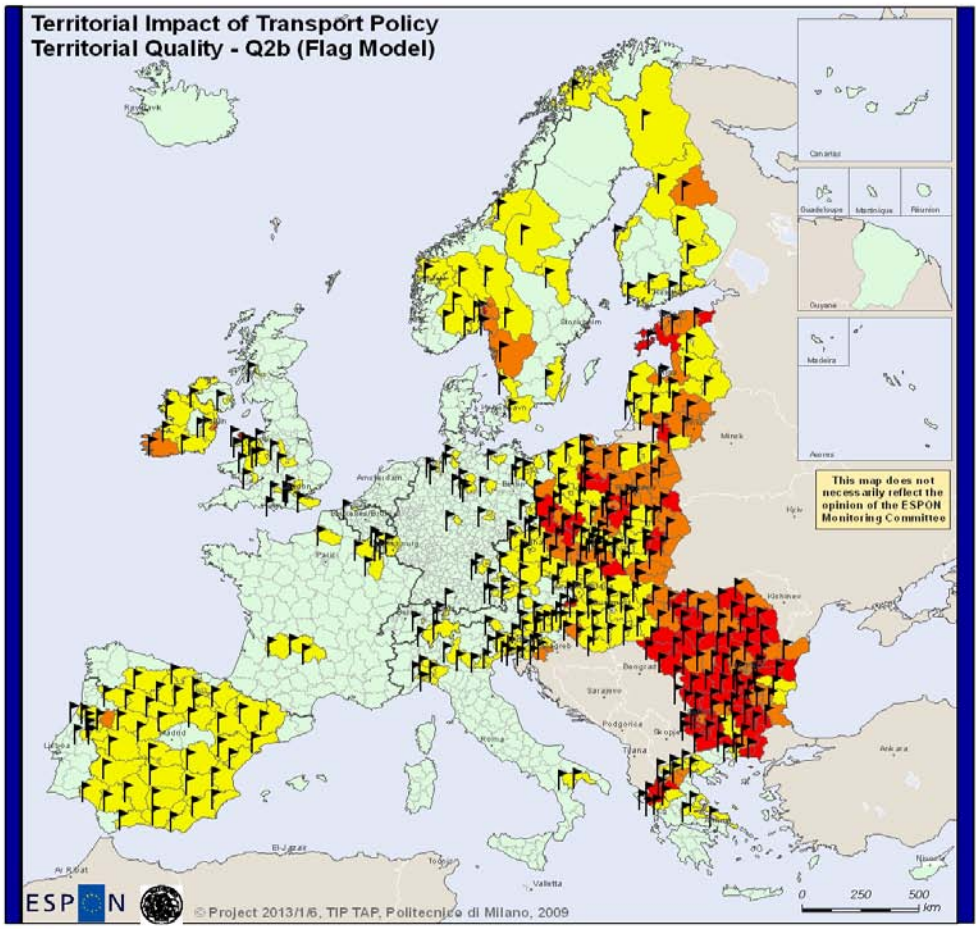
Legend

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 of other policy measures.

A comparison of the Tequila methodology with other existing approaches looks difficult, as no other experience exists bearing the same characteristics: addressing *territorial* impacts, in a *quantitative* way, on *all* EU regions, on a *wide spectrum of impacts*, potentially usable for *any policy measure*, making full use of existing econometric or dynamic simulation models and/or of existing statistical data base. Experts judgement is reduced to a minimum: differently from other experiences, impacts are not determined by experts (an operation that looks almost impossible, given the number of regions), but only value functions and weights in order to allow comparisons between impacts.

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).

j. Some refinements could also be implemented on the present configuration of the Tequila 2 model. In fact, in its present version encompassing experts judgements, the model looks highly sensitive to the D and V effects (Desirability and Vulnerability

variables) and the way they are defined (through classifications of regions: eastern, western; northern, southern; advanced, lagging; urban, rural). A coming back to some features of the previous Tequila 1 model, namely the utilisation of continuous regional variables instead of (or combined to) discrete classes, could be tested and eventually included in a third version of the model.

Further extensions of the TIA project line could envisage:

k. 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.

l. The identification of further typologies of regions which are similarly affected by the policies under examination. This typology exercise could complement the aassessment 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.

m. 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.