ESPON ARTS
Assessment of Regional and Territorial Sensitivity

Applied Research 2013/1/17

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This report presents a more detailed overview of the analytical approach to be applied by the project. This Applied Research Project is conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

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This basic report exists only in an electronic version.

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A Executive summary

Setting the frame for TIA

The necessity of an in-depth assessment of the territorial and regional effects of EU sectoral policies and directives had already entered the European policy debate during the preparation of the European Spatial Development Perspective (1995-1999). The *Territorial Agenda* of the Union (May 2007) and the First Action Programme (November 2007), as well as the *Green Paper on Territorial Cohesion* (October 2008), focussed explicitly on the issue of regional diversity.

The impact assessment (IA) procedure on the Commission level was introduced in 2002 and further developed by means of a gradual process that allowed Commission officials and organization to grow with it. The basic idea of the IA procedure is that ex ante impact evaluation, parallel to the policy making process, will improve the original ideas and result in robust, effective, efficient and widely supported policies.

In line with the goals of the EU *Impact Assessment Guidelines* ESPON ARTS aims to develop a tool allowing for analysis of the impact of EU legislation against the background of the different sensitivity of regions. The analysis of regional sensitivity to EU directives and policies is to be intended as a simplified, evidence-based procedure of Territorial Impact Assessment (TIA). TIA is defined as "a tool for assessing the impact of spatial development against spatial policy objectives or prospects for an area", working at "any spatial scale" and therefore applicable to large projects, plans and programmes (Williams et al., 2000, ECTP/CSD 2001, Böhme & Eser, 2008).

ESPON ARTS takes this experiences on board and tries to develop the methodological approach in line with the vulnerability concept according to the ICCP definition. Furthermore, it intends to come up with easily usable tools for policy makers as well as for practitioners.

The methodological approach

The vulnerability concept

The vulnerability approach according to the IPCC[1] definition allows to assess the impact of a policy by combining the exposure deriving from the effect of a policy measure and the territorial sensitivity (of regions). The concept of vulnerability consists of three elements with relevance for ESOPN ARTS: exposure, sensitivity, and potential impact:

- *"**exposure"*** describes the intensity by which EU directives and policies affect European regions ("regional exposure"), involving particular "fields" of the

[1] Intergovernmental Panel on Climate Change

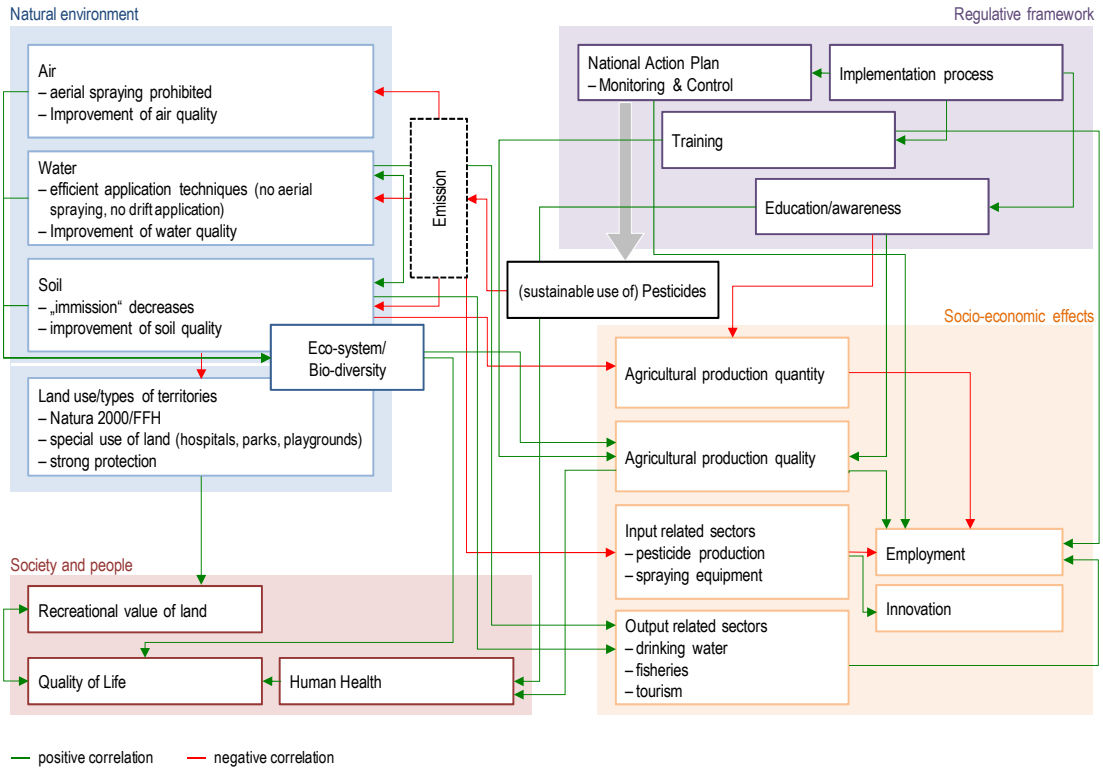
territorial realm, e.g. surface water quality, emissions, sectoral production ("field exposure");

- (territorial) ***"sensitivity"*** describes how single territories/regions are sensitive to, or evaluate, impacts in specific exposure fields, due to their socio-economic and geographical characteristics and to the social values and priorities they are likely to show;
- ***"territorial impact*** " is the potential effect (in the future) of a given EU policy or directive as a consequence of field exposure, regional exposure and regional sensitivity. Basically the potential impact can be direct or indirect along specific cause-and-effect logical chains.

The conceptual model of a directive

As a first step it is necessary to translate the text of a directive into cause effects relations describing the "intervention logic" of a directive. The cause-effect relations are to be reduced into logic representation schemes picturing the links between the effects deriving from the regulation laid down in the directive ("exposure" in the vulnerability concept) and the receptive capacity of a region ("sensitivity" in the vulnerability concept).

Figure A 1: Conceptual model of the directive 2009/128/EC Directive on the sustainable use of pesticides



The different matrices for calculating the territorial impact

As all European regions have to be inspected and many directives considered, it is necessary to use a statistical and quantitative methodology. Three definitions represent the conceptual pillars on which the quantitative methodology is built: exposure, sensitivity and territorial impact.

Given the fact that in line with the vulnerability concept three dimensions are involved – exposure fields, regions and directives – the methodology resides in the construction and combination (multiplication) of three indicators, organised respectively in matrices, which were set up in Excel.

The Directive/Exposure Matrix, presents the evaluation of the intensity by which each Directive affects the different Exposure Fields (environment, economy, society and territory) indicating the intensity of exposure of each field to each single directive. The intensity of exposure of these fields to directives is assessed by experts judgement, thorough the careful identification of the logical chains from EU decisions to territorial impact. The regional dimension is absent here.

The Regional Exposure Matrix encompasses the exposure of single regions to each directive, i.e. whether EU directives affect or not the single regions. In fact, a directive could touch only particular regions – e.g. coastal regions, peripheral regions, regions with presence of particular productions or facilities like nuclear power plants or else – and not being relevant for other regions. In this project, this matrix is a dychotomic, NO/YES matrix (0/1). The matrix is filled (with 0/1 scores) according to the results of the logical chain inspection on the single directives: regions are classified in different categories.

The Regional Sensitivity Matrix encompasses the general sensitivity of each region to single exposure fields, i.e. the attention and importance attributed in each region to each exposure field. No reference to any specific directive is made here. This sensitivity depends on socio-economic and geographical characteristics of the single regions, their social values and the political priorities attached to the different policy fields. The Regional Sensitivity matrix is built, for each exposure field, using relevant statistical indicators from a regional data base.

The result: The Territorial Impact Matrices.

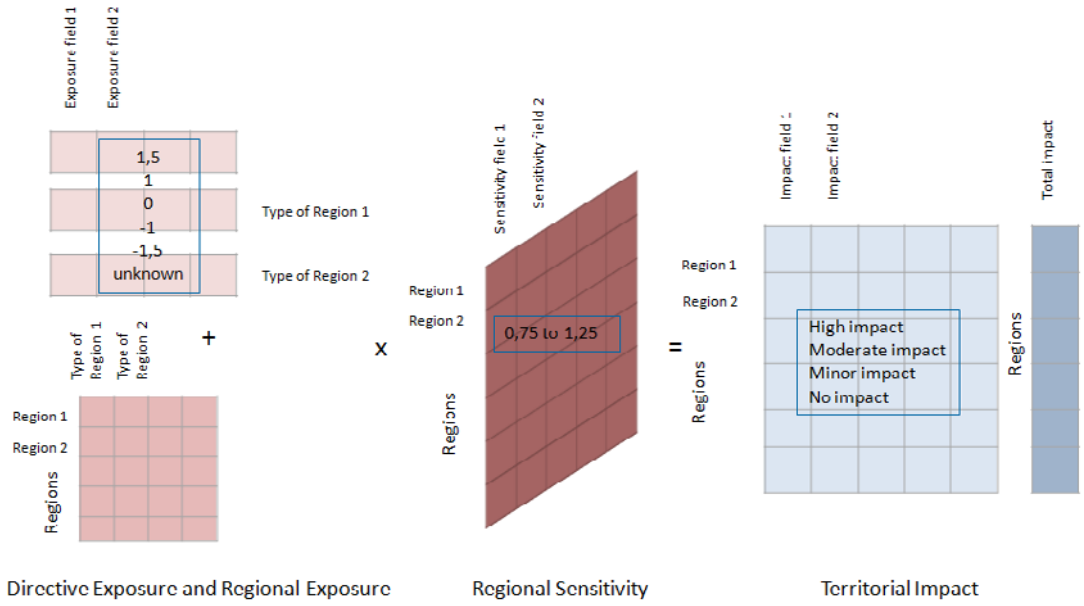
The three matrices mentioned above, duly elaborated, bring to the definition of the Territorial Impact of the Directives, represented in a series of Impact Matrices, one for each Directive, as shown in Figure B 4. The impact of directives is indicated as TIM (Territorial IMpact). The elements of the three matrices are multiplied by each other, term by term (not in the linear algebra way), and the general term obtained will be:

$$_dTIM_{r,f} = {}_dEXP_f \,.\, {}_dREXP_r \,.\, S_{r,f}$$

where:

- $dTIM_{r,f}$ is the likely impact of directive d on the exposure field f in region r,
- $dEXP_f$ is the exposure of field f to directive d,
- $dREXP_r$ is the regional exposure of region r to directive d,
- $S_{r,f}$ is sensitivity of region r to exposure field f.

Figure A 2: Assessment process of regional sensitivity to a branched EU Directive



Application of the methodology

The methodological approach was applied for twelve selected directives. It combines a standardised indicator based tool developed in Excel with a methodology to collect expert knowledge in a workshop atmosphere. The expert contribution serves as input for the analysis and for providing the interpretation of the output of the impact indicators. The application of the tool is done in seven steps:

(1) Setting the frame: The conceptual model and the logical chains

In a first step it is necessary to detect the potential effects of a directive on territorial development. In a workshop atmosphere the experts draw a picture of the conceptual model of the directive translating the text of the directive into cause effects relations. The result is a systemic picture showing the conceptual model of the directive according to its intervention logic and the potential effects.

(2) Considering different types of regions – the Regional Exposure Matrix

A directive could touch only particular regions (e.g. coastal regions, regions with presence of particular productions or facilities like nuclear power plants etc.) or different types of regions could be touched in different ways by a directive. The Regional Exposure Matrix provides a set of pre-selected types of regions allowing to

decide, if a certain type of region is not touched at all. Moreover it enables to define the exposure differently for different types of regions.

Based on the conceptual model in step 2 the decision is made,

(a) If a directive does not affect a certain type of region (according to the pre-selected types of region) at all? or

(b) Is it necessary to distinguish the exposure resulting from a directive along different types of regions? (= "branching of directives" into two or more logical chains)

(3) Filling in the Directive/Exposure Matrix

In step 2 the conceptual model of the directive is translated into the directive exposure matrix that describes the intensity by which EU directives and policies affect European regions along a pre-defined set of thematic fields covering natural environment, regional economy as well as society and people. For each field the exposure of a directive has to be defined according to the following classes:

- high positive exposure intensity/low positive exposure intensity
- no exposure
- high negative exposure intensity/low negative exposure intensity

If in Step 2 a "branching" was decided then the Directive/Exposure Matrix has to be completed for each branch.

(4) Calculating the TIM and plausibility checks

Based on the Directive/Exposure Matrix and the Regional sensitivity matrix, which is a standardised part of excel tool the territorial impact matrix (TIM) is calculated automatically. It provides for each thematic field/indicator and for each region the impact of the directive in a region in 9 classes ranging from very high positive impact to very high negative impact. The TIM displays the different values in different regions. In a first overview a plausibility check is made.

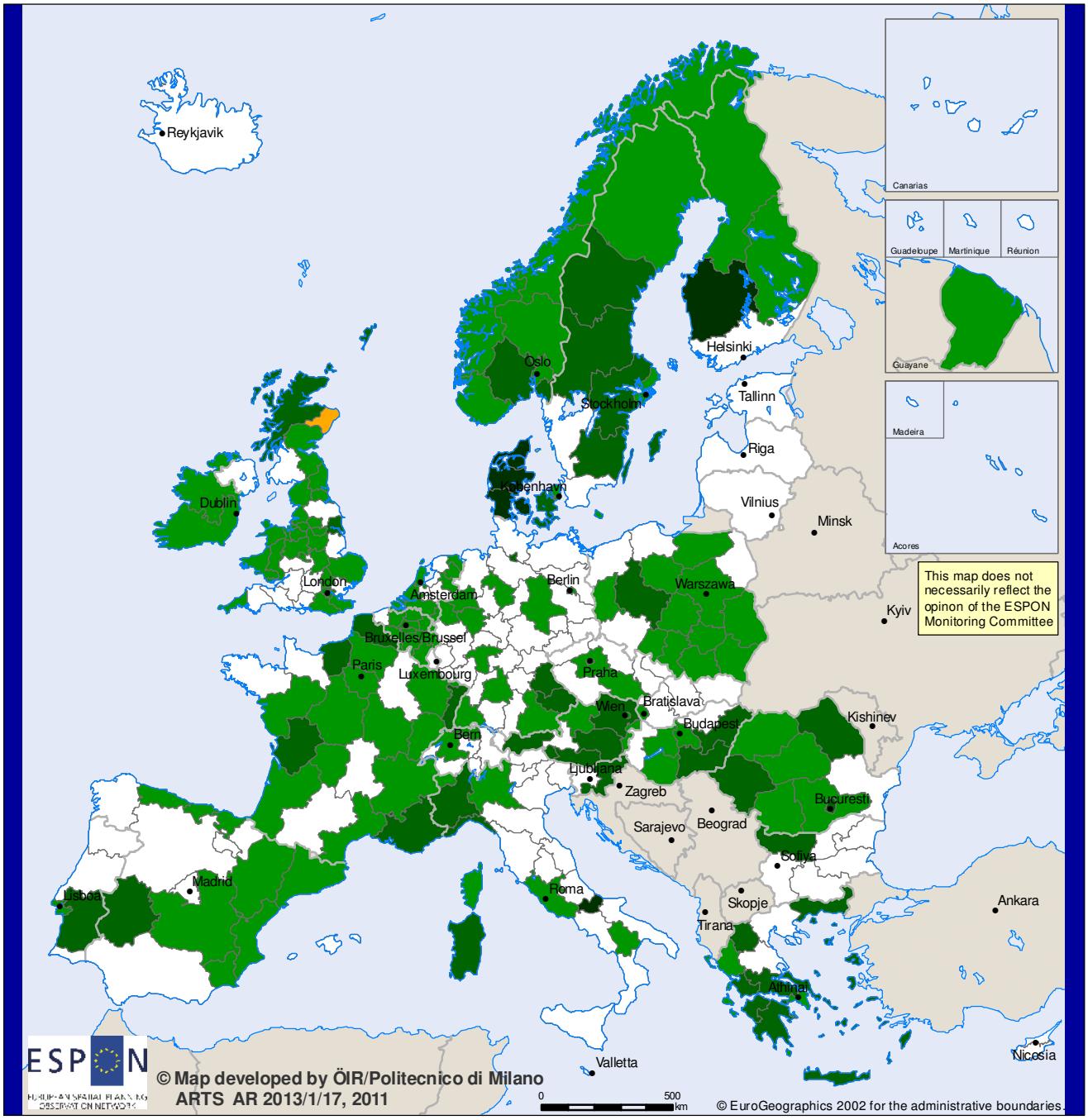
(5) Mapping the Territorial impact

If the plausibility checks are positive the maps showing the impact along the different indicators can be drawn. Additionally "summative" impacts of a directive on each region, considering together all impacts on the different fields can be drawn (see Map A 1 as an example)

Map A 1: Summative positive impact of Directive on sustainable use of pesticides

[following page]

ESPON ARTS



Summative positive impact of Directive on sustainable use of pesticides

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: rural, chemical industries

(6) Discussion on policy implications

Based on the maps the discussion on policy implication can be done. Focusing on the positive impacts of a directive as well as on negative effects. The host moderates the discussion and writes the minutes.

(7) Writing the minutes

Based on the results of the meeting and the discussion minutes are elaborated according to a common structure.

Examples of the analysis of 12 directives

This procedure was conducted for the following 12 directives.

(1) Directive on air quality
(2) Waterframework Directive
(3) Seweso Directive
(4) Directive on managing environmental noise
(5) Directive on promotion of use of biofuels
(6) Directive on the environmental liability
(7) Directive on the interoperability of electronic road toll systems
(8) Directive on recognition of qualifications
(9) Directive on critical infrastructure
(10) Directive on sustainable use of pesticides
(11) Directive on clean and energy-efficient road transport vehicles
(12) Directive on the energy performance of buildings

For three selected directives in depth analysis were conducted. Thereby, the different logic chains of reasoning in terms of cause-effect relations were analysed in different types of regions reflecting also different alternatives in implementing the policies. Methodologically, this was done by “branching” the directives according to different types of regions/different implementation strategies. The different “branches” of the directives policy implications were discussed taking into account potential policy alternatives.

Governance

In order to integrate the factor governance in the ARTS methodology governance indicators were taken on board in the exposure and regional sensitivity matrices for the following impact fields:

(1) efficiency of government/governance mechanisms (efficiency/effectiveness of public administration)

(2) duration or complexity of planning procedures (introduction of new administrative tasks/mechanisms/units/structure)

(3) participation rate

(4) Societal transfer (e.g. tax added)

(5) transnational cooperation between member states

Although five governance factors have been factored into the model, the possibilities to confront them with the territorial sensitivity matrix and differentiate their impact to regional characteristics are rather limited. The impact field 'cross-border co-operation' can be operationalized in a meaningful way. Other impact fields such as complexity of panning process a societal transfer are relatively difficult to operationalize as they are not stable over time. In so doing the exposure fields relating to governance primarily have a signalling function. They indicate to policy makers that the implementation of the directive will impact upon the current domestic governance system. It nevertheless enables policy makers to take the effect into account in the wider process of assessing the desirability of the directive in its, at that moment, unfinished form.

Options for policy development

The TIA as developed in ESPON ARTS could serve as a first pre-check on the expert level of the Commission and add the territorial dimension to the Commission's Impact Assessment procedure. It enables to identify those regions with would benefit intensely and those regions with likely high negative impacts. The result of TIA could feed in into the further stakeholder driven process of the Commission's Impact Assessment. Another option would be to use the TIA procedure as part of the strategic environmental assessment (SEA).

Each directive will also produce spill over effects towards the neighbouring countries. These effects are not covered by the TIA procedure up to now. Analysing the impacts of EU legislation on the EU neighbourhood could be a new part of the EU neighbourhood policy in order to support the neighbouring to be better prepared.

Issues for further analytical work and research

The following issues came up for further analytical work:

- The analysis of the impact of the directives should cover all relevant fields of territorial development: covering natural environment, regional economy as well as society and people. Missing indicators were especially concerning land use, governance (efficiency of government/governance mechanisms, duration or complexity of planning procedures, participation rate, societal transfers), innovation and market barriers, cultural heritage. Additional indicators would be needed in order to provide the full range of possible impacts of directives.
- The existing typologies do by not cover the types that would be necessary for a TIA. It would be very useful to extend the list of pre-selected types of regions of the regional exposure matrix.
- NUTS 2 is quite a large scale for the distinction of effects of some directives e.g. when directives aim at urban areas etc. It would be good to get the list of indicators as well as the list of types of regions on NUTS 3.
- For policy makers it would be interesting to get also an overview about "summative" impacts of a directive on each region, considering together all impacts on the different fields. Additional research would be interesting how to picture this "summative" effects better.
- The analysis focuses an depicting the impact of the EU legislation within a region. Additionally, spill over effects and cross boarder effects could be analysed.
- Instead of trying to model governance in order to predict where problems might occur, a different approach is to help stakeholders with identifying potential issues in the process of developing, transposing, implementing and using the directive. This could be done by developing a guidance and check-list which provides general and stage specific guidance.

B Report

1 Main results, trends, and impacts

The policy context

The necessity of an in-depth assessment of the territorial and regional effects of EU sectoral policies and directives had already entered the European policy debate during the preparation of the European Spatial Development Perspective (1995-1999). The *Territorial Agenda* of the Union (May 2007) and the First Action Programme (November 2007), as well as the *Green Paper on Territorial Cohesion* (October 2008), focussed explicitly on the issue of regional diversity.

The impact assessment (IA) procedure on the Commission level was introduced in 2002 and further developed by means of a gradual process that allowed Commission officials and organization to grow with it. The basic idea of the IA procedure is that ex ante impact evaluation, parallel to the policy making process, will improve the original ideas and result in robust, effective, efficient and widely supported policies.

In line with the goals of the EU *Impact Assessment Guidelines* ESPON ARTS aims to develop a tool allowing for analysing the impact of EU legislation against the background of the different sensitivity of regions. A methodological approach was developed in line with the vulnerability concept according to the ICCP definition and usable tools for policy makers as well as for practitioners were developed.

The methodology developed

As a first step it is necessary to translate the text of a directive into cause effects relations describing the “intervention logic” of a directive. The cause-effect relations are to be reduced into logical representation schemes picturing the links between the effects deriving from the regulation laid down in the directive (“exposure” in the vulnerability concept) and the receptive capacity of a region (“sensitivity” in the vulnerability concept).

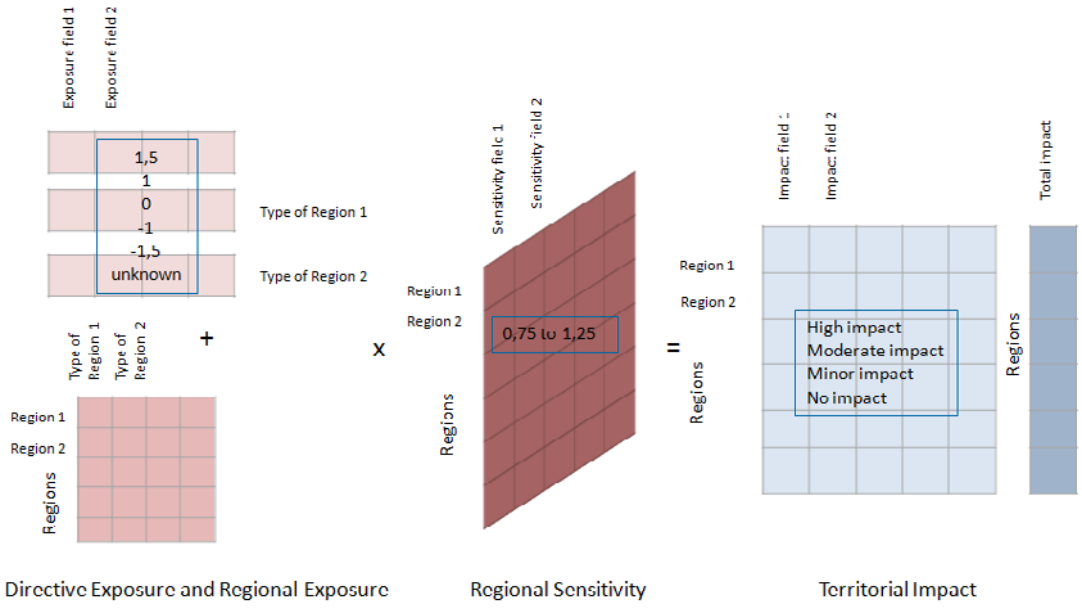
Given the fact that in line with the vulnerability concept three dimensions are involved – exposure fields, regions and directives – the methodology resides in the construction and combination (multiplication) of three indicators, organised respectively in matrices, which were set up in Excel.

- **The Directive/Exposure Matrix**, presents the evaluation of the intensity by which each Directive affects the different Exposure Fields (environment, economy, society and territory) indicating the intensity of exposure of each field to each single directive.

- **The Regional Exposure Matrix** encompasses the exposure of single regions to each directive, i.e. whether EU directives affect or not the single regions.
- **The Regional Sensitivity Matrix** encompasses the general sensitivity of each region to single exposure fields, depending on socio-economic and geographical characteristics of the single regions, their social values and the political priorities attached to the different policy fields.

The three matrices mentioned above, lead to the definition of the Territorial Impact of the Directives, represented in a series of Impact Matrices, one for each Directive, as shown in Figure B 1.

Figure B 1: Assessment process of regional sensitivity to a branched EU Directive



This methodological approach was applied for twelve selected directives combining a standardised indicator based tool developed in Excel with a methodology to collect expert knowledge in a workshop atmosphere. The application of the tool is done in seven steps:

(1) Setting the frame: The conceptual model and the logical chains

(2) Considering different types of regions – the Regional Exposure Matrix

(3) Filling in the Directive/Exposure Matrix

(4) Calculating the TIM and plausibility checks

(5) Mapping the Territorial impact

(6) Discussion on policy implications

(7) Writing the minutes

Options for policy development

The TIA as developed in ESPON ARTS could serve as a first pre-check on the expert level of the Commission and add the territorial dimension to the Commission's Impact Assessment procedure. It enables to identify those regions which would benefit intensely and those regions with likely high negative impacts. The result of TIA could feed in into the further stakeholder driven process of the Commission's Impact Assessment. Another option would be to use the TIA procedure as part of the strategic environmental assessment (SEA).

Each directive will also produce spill over effects towards the neighbouring countries. These effects are not covered by the TIA procedure up to now. Analysing the impacts of EU legislation on the EU neighbourhood could be a new part of the EU neighbourhood policy in order to support the neighbouring countries to be better prepared.

Issues for further analytical work and research

The following issues came up for further analytical work:

- The analysis of the impact of the directives should cover all relevant fields of territorial development: natural environment, regional economy, society and people. Missing indicators were especially concerning land use, governance, innovation market barriers and cultural heritage. Additional indicators would be needed in order to provide the full range of possible impacts of directives.
- The existing typologies by enlarge do not cover the types that would be necessary for a TIA. It would be very useful to extend the list of pre-selected types of regions of the regional exposure matrix.
- NUTS 2 is quite a large scale for the distinction of effects of some directives e.g. when directives aim at urban areas etc. It would be good to get the list of indicators as well as the list of types of regions on NUTS 3.
- For policy makers it would be interesting to get also an overview about "summative" impacts of a directive on each region, considering all impacts on the different fields together. Additional research would be needed on how to picture this "summative" effects better.
- The analysis depicts the impact of the EU legislation within a region. Additionally, spill over effects and cross boarder effects could be analysed.
- Instead of trying to model governance in order to predict where problems might occur, a different approach is to help stakeholders with identifying potential issues in the process of developing, transposing, implementing and using the directive. This could be done by developing a guidance and check-list.

2 Key analysis and findings

2.1 Introduction

The vulnerability concept

The terminology in the ToR in ESPON ARTS is rooted in the vulnerability concept developed by the IPCC[2] and broadly discussed in the impact assessments in natural sciences, especially concerning climate change. This approach allows to assess the impact of a policy by combining the exposure deriving from the effect of a policy measure and the territorial sensitivity (of regions).

However, the definitions between the ToR and the IPPC approach differ. In ESPON ARTS we will stick to the IPPC definitions in order to be able to communicate the TIA concept with this scientific community.

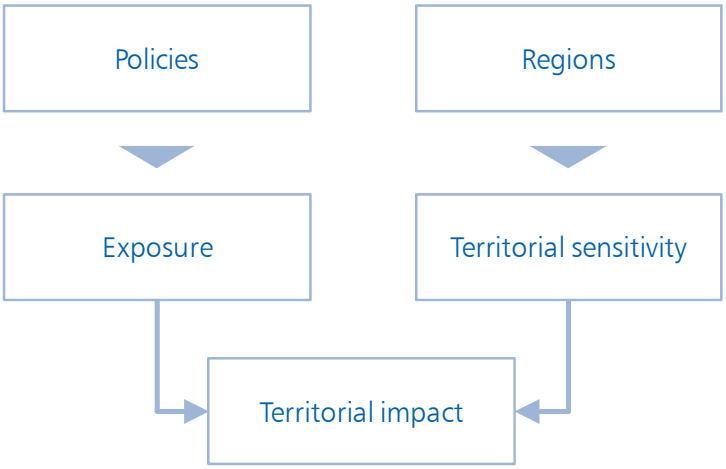
The concept of vulnerability consists of four core elements: exposure, sensitivity, potential impact and adaptive capacity:

- *"**exposure"*** describes the intensity by which EU directives and policies affect European regions ("regional exposure"), involving particular "fields" of the territorial realm, e.g. surface water quality, emissions, sectoral production ("field exposure");
- (territorial) ***"sensitivity"*** describes how single territories/regions are sensitive to, or evaluate, impacts in specific exposure fields, due to their socio-economic and geographical characteristics and to the social values and priorities they are likely to show;
- ***"territorial impact*** " is the potential effect (in the future) of a given EU policy or directive as a consequence of field exposure, regional exposure and regional sensitivity. Basically the potential impact can be direct or indirect along specific cause-and-effect logical chains.
- The "**adaptive capacity"** is the ability of a system to adjust to the potential impact, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC, 2007). Thus, adaptive capacity is closely linked with governance aspects.

ESPON ARTS focuses on analysing the impact. It does not consider the (possible) adaptive capacity of a territory. However, as we also discuss governance issues in the projects, aspects of the adaptive capacity of territories are taken into account in a qualitative way.

[2] Intergovernmental Panel on Climate Change

Figure B 2: The territorial impact combining exposure with sensitivity



Looking at the effects to be analysed on the exposure-side in ESPON ARTS three distinct elements/processes are taken into account:

(a) **a *direct and intentional impact of EU directives***, which is proportional to the presence of the territorial assets involved in sectoral EU LPDs.

(b) ***an indirect and mainly unintentional or unexpected impact of the directives***, concerning positive or negative side effects.

The relevance of the last process is linked to main characteristics of the regional context:

(I) the *complexity and differentiation* of the socio-economic context,

(II) the *redundancy* of potential internal and external linkages,

(III) the local *governance structure*. In fact, *"domestic territorial characteristics and governance systems act as a filter and interface"* between EU directives and territorial actual impacts (Zonneveld, Waterhout, 2009). General results of the same EU intervention are likely to be highly differentiated among regions and territories according to territorial specificities and, particularly, of national/regional/local governance systems. Therefore we speak here about "filtered" impacts. In this case, both a theoretical and an empirical analysis will be carried out through case studies.

All the preceding tasks were carried out on a sample of 12) directives. From these, 3 cases were selected in a second time for more in-depth analysis.

2.2 The methodological approach to be applied

2.2.1 The conceptual model of a directive

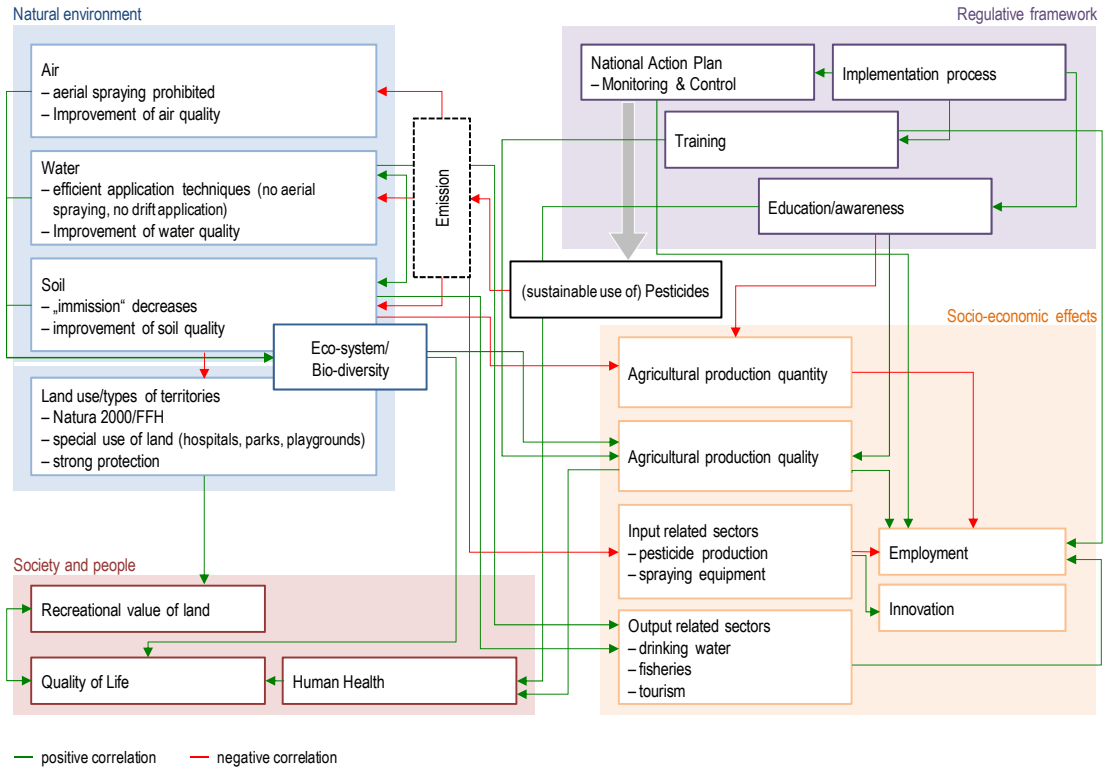
As a first step it is necessary to translate the text of a directive into cause effects relations describing the "intervention logic" of a directive. The cause-effect relations are to be reduced into logical representation schemes picturing the links between the

effects deriving from the regulation laid down in the directive ("exposure" in the vulnerability concept) and the receptive capacity of a region ("sensitivity" in the vulnerability concept).

This conceptual model comprises the establishment of relations between all relevant model components and the drawing of systemic borders. The elements of the model are to be selected carefully so that they show a direct relation to the system reality (in our case the causes and effects of EU directives on territorial impacts) and therefore allow for traceability for the user of the model, taking also into account the data availability. It enables to picture cause-effect relations as well as positive and negative feed-back loops of a directive on the development of regions. In the case of EU Directives, model modules were identified as 'Natural environment', 'Regional economy', 'Society and people' and 'Regulative framework'. Each of them contains several model components that were identified as part of system reality. Links between the components were drawn, indicating indirect or direct negative and positive relations.[3]

The following figure shows an example of such a conceptual model for the Directive establishing a framework for Community action to achieve the sustainable use of pesticides.

Figure B 3: Conceptual model of the directive 2009/128/EC Directive on the sustainable use of pesticides



[3] This was done for all 12 selected directives and not only for the directives selected for the in depth analysis as required by the ToR.

2.2.2 The statistical and assessment tools

One of the goals of the project is to build a "*KIS*" ("keep it simple") operational methodology (as simple, comprehensible and user-friendly as possible) in order to define in quali/quantitative and comparative terms the sensitivity of European regions to EU directives. As all European regions have to be inspected and many directives considered, it is necessary to use a statistical and quantitative methodology, as it was done in previous ESPON exercises on Territorial Impact Assessment, namely in the Tequila Models.

Three definitions represent the conceptual pillars on which the quantitative methodology is built: exposure, sensitivity and territorial impact.

The starting point is given by three sets of elements:

(a) a common set of n exposure fields f, the same for all directives,
where f = 1…… f …. n

(b) a common set of m regions r (at NUTS 2 level in this project)
where r = 1 …..r..... m

(c) a common set of 12 EU Directives d,
where d = 1-12 (as agreed with the ESPON CU).

Given the fact that three dimensions are involved – exposure fields, regions and directives – the problem at hand looks statistically complex and has to be simplified without missing relevant information or trivializing the entire procedure [4].

The methodology resides in the construction and combination (multiplication) of **three indicators, organised respectively in three matrices**, which represent the three logical steps of the methodology itself (Figure B 4):

- **A – the Directive/Exposure Matrix**, indicating the intensity of exposure of each field to each single directive,
- **B – the Regional Exposure Matrix,** indicating the intensity of exposure of each region to each single directive,
- **C – the Regional Sensitivity Matrix,** indicating the attention and the importance given in each region to each specific exposure field.

A – The Directive/Exposure Matrix

The Directive/Exposure Matrix – n fields and 12 directives [5]- presents the evaluation of the intensity by which each Directive acts on the different Exposure Fields. As said

[4] For each directive, n TIMs on m regions have to be indicated and computed, namely 41 x 287 = 11.767. Multiplied by 12 directives this gives 141.204 potential territorial impacts. Of course, many impacts are nil, as some fields might not be touched by some directives or some regions might not be exposed to some directives.

[5] The generic value of the indicator of intensity of exposure in each cell of the matrix is: **dEXPf** (intensity of exposure of field f to directive d)

before, exposure fields relate to different dimensions of environment, economy, society and territory.

Table B 1: List of exposure fields

Natural environment				
Soil	Water	Air	Climatic factors	Fauna/Flora/Habitat
erosion	water consumption	pollutants in air	emissions of CO2	biodiversity
pollutants in soil	pollutants in ground/surface water		heavy rain/flood hazard/occurrence of landslides	conservation of natural heritage (landscape diversity)
share of artificial areas/soil sealing				conservation of cultural heritage
Regional economy				
Economic development	Agriculture	Industry	Services	Tourism
economic growth	employment in primary sector	employment in secondary sector	employment in tertiary sector	overnight stays
innovation	% of arable area, permanent grass/-crop area			
entrepreneurship				
market barriers				
Society and people				
Social disparities	Demography	Accessibility	Built environment	Governance
disposable income in PPS per capita	out-migration/brain drain/"shrinking" regions	daily accessibility by air	increase of urbanization relative to population growth	efficiency of government/governance mechanisms
equal income distribution	number of people exposed to noise	daily accessibility by waterways	mixed land use	duration or complexity of planning procedures
employment rate	accident rate in transport	daily accessibility by road		participation rate
	accident risk: industry/energy supply	daily accessibility by rail		societal transfers (e.g. tax added)
	healthy life expectancy at birth	renewable energy		transnational cooperation between member states
		fossil fuel consumption		

Intensity of exposure of these fields to directives is assessed by experts judgement, thorough the careful identification of the logical chains from EU decisions to territorial impact. The regional dimension is absent here.

In this project, the Exposure values are indicated by positive and negative scores, as follows:

1,5 = high positive exposure intensity
1 = low positive exposure intensity
0 = no exposure
- 1 = low negative exposure intensity

- 1,5 = high negative exposure intensity

The sign of impact scores is assigned looking at the likely direction of field indicators when exposed to a directive. In the Directive/Exposure Matrix it is clearly indicated whether an increase in the indicator has to be considered a benefit or a cost.

A case that often presents itself – given the complexity of the single directives, the multiplicity of policy indications eventually encompassed, the multiplicity of the logical chains that each directive generates, from decision to impact – is the impossibility of treating in a simple and direct way the potential effects of a Directive on the different exposure fields. In this case is necessary to devise a "*branching*" of the effects of the directive into two or more logical chains, and consequently impacts. In fact, the effects of the directive on a single exposure field (e.g. air quality) could be different in the different branches of the logical chain, and impact differently on different classes of regions. For example, a directive supporting the production of electric engines for cars will improve the air quality in regions where the new cars will be adopted, but worsen air quality in regions where the new cars will be produced, due to increases in emissions from plants and transport involved.

In this case, the directive splitting in two branches is treated as two separate directives (Directive Xa and Xb). Of course, at the end of the elaboration process, the results of the two branches are summed up term by term in a single Territorial Impact Matrix.

B – The Regional Exposure Matrix

The Regional Exposure Matrix – – m regions and 12 directives [6] – encompasses the exposure of single regions to each directive, i.e. whether EU directives affect or not the single regions. In fact, a directive could touch only particular regions – e.g. coastal regions, peripheral regions, regions with presence of particular productions or facilities like nuclear power plants or else – and not being relevant for other regions. As a consequence, only regions directly hit by the directives are considered; indirect and side effects, both expected or generally unexpected, are supposed to take place only inside the regions directly affected and not to spill-over the regional borders.

In this project, this matrix is a dychotomic, NO/YES matrix (0/1). Two possible complexifications of the method could be envisaged, though:

- considering also interregional *spillover effects* (very difficult to model for the entire European territory), and
- considering the *intensity of exposure* in the single regions. This second refinement is more easy to handle, and could be introduced in future projects in case a single Directive is in depth explored in its territorial impacts.

[6] The generic value of the regional exposure matrix in each cell is: **dREXPr** (intensity of regional exposure of region r to directive d).

In this case, the exposure field dimension is absent. The matrix is filled (with 0/1 scores) according to the results of the logical chain inspection on the single directives: regions are classified in different categories, relevant for the single exposure potentials indicated in the logical chain description, according to the ESPON definitions: rural/urban, central/peripheral, coastal/mainland, advanced/lagging, high/low presence of sectors or specific productions considered by some directive, presence of protected natural areas, ...- The indicators and thresholds for considering a region exposed/non-exposed is given in the Scientific Report, section 3.4.

C – The Regional Sensitivity Matrix

The Regional Sensitivity Matrix– m regions and n exposure fields [7] – encompasses the general sensitivity of each region to single exposure fields, i.e. the attention and importance attributed in each region to each exposure field (an element which was directly taken into consideration in the previous Tequila models). No reference to any specific directive is made here. This sensitivity depends on socio-economic and geographical characteristics of the single regions, their social values and the political priorities attached to the different policy fields. A region might be particularly sensitive to economic impacts (on GDP or employment levels), given its relative backwardness; another could be particularly sensitive to environmental impacts given the presence of very sensitive natural or mountain areas; a further region could be very sensitive to impacts on congestion given its present high level of traffic density and traffic jams. In this case, the directive dimension is not present.

The Regional Sensitivity matrix is built, for each exposure field, using relevant statistical indicators from a regional data base. In general, on the basis of experts judgement and data availability, a region is hypothesized to be more sensitive to "pressure" indicators in direct proportionality to the present pressure condition (e.g., in the field of emissions, air or water quality), and more sensitive to status conditions in inverse proportionality (e.g. in the field of GDP and employment). Details are given in the relative table in the Scientific Report, section 3.4.

In further research works, the sensitivity matrix could encompass the effect of the analysis on regional reaction or adjustment capability with respect to the potential effects of EU directives, taking into consideration the internal governance structure and performance in each region. In the present research project this last issue is only tackled in theoretical terms.

[7] The generic value of the regional sensitivity in each cell of the matrix is: **Sr,f** (sensitivity of region r concerning exposure field f). Each term of the S matrix has the form of a correction coefficient, amplifying or reducing the potential impact of directives on each exposure field in each region (given by the multiplication of the previous two matrices, as it will be explained below). It was decided to allow a correction of ± 25% to potential impact: therefore the coefficients range from 0,75 to 1,25 in the entire array of regions and are proportional to the specific sensitivity indicators chosen for each exposure field.

2.2.3 The Territorial Impact Matrices.

The three matrices presented in the previous section are built by the research group through empirical investigation and statistical elaborations on:

- the 12 chosen Directives,
- all European regions of EU 28 countries. The other countries of the ESPON space are not considered, due to data availability problems but mostly because their sensitivity to EU Directives that do not engage them directly bears a completely different meaning than for present Member Countries;
- the checklist of 41 Exposure Fields, defined for any directive on the basis of the Commission's suggestions in its *Impact Assessment Guidelines* (January 2009: SEC(2009)92) and other considerations concerning data availability and possibility of impacts definition.

The three matrices, duly elaborated, bring to the definition of the Territorial Impact of the Directives, represented in a series of Impact Matrices, one for each Directive, as shown in Figure B 4. The impact of directives is indicated as TIM (Territorial IMpact).

The elements of the three matrices are multiplied by each other, term by term (not in the linear algebra way), and the general term obtained will be:

$$_{d}TIM_{r,f} = {}_{d}EXP_{f} \,.\, {}_{d}REXP_{r} \,.\, S_{r,f}$$

where:

- $_{d}TIM_{r,f}$ is the likely impact of directive d on the exposure field f in region r,
- $_{d}EXP_{f}$ is the exposure of field f to directive d,
- $_{d}REXP_{r}$ is the regional exposure of region r to directive d,
- $S_{r,f}$ is sensitivity of region r to exposure field f.

Given the three dimensions encompassed (d,f,r: directives, impact fields and regions), the results are organised in a series of 12 matrices (one for each directive), each of them indicating likely impact on exposure fields in all regions for a single directive.

As a consequence of the scores attributed in the first matrix (± 1,5, 1, 0) and in the third one (0,75-1,25), the final scores emerging in the TIM matrices are continuous scores ranging from – 1,875 to – 1,875. In maps, impacts are aggregated in three classes (plus the 0 class, indicating no exposure): "high, moderate and minor" impact.

A further elaboration (a further column in the TIM matrix of a directive) concerns the possibility of calculating a "summative" impact of a directive on each region, considering together all impacts on the different fields. Two solutions exist in this case:

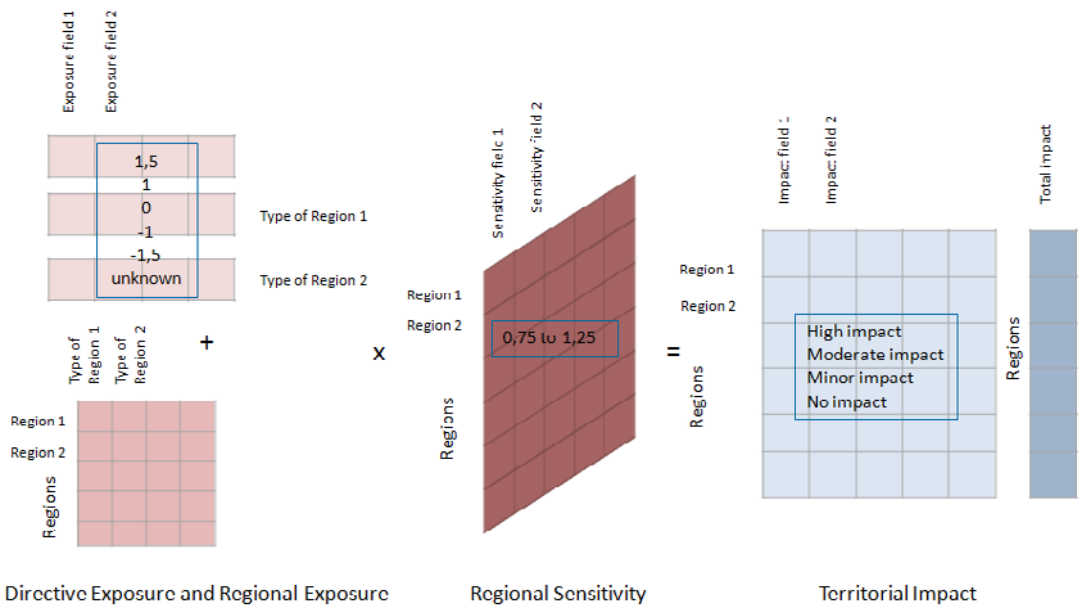
- the simplest solution: counting all fields in which the impact on the region was considered "high": is the solution utilised in the present project;

- the complex solution: computing a weighted multi-criteria impact index, in the same way as it was done in the ESPON Tequila Models. This solution implies the definition of a shared system of weights for the single impacts (through expert's judgement, policy maker's priorities, etc.) and of some thresholds beyond which compensation among impacts is excluded (the FLAG methodology in the Tequila 2 model). This is something left to possible future extensions of the project.

The summative impact as realised in this project focuses on the need communicate the result of the TIM in an easily comprehensible way. It allows merging branched directives to show the directives combined impacts, although the positive and negative summative impacts are kept apart.

The impact fields on which the directive has a high impact are marked. The more impact fields per region are hit (meaning marked), the higher the summative positive respectively negative impact on the region. A map of a directive's summative impact (either positive or negative) depicts the intensity of impacts that can be deduced from the directive.

Figure B 4: Assessment process of regional sensitivity to a branched EU Directive



2.3 Territorial/regional sensitivities of EU directives

2.3.1 Selection of case study directives

The relevance filter was developed as a tool to screen policies in order to attain a selection of 12 territorial relevant directives. This filter contains 3 steps:

(a) Eur-Lex Filter

The website of Eur-Lex (http://eur-lex.europa.eu/RECH_menu.do) contains all legal documents of the EU. A refinement of the search enquiry is the first step towards the relevant directives by using the existing filtering options.

(b) Title check

After the Eur-Lex filter, the number of directives decreases significantly. The next steps comprise reading through the titles of the directives and sort out those which

- do not cover the entire EU (directives targeting single states)
- have self evidently no territorial impact (i.e. statistics, marketing measures,…)
- Filter out substantively overlapping directives (e.g. choose only one on water, air, noise, safety, etc) best done by choosing the most recent one.

(c) Text check

This last step involves reading through the directives and assess if it has a potential effect on the territorial based economy of a region, the society and population as well as on the built and natural environment. It also includes rating these potential impacts into no-, low-, high- or unknown relevance. This rating of hypothetical intensity or importance of impact is based on expert judgment.

Table B 2: Relevance filter process

Number of directives	Result of Eur-Lex filter	Result of title check	Result of text check – selection for potential analysis
4396 directives	1393 directives	149 directives	28 directives

The implementation of the relevance filter led to 28 directives to be considered for further analysis. Following a discussion with the CU an ensemble of 12 directives were chosen[8] and analysed in terms of their effect on regional exposure. This final selection consists of the following directives:

(1) Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (Directive on air quality)

(2) Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy (Waterframework Directive)

[8] After consultation with the ESPON MC the Directive on the control of major-accident hazards was included due to its highly differentiated territorial impact. It was exchanged with the Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market. Since this directive focuses on the promotion of renewable energy, it is assumed to be similar in their regional territorial impact to the directives on the promotion of clean and energy-efficient road transport vehicles and on the promotion of the use of biofuels or other renewable fuels for transport.

(3) Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances (Seweso Directive)

(4) Council Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise (Directive on managing environmental noise)

(5) Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport (Directive on promotion of us of biofuels)

(6) Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

(7) Council Directive 2004/52 on the interoperability of electronic road toll systems in the Community

(8) Council Directive 2005/36/EC on the recognition of professional qualifications (Directive on recognition of qualifications)

(9) Council Directive 2008/114 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection (Directive on critical infrastructure)

(10) Council Directive 2009/128/EC on the establishing a framework for Community action to achieve the sustainable use of pesticides (Directive on sustainable use of pesticides)

(11) Council Directives on the promotion of clean and energy-efficient road transport vehicles (Directive on clean and energy-efficient road transport vehicles)

(12) Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (Directive on the energy performance of buildings)

The examination of two directives (no 6: directive on the on environmental liability and no 7: directive on the interoperability of electronic road toll systems) showed that no regional differentiation was possible. For these two directive the conceptual model about their intervention logics was set up and the directive exposure matrix was completed, but no further regional differentiated analysis was conducted.

2.3.2 Key results of the Territorial Impact on the Case Study Directives

Key results of Territorial Impact Matrix of the Directive relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air

This directive is one of the daughters of the 1996 Air Quality Framework directive. It provides for the measurement of air quality and designates an air quality standard

that applies universally. This standard is especially exceeded in urban areas, which is exactly where most people live.

(a) Conceptual model, logical chain and exposure

This directive does not specify policy options. Member states are free to decide for themselves which measures to take to improve air quality in areas not meeting the standards. In practice, a wide range of possibilities of measures can be taken, each of which can form its own 'branch'. These include redirecting traffic, traffic reduction, urban design measures (planting trees, building walls, tunnels, etc.). It can also include prohibiting all new spatial developments in areas which exceed cut-off values in order not to generate extra traffic in these areas (thus exacerbating the problem) and prevent more people from being exposed to poor air quality. Other measures can be directed towards reducing emissions by industry or agricultural facilities (Tennekes and Hornis 2007, VROM-Council, 2008).

Because this directive has not been selected for an in-depth analysis, only the most probable situation was taken into account: traffic measures in urban areas. The assumption of the analysis is that these measures are successful in reducing traffic in non-compliance areas, and hence in reducing emissions of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air. Indirect effects are perceptible in the environment due to less contamination of soil and water and reduction of acid rain (which also harms historic buildings – and hence cultural heritage – and natural habitats of species and agricultural crops). Traffic reduction measures are also seen as potentially improving urban quality of life, but on the other hand, will involve more planning effort and provide additional complexity and challenges when planning projects in urban areas.

(b) The regions affected by the directive

All areas will be affected by the directive in so far that all areas have to measure air quality. However, only in areas where the thresholds have been exceeded will experience impacts caused by nationally or locally implemented 'measures' stemming from this directive. The regions selected in the exposure matrix were restricted to urban and agglomerated areas, due to the decision not to branch the directive. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

The main impact of the Directive is expected to be on the **natural environment**, and specifically on air quality (F6)[9], the objective of the directive. From the model results,

[9] These abbreviations are related to the corresponding exposure fields and indicators in the TIM. (For a detailed description see scientific report, chapter 3.5.

we see especially high impacts in cities such as Bucharest (RO), Slaskie (PL), Brussels and Közép-Magyarország (H). More indirect effects expected on the environment include **pollutants in ground and water** (F2 and F5). Since measures to reduce air pollution by vehicles generally result in less emissions in general, we also assume that **CO_2** will be reduced (F7) in addition. Due to the reduction of acid rain caused by pollutants, this directive is also seen as positively affecting the protection of historical buildings and hence **cultural heritage** (F11). We see high values of this variable in Tuscany.

Impacts on the **regional economy** are generally seen as negative, due to the efforts and investments required to implement the directive. The impact on **economic growth** (F12) is most significant in areas where the regional sensitivity is highest, namely the poorer regions. The top five most affected regions are all in Romania and Bulgaria. There is some slight positive impact on services (F20) due to the need for setting up measurement systems, drafting air quality plans in non-compliance zones and consultants.

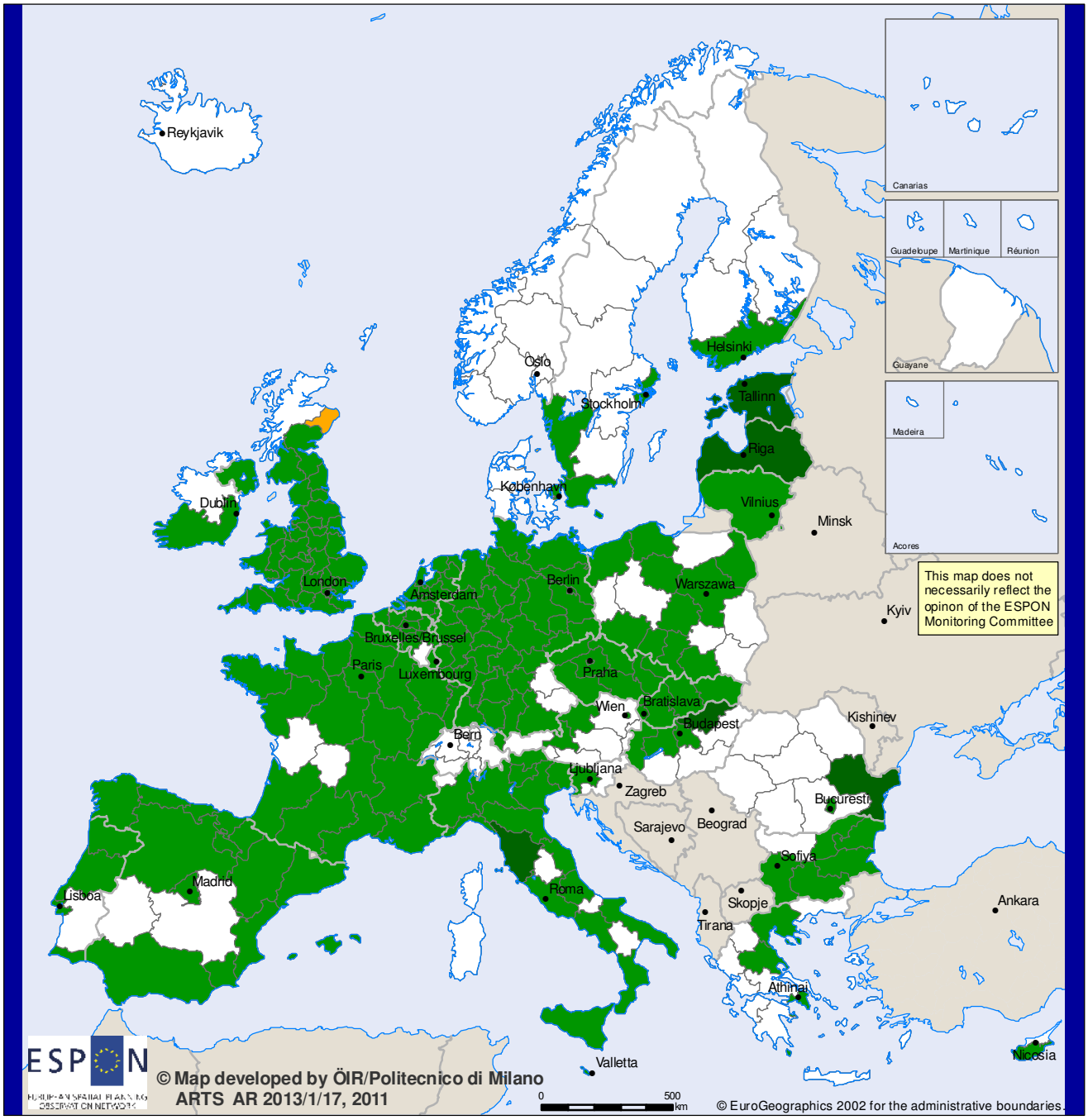
The impact on **society and people** mainly regards the health benefits generated by breathing cleaner air. This is expected to contribute positively to **healthy life expectancy** (F28). Partly due to the regional sensitivity, the regions which show the highest impact are Latvia, Estonia, Észak-Magyarország (H), Sud-Est (RO) and both Ciudad Autónoma de Ceuta and Melilla (ES).

Finally, the air quality directive is not expected to have a major impact on accessibility in general. An indirect negative effect on **road accessibility** (F31) is expected from measures which reroute traffic or attempt to reduce the amount of vehicles travelling in polluted areas. Regions where this factor is expected to have the greatest impact includes, Canarias (ES), Ciudad Autónoma de Melilla (ES), Malta, Cyprus and Iceland.

Map B 1: Summative positive impact of Directive on air quality

[following page]

ESPON ARTS



Summative positive impact of Directive on air quality

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: urban, agglomerated

Key results of Territorial Impact Matrix of the Directive establishing a framework for Community action in the field of water policy

The Water Framework Directive (WFD) concerns a comprehensive package of regulations on water. It applies to all types of inland water, including ground, transitional (i.e. from sweet to salt) and coastal waters. It therewith covers the entire water system, from spring to sea and from sweet to salt and provides a uniform regulatory framework for the management and protection of water across the European Union.

(a) Conceptual model, logical chain and exposure

Its main aim is to secure good water quality. The focus is on chemical, system, nutrients and ecological quality indicators. The background is that water is a vital resource for both humans and nature. The aims and objectives of the WFD overlap greatly with existing EU (and domestic) policies, such as Natura 2000, Swimming water directive and the Nitrate directive.

To achieve these goals member states are required to develop water management plans at a water (river) basin level, by 2009. These plans outline the measures and instruments taken in order to achieve the objectives. A good ecological and chemical water quality should be achieved by 2015 or at maximum by 2027 in case of technological constraints or excessive costs.

The WFD has significant territorial impact. The WFD applies to the complete water system in Europe which means that all regions in Europe will be affected to some extent. It means that in all areas where water quality does meet the thresholds additional measures are to be taken. Measures range from filtering, end-of-pipe solutions, ecological improvement, restoring traditional morphology to, finally, change or restrictions on certain types of land use, for example agriculture. The overall territorial impact should in particular benefit environmental aspects, such as a reduction of pollutants in ground and surface water, biodiversity, reduction of flood hazards and conservation of natural heritage. What is not clear is the whether the WFD will have consequences for shipping purposes, the production of hydro energy and inland fishing industry.

Significant impacts are to be expected in the fields of efficient governance system, complexity of planning procedures and cross-border cooperation . This is the outcome of the requirement to develop management plans at the level of water basins. It is expected that such water plans impact on planning procedures. Regions that do not have a water management governance system will need to install such a system. Since regional jurisdictions do not always neatly overlap with functional water basin boundaries, regions may be forced to co-operate with each other and develop joint water management plans. Where water basins cross national borders regions need to start to cross border co-operation.

(b) The regions affected by the directive

Given the objectives relating to chemical and ecological water quality it is possible to become more specific about regions that will be affected relatively more thoroughly than others due to specific territorial characteristics and land uses. This concerns regions where the water quality is relatively bad or under pressure due to intensive and/or polluting territorial functions. Regions that will be relatively highly affected concern:

- Regions with a high share of agriculture (see Map B 2)
- Urbanized regions
- Regions with high share of inland water
- A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

In particular regions where intensive agricultural production takes place will be affected. Following the available indicator and data, in this case ESPON data, much of the EU territory can be characterized as agricultural and is expected to be affected (see Map B 2). Urbanized regions in general will be affected due to considerable amounts of urban waste water. It means that in these regions the WFD will have a high positive impact in terms of a reduction of **pollutants in surface and groundwater** (F5) and hence on **habitat and biodiversity** (F9, F10). On the other hand, this will only be the case after considerable additional investments. A last type of region where impact can be expected is simply those regions with a high share of natural water bodies as a percentage of the total surface. Such regions are more prone to water quality issues. Moreover such regions will need to spend considerable effort in maintaining the ecological and morphological conditions of the water system.

The ambitions of the WFD are high and generally exceed those of individual member states. Regions that are highly affected by the WFD will be required to make considerable additional effort in order to comply with the objectives. It is to be expected that this translates in higher taxes (F40), and thus slightly lower **disposable income** (F21), in order to fund these efforts.

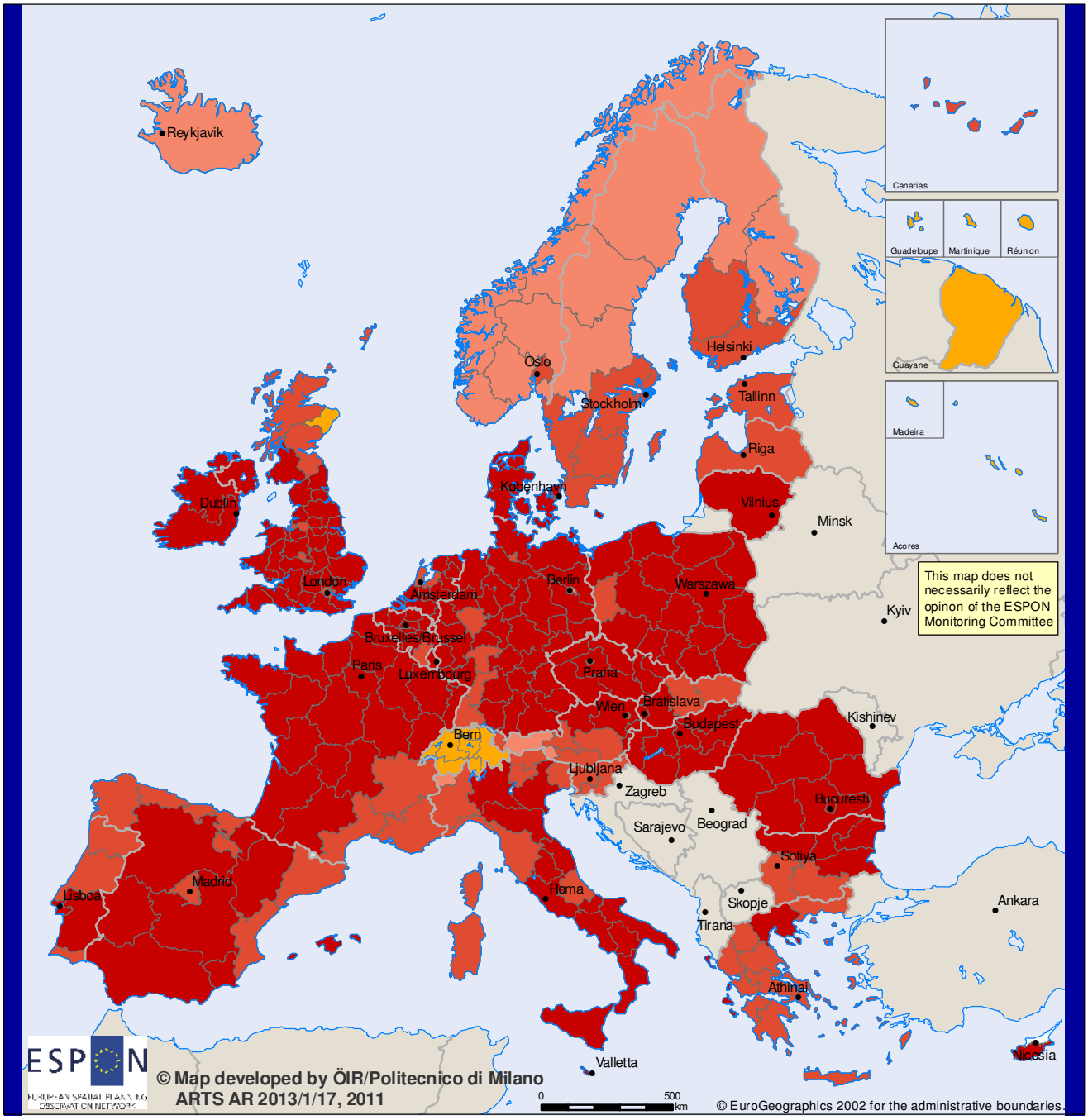
The territorial impact of WFD cannot be underestimated. Once all objectives are achieved the European environment will be in considerably better shape. This will not only be experienced in regions with a high share of nature, but also in urbanized regions. However, the positive results do come at a price and require significant investments. Most affected will be agricultural regions where solutions need to be found to reduce pollution. Also urbanized areas will need to invest significantly in water filtering and improved sewer systems. In terms of **governance the administrative burden** will increase. The sector water will become stronger which means that **planning procedures** could be negatively affected in terms of complexity. Taxes will increase due to necessary investments. **Cross border**

cooperation will increase. All in all, despite some serious sacrifices, from the perspective of sustainable environmental development and the Europe 2020 objectives, the impact of the WFD should be regarded as positive.

Map B 2: Territorial Impact of Directive 2 on share of arable area, permanent grass area, permanent crops area

[following page]

ESPON ARTS



Territorial Impact of Directive 2 on share of arable area, permanent grass area, permanent crops area

Negative Impact
- Very high impact
- High impact
- Moderate impact
- Minor impact
- Not affected

Positive Impact
- Minor impact
- Moderate impact
- High impact
- Very high impact

- No Data
- Neighbourhood Countries

Types of regions affected: all regions

Key results of Territorial Impact Matrix of the Directive on the control of major-accident hazards involving dangerous substances (so-called Seveso II Directive)

This Directive is aimed at the prevention of major accidents which involve dangerous substances, and the limitation of their consequences for man and the environment, with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.

(a) Conceptual model, logical chain and exposure

This Directive induces a comprehensive regulative framework. The operator of plants dealing with dangerous substances must notify the competent authority of the particular member state about its establishment and installation. He also has to submit reports covering safety issues as well as the operator's major-accident prevention policy. In addition intern as well as extern emergency plans must be prepared. The public has to be able to access the safety report and give its opinion on the planning of new plants and developments around existing establishments. The appointed competent authority's assigned tasks are to monitor and inspect the establishments and to provide expedient information for other member states and the public in case of major accidents.

This introduction of new administrative tasks has two implications. Firstly, it allows to increase the transnational cooperation and mitigates the risk of major-accident hazards, hence it increases the efficiency of governance. Secondly, it complicates matters for operators leading to increased consumer prizes and consequently to a decline of a household's disposable income.

The member states have the option to influence land use planning depending of the state of affairs: After the establishment of a site, it can restrict land use in terms of settlement areas or in order to protect nature. This restraint might unbundle the mix of land uses and leads to isolated industrial districts and the emigration of resident population. Before the establishment, the options range from prohibiting the installation to specific measure to protect the ecosystem.

These measures have effects on the regional economy. They form market barriers and hamper production in industries related to that Directive but at the same time push innovation in end-of-pipe technologies and environmental friendly chemistry as well as lessen negative externalities. The employment is affected diversely. In the industrial sector there is a balance between the loss of jobs in hazardous industries and the gain of workplaces in end-of-pipe technology. In the service sector people are needed to deal with the enlarged administrative tasks. In agriculture environmental friendly chemistry asks for increased production and diversification as an input which increases the need for employment in that sector.

The Directive's most direct effects are on the environment and human health in case of an accident with hazardous substances. Better and more efficient repair measures have positive effects on the quality of soil, water and air, ameliorate general health as well as safety at work.

(b) The regions affected by the directive

For reasons described above we expect regions showing a high technological/environmental risk are likely to be affected by this Directive. We identify those regions as those falling in the top 10 percentile of the technological/environmental risk distribution. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

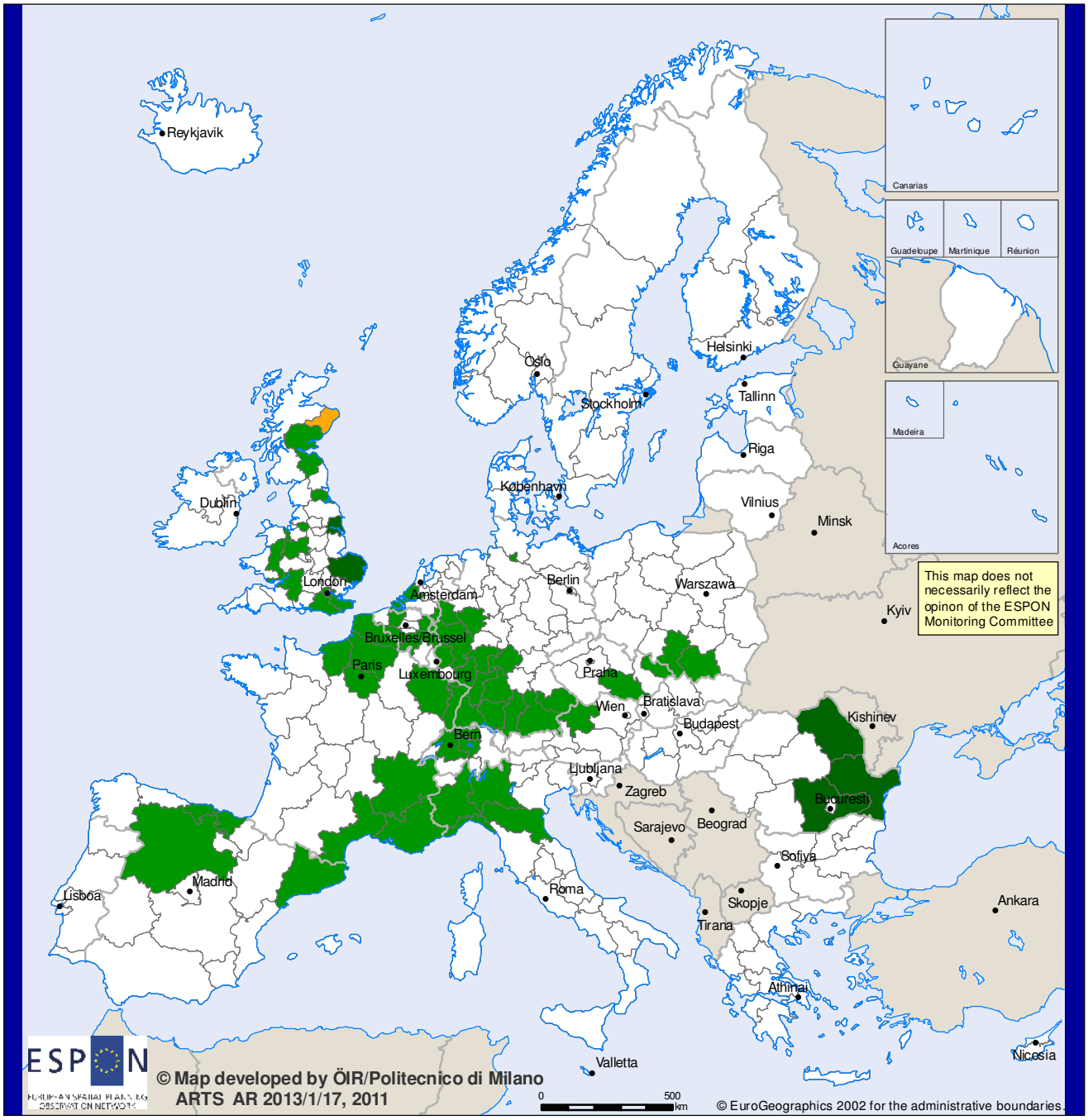
On all regions exposed the impacts on the **natural environment** are predominantly minor positive and not highly differentiated. This is true for **impacts on soil** (F2), **water** (F5) and **air quality** (F6). An exception being that **biodiversity** (F9) in Languedoc-Roussillon, Provence-Alpes-Côte d'Azur in France and Sud-Est in Romania is moderately positively affected. Impacts on **soil sealing** (F3) tend to be negative and minor. Cities, having already a high share of artificial area like Greater Manchester, Outer London and Hamburg are affected moderately.

Minor positive impact on the regional economy shows on the **employment in the primary sector** (F16) and a moderate positive impact on the **share of agricultural areas** (F17). The British regions, East Anglia and East Riding and North Lincolnshire experience a high impact of the latter.

Moderate negative impacts on an household's **disposable income** (F21) can be observed in all affected region albeit Nord-Est in Romania is strongly affected, being very sensitive to this exposure already. Impacts on **technological and/or environmental risk** (F27) of regions are pervasively positive and very strong which also shows positive (although differentiated) impacts on **health** (F28): Eastern European regions displaying stronger impacts (moderately in Moravskoslezko in Czech Republic, Malopolskie, Slaskie in Poland; strong impacts in Nord-Est, Sud-Est and Sud in Romania) than all other affected regions, the impact there being minor.

Map B 3: Summative positive impact of Seweso Directive

[following page]



Summative positive impact of Seweso Directive

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: areas at highest technological/environmental risk

Key results of Territorial Impact Matrix of the Directive relating to the assessment and management of environmental noise

Member States shall make noise maps and action plans for agglomerations, major roads, major railways and major airports. Exceeding limit values shall cause competent authorities to consider or enforce mitigation measures[10] such as land use planning, systems engineering for traffic, traffic planning, abatement by sound insulation measures and noise control of sources.

(a) Conceptual model, logical chain and exposure

This Directive envisages determining exposure to environmental noise through noise mapping and subsequently developing action plans in order to prevent or reduce this noise. The public is involved in this process, not only by having access to information but also by being given the opportunity to participate in the preparation of the actions plans. These provisions aim at increasing the efficiency of governance by providing information and empowering the people. At the same time, these additional procedures increase the complexity of administrative tasks.

Differences in administrative and juridical system will determine to some extent whether these norms affect land-use planning. The consequence of reducing the exposure to noise of quiet areas is the disentangling of land use types.

Generally the Directive leaves the member states a great amount of leeway – the specifications in the action plan determine the Directive's potential territorial effects. In that sense the accessibility by road and rail decreases if traffic is restricted partly as e.g. in case of night traffic bans. Measures like speed limits or traffic telematics lead to retrogressive fossil fuel consumption and road accident rate.

The decline of fossil fuel consumption reduces CO_2 emissions and other pollutants which induce positive effects on the quality of water and air. Measures specified in the action plans aim primarily at reducing the number of people exposed to noise. Less noise also provides better habitat conditions and helps to sustain biodiversity. Positive effects on the environment and level of noise cause strong positive direct effects on health.

Also positive effects are expected on the regional economy. Innovations in the input related sectors (e.g. noise barriers, silent asphalt, active noise filters, traffic telematics, green jobs,…) boosts the economic growth and employment in the industrial and service sector. In the latter additional workplaces are established for the mapping exercises and in tourism, where the increased recreational value attracts more visitors.

[10] Limit values may be different for different types of noise (road-, rail-, air-traffic noise, industrial noise, etc.), different surroundings and different noise sensitiveness of the populations; they may also be different for existing situations and for new situations (where there is a change in the situation regarding the noise source or the use of the surrounding);

These economic developments together with declining health expenditures have possible effects on the disposable household income, opposed by increased prices for mobility (e.g. road tolls).

(b) The regions affected by the directive

Measures are implemented in areas where there is a high exposure to noise, caused especially by high traffic volumes. We identify these regions by aggregating those that fall either in an urban or agglomerated area, in the top 10 percentile of population density distribution, in the top 25 percentile of density distribution of road and rail kilometres or regions endowed with an airport with more than 500000 passengers per year.

When applying these regional filters on NUTS 2 regions, almost all (276 out of 287) European regions are indicated. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

The Directive's primary objective is to reduce the **number of people exposed to noise** (F25). Strong positive impacts on this field mirror this effort, especially in densely populated areas. A reduction of exposure to noise is beneficial for people's health. Consequently a high positive effect on the **healthy life expectancy** (F28) is shown for all affected regions. Although the impact intensity ranges from moderate to very high, in the case of healthy life expectancy a high intensity prevails, in the case of noise a very high intensity prevails.

Also generally positive but limited are the Directive's effects on **road fatalities** (F26) albeit Sterea Ellada in Greece sticks out as being impacted highly due its present sensitivity to this to road accidents.

The Directive's impact on the **environment** is consistently positive and limited to minor and in a very few cases moderate and high. Latter is the case in Ciudad Autónoma de Ceuta (ES) on **water quality** (F5), in Bucharest (RO) on **air quality** (F6), Inner London on **CO_2 emissions** (F7), the Canaries on **biodiversity** (F9) and highly sensible Tuscany on **cultural heritage** (F11).

In case of measures relating to traffic bans (spatial and/or temporal) negative impacts on the **accessibility by road** (F31) and **rail** (F32) are expected. Although mainly minor, islands like Iceland, Malta and the Canarias are affected more. Consequently **fuel consumption** (F34) decreases and leads to positive albeit limited impacts on the affected regions. More pronounced is this positive effect in Greece, Spain, Portugal and Italy, where the sensitivity is very high.

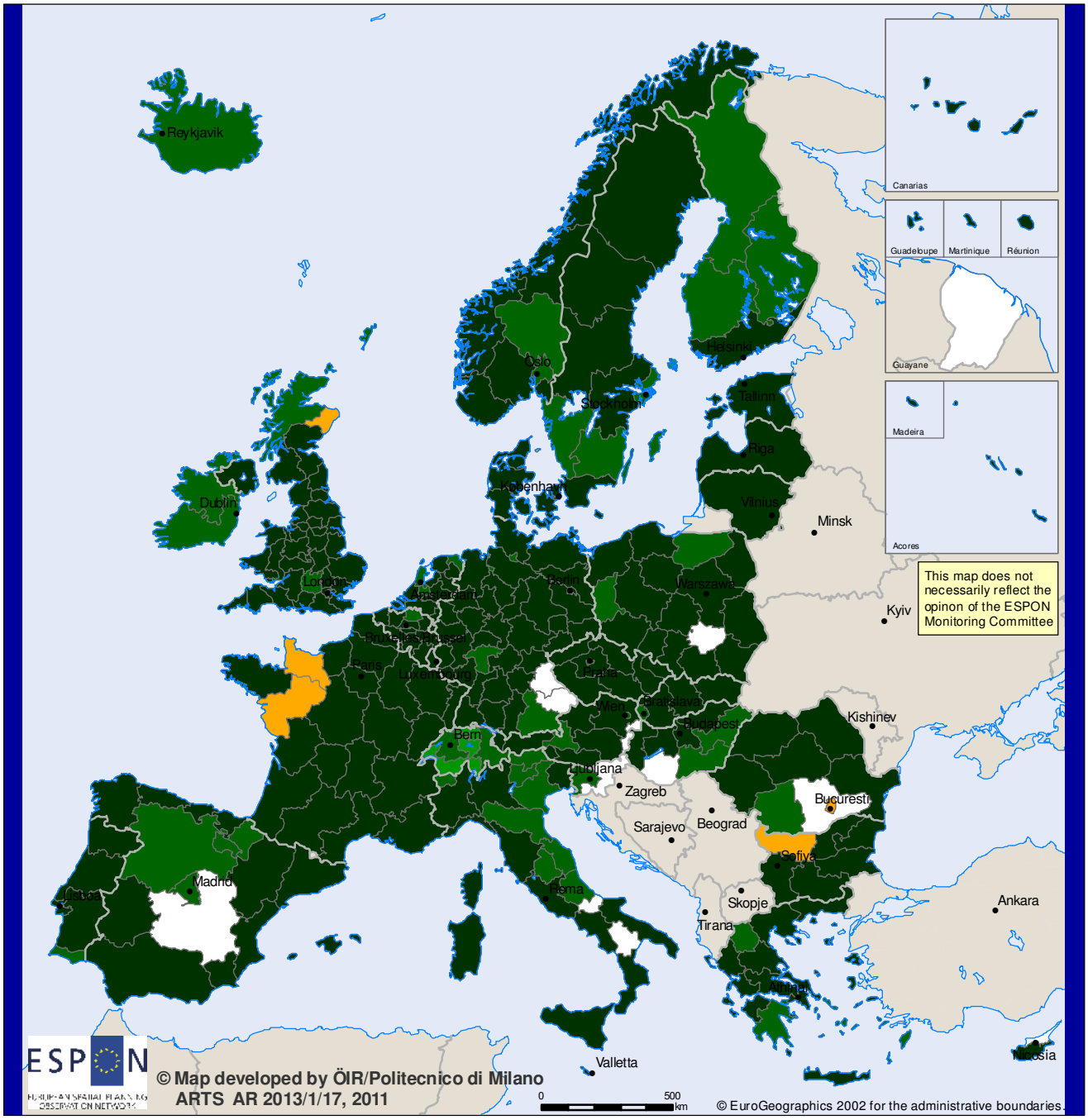
The **regional economy** is positively affected across all affected regions. Most pronounced are these effects on **economic growth** (F12), where they can be

considered mainly as high. Poorer regions profiting more than wealthier ones: Most of Romania and Bulgaria, many regions of Poland, Hungary's East and Východné Slovensko in Slovakia show a very high impact. Similar a high positive impact on **income distribution** (F21) can be noted in Bulgaria and Romania, while other regions are affected only minor. The positive impact on the economy also shows on the **entrepreneurship** (F13) and on the share of **agricultural area** (F17) although on a smaller scale, the latter mostly in British regions.

Map B 4: Summative positive impact of Directive on managing environmental noise

[following page]

ESPON ARTS



Summative positive impact of Directive on managing environmental noise

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: urban, agglomerated, densly populated, high density of road, high density of rail, major airport location

Key results of Territorial Impact Matrix of the Directive on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection

This directive establishes a procedure for the identification of European critical infrastructures ('ECIs) and a common approach to the assessment of the need to improve the protection of people. The specific focus of the directive is on energy and transport sectors.

(a) Conceptual model, logical chain and exposure

The expected impact of the directive is likely to be relatively more relevant in two fields.

First, on the natural environment. In this regard, the implementation of the directive could lead to a lower risk of environmental and technological disasters.

Second, and probably more importantly, on accessibility. Greater protection of critical infrastructure such as airport, rail and road networks may positively impact on accessibility and in turn on economic growth (i.e. GDP) and, marginally, on employment, especially in security services and construction sector. GDP and employment may also benefit from the extra investments undertaken to improve critical infrastructure safety conditions.

Overall, these have some impact on people safety, both in terms of reduced accident rates and lower technological/environmental risk.

This directive is likely to affect several fields (overall 16 out of 41), ranging from society and people and natural environment, to economy and governance.

The field most affected by this directive is accessibility by road, rail and air. An improvement in critical infrastructure protection and safety may generate a quantum jump in accessibility. This in turn may bear positive effects on GDP and employment.

Also, the effect on soil is of relevance although we expect that the impact of the directive in this field is moderate. For example, the overall level of pollution depends not only on improvement in safety conditions of critical infrastructure but also on firm and consumers behaviour. Similarly, the effect on the share of natural areas depends also on new construction being built up which are not necessarily related to the protection of critical infrastructure. Overall, this leads to a moderate reduction of accidents in transport as well as technological and environmental risk.

(b) The regions affected by the directive

We expect that regions showing either a relatively high technological/environmental risk or with a relatively high density of rail and road networks are likely to be more affected by this directive since they are more likely to be endowed with critical

infrastructures. We identify these regions as those falling in the top 10 percentile of the distribution of an aggregated index of technological/environmental risk and/or in the top 10 percentile of the distribution of rail and road network density. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

Impacts on the **natural environment** will be somehow limited. **Soil erosion** (F1), in fact, show positive albeit minor impact in all the exposed regions as well as **pollutants in soil** (F2), the latter with the exception of two regions, Région de Bruxelles and Ciudad Autónoma de Ceuta which are, respectively, moderately and highly affected. Impacts on **soil sealing** (F3) tend to be positive and minor as well, but with some exception, notably Wien, Région de Bruxelles, Hamburg, Ciudad Autónoma de Melilla, Greater Manchester, West Midlands and Outer London, showing moderate impact. Lastly, impact on the **conservation of natural heritage** (landscape diversity, F10) will be overall minor and negative with some regions that look moderately affected, namely, Tirol, Vorarlberg, Cantabria, Comunidad de Madrid, Corse, Valle d'Aosta, Provincia Autonoma Bolzano, Övre Norrland, Eastern Scotland.

Impacts on the **regional economy** will be as well relatively limited and to some extent not highly differentiated. More in detail, impact on **economic growth** (F12) looks positive albeit minor in all the exposed regions but four all in Eastern Europe, namely East and South Romania and Malopolskie and Slaskie in Poland where it looks moderate. On the other hand, impact on **employment** both in **manufacturing** (F18) and **services** (F19) will be positive and moderate in all the regions.

Impacts on the **society and people** touch a greater number of fields and are, on average, of greater magnitude. As to **accidents in road transports** (F26), impacts will be overall positive although minor and become moderate in a handful number of regions, namely Prov. Namur, Castilla y León, Corse, Provincia Autonoma Bolzano, Emilia-Romagna and Algarve. As to **accident risk in industry/energy supply** (F27), most of regions show positive and moderate impacts with only a few of them showing either minor impact (namely, Ciudad Autónoma de Ceuta and Ciudad Autónoma de Melilla in Spain, Norra Mellansverige and Mellersta Norrland in Sweden) or high impact (namely, Hamburg, Haute-Normandie, Nord – Pas-de-Calais, Alsace, Piemonte, Liguria, East Riding and North Lincolnshire). More interesting, it is the case of impacts on accessibility. As to **air accessibility** (F29), impacts look on average positive and high, being however moderate in western capital regions such as Bruxells, Madrid, Paris, London, Zurich, Wien, Hovedstaden on the one hand, and very high in a few regions, namely Hedmark og Oppland, Nord-Est and Sud-Est in Romania (Map B 5, below). Differently, impact on **road accessibility** (F31) look pervasively positive and moderate across all European regions exposed to this directive and high in just three Nordic regions, namely Hedmark og Oppland,

Mellersta Norrland and Övre Norrland. Similarly, impact on **rail accessibility** (F32) look pervasively positive and moderate across all European regions exposed to this directive and high only in the Swedish region of Övre Norrland.

Map B 5: Territorial Impact of Directive 9 on daily accessibility by air

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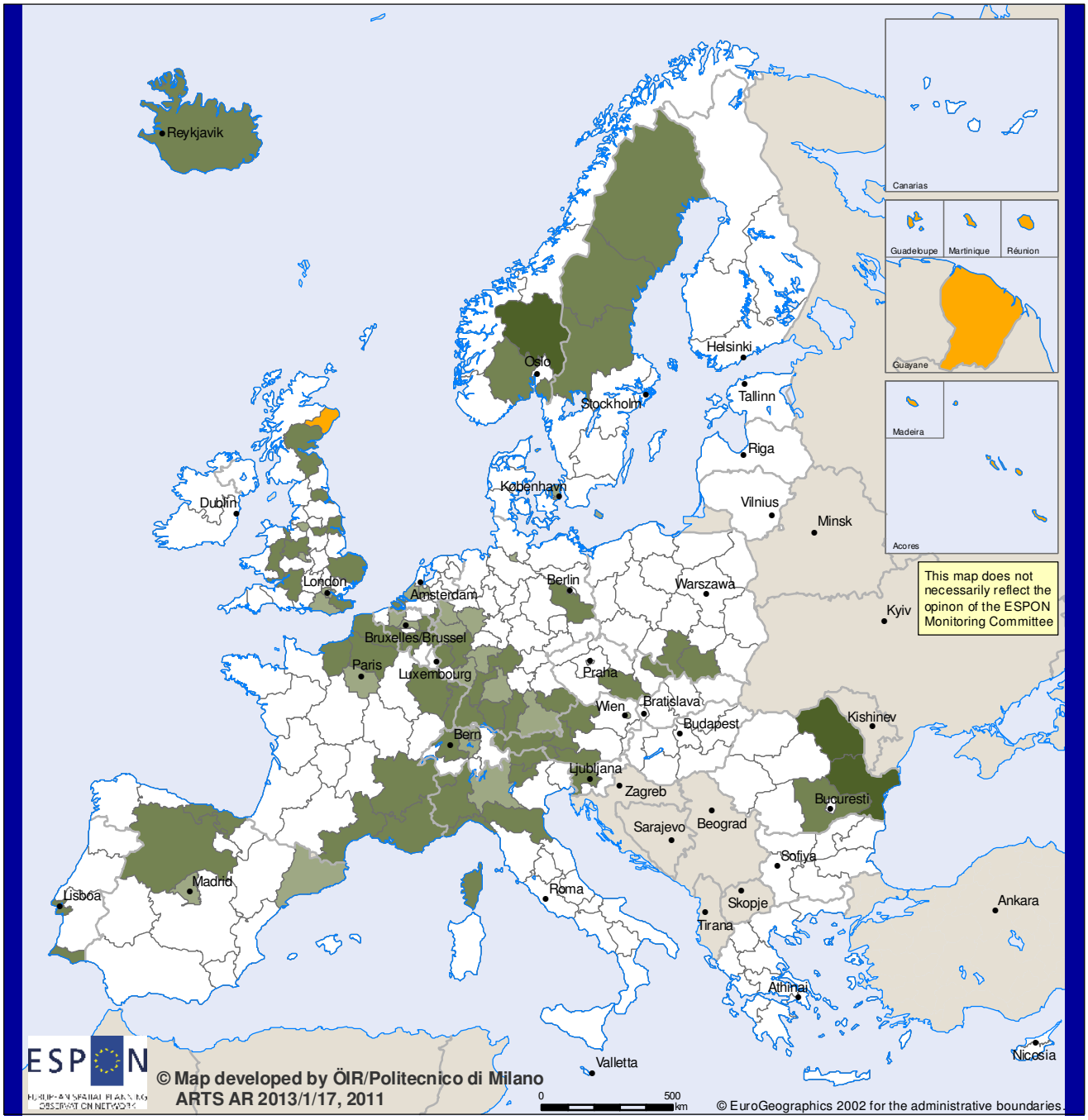

Territorial Impact of Directive 9 on daily accessibility by air

Negative Impact

- Very high impact
- High impact
- Moderate impact
- Minor impact
- Not affected

Positive Impact

- Minor impact
- Moderate impact
- High impact
- Very high impact

- No Data
- Neighbourhood Countries

Types of regions affected: highest density of rail and road network, areas at highest technological/environmental risk

Key results of Territorial Impact Matrix of the Directive on the establishing a framework for Community action to achieve the sustainable use of pesticides

This Directive establishes a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of integrated pest management and of alternative approaches or techniques such as non-chemical alternatives to pesticides

(a) Conceptual model, logical chain and exposure

The aim of the Directive is to ensure that Member States draw up action plans to reduce the potential damage to human health and environment caused by pesticides. The Directive also requires that appropriate inspections of equipment are carried out and training and certification schemes for all professional users of pesticides are set up. Furthermore necessary measures are adopted to inform the general public on health and environmental hazards relating to pesticide use and awareness raising programmes on those dangers and possibilities of switching to non-chemical alternatives are drawn up. These added administrative tasks provide jobs in the service sector. This directive is expected to affect rural regions (branch a) differently than it affects regions with a high number of chemical plants (branch b). The first being the recipient and the latter being the producer of pesticides.

Regulations concerning the sustainable use of pesticides constrain their use and bring about less pollution in water, soil and air. The prohibition of aerial spraying which has caused harm to the environment and human health through spray drift contributes to the decline in pollutants. Additionally chemical industries reduce the production of pesticides which also decreases their level of emissions. Obligatory establishment of buffer- and safeguard zones (i.e. for surface and groundwater used for the abstraction of drinking water, areas used by the general public or by vulnerable groups) involves changes in land use. The decrease in quantity but much more the regulations concerning transport and storage of pesticides mitigate the risk for users but also accidents in chemical industries.

On one hand, these developments have positive effects on the eco-system and public health; on the other hand they hinder economic growth. Producers of pesticides and other input related sectors suffer financial losses as do agricultural producers due to falling crop yield, at least in the short run. The promotion of alternative approaches fosters innovation, alters the region’s range of arable crop and entails labour intensive agricultural production. Low regional labour costs lead to substitution gains from replacing pesticide costs with labour; however in regions with high labour costs (especially in areas with high competition for labour) the reverse effect shows. High value-added farm products due to environmentally benign production jointly with inelastic demand for aliments increase the disposable income of rural population. The opposite is true for jobholders in the chemical industry. First-tier effect of losses and gains in different sectors lead to a short term imbalance of

regional income distribution. This influences migration flows, higher qualified work force is endangered to move out whereas low skilled farm workers are more likely to immigrate to rural regions.

(b) The regions affected by the directive

This directive has different affects on regions that are primarily rural (branch a) and those that hold a fair number of chemical industries (branch b). The former dominated by agricultural production and therefore the primary recipient of pesticides. Regions with a high number of chemical plants (defined by above EU average) are more likely to be affected by changes in the pesticide production. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

Considering branch a and branch b of this Directive, the impacts on the **environment** is limited but pervasively positive across all affected regions. While impacts on **quality on air** (F6) can be considered minor **in rural regions** and those with **chemical plants** (the exception is Bucharest benefitting highly), the directive bears undifferentiated moderate positive impacts on the **quality of water** and **soil** and minor positive effects on **biodiversity** (F9) in **rural regions**.

The positive effects on the environment are mirrored in the strong to very strong (pervasively in eastern European countries) positive impacts on **health** (F28) and moderate to high positive impacts on **environmental and technological risk** (F27) in the affected regions. It has to be noted that these impacts are a bit less pronounced in rural regions than in those where chemical plants are situated.

Impacts on the **regional economy** are quite differentiated across affected regions. The **economic growth** (F12) in **rural regions** is generally hampered by minor negative impacts, getting stronger the poorer the affected regions are. Regions in Hungary (Dél-Dunántúl, Észak-Alföld, Dél-Alföld), Poland (Lubelskie, Podkarpackie, Swietokrzyskie, Warminsko-Mazurskie) and Romania (except Sud-Est and Bucaresti) show moderate impacts, whereas Nord-Est in Romania and Severozapaden in Bulgaria are affected strongly. Similar is the impact (minor negative) **on economic growth** in regions with **chemical production**, although less differentiated. Only Malopolskie, Opolskie, Kujawsko-Pomorskie in Poland and Észak-Alföld in Hungary are affected moderately. Impacts of branch a and b on **agricultural area** (F17) can be compared to those on economic growth although of a greater magnitude, mostly bearing moderately negative impacts. High negative effects are shown in Pays de la Loire in France, East Riding and North Lincolnshire, Leicestershire, Rutland and Northants as well as East Anglia in the UK.

Differently, effects on **employment in the primary sector** (F16) are minor and positive across all affected regions albeit moderate in city regions that have chemical

plants like Hamburg, Stockholm, Groningen, Île de France, Brussels, Vienna and strong in Inner London.

Impacts on social disparities differ from branch a (mainly positive) to branch b (mainly negative). Solely the effect on **income distribution** (F22) is negative for both albeit mainly minor and moderate; only Alentejo in Portugal shows a high impact.

Rural regions profit from the generally minor positive impacts on a household's **disposable income** (F21) and on the **employment rate** (F23). Poland (examining employment) and Bulgaria (examining disposable income) stick out as being moderately affected. An exception form Severozapaden in Bulgaria and Nord-Est in Romania, which experience a high impact. A greater magnitude of impacts can be found assessing **migration** (F24), ranging mainly from moderate to high positive impacts, indicating immigration. Itä-Suomi in Finland and Dél-Dunántúl in Hungary, Basilicata in Italy and most regions in Poland and Romania form the exception showing only minor impacts.

Limited und undifferentiated negative impacts on an household's **disposable income** (F21) and on the employment rate (F23) become apparent in **regions with chemical plants**. The impact being mostly minor, some regions in Poland as well as Sachsen-Anhalt in Germany and Brussels show a moderate impact. Similar to rural regions, the impact on **migration** (F24) is of a greater magnitude albeit negative, indicating out-migration. France and the UK are highly differentiated with an impacts range from minor to high.

Map B 6: Summative positive impact of Directive on sustainable use of pesticides

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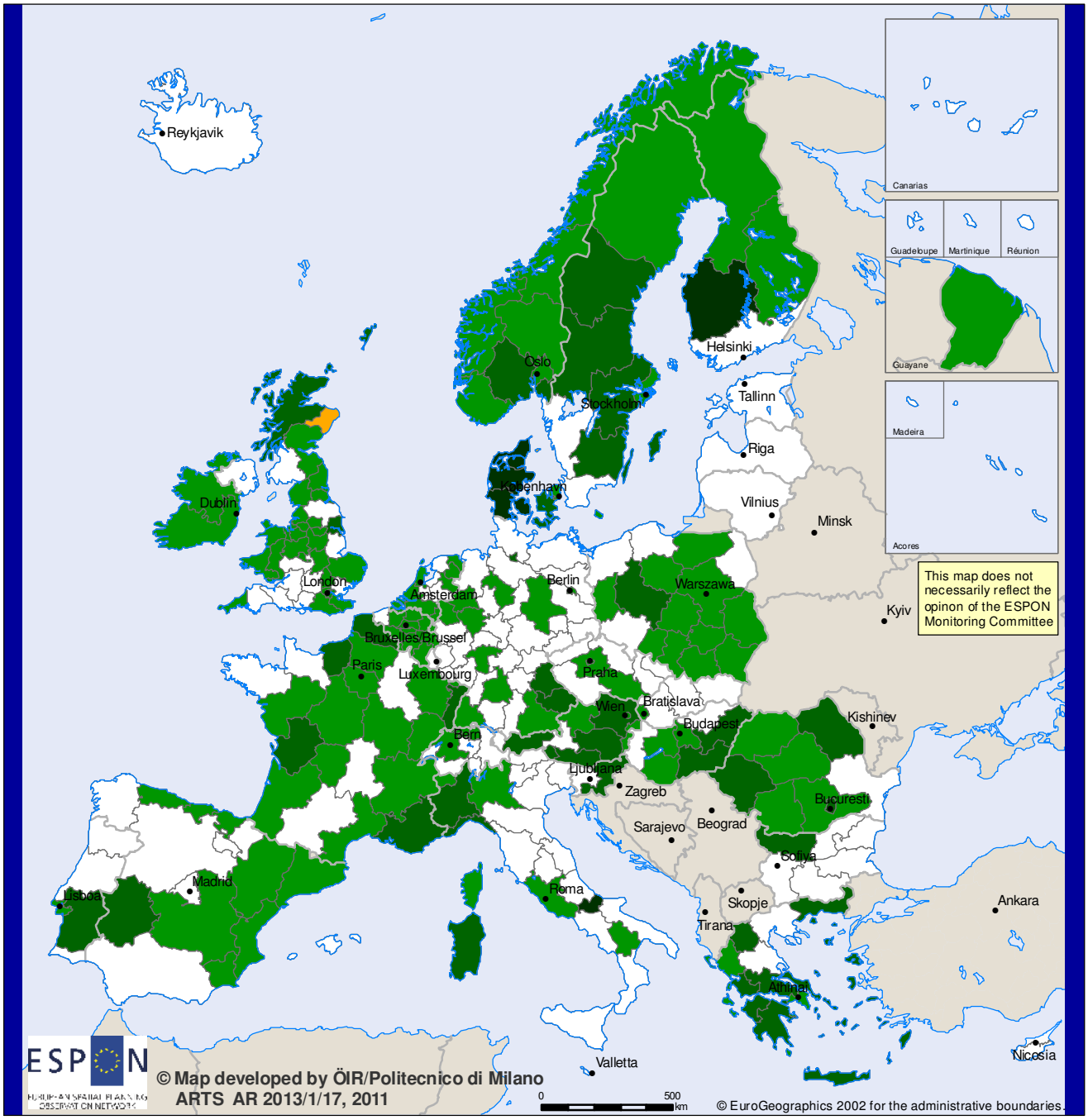

Summative positive impact of Directive on sustainable use of pesticides

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: rural, chemical industries

Key results of Territorial Impact Matrix of the Directive on the energy performance of buildings

The directive promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness. Local planners are directly addressed by the directive, to properly consider the optimal combination of improvements in energy efficiency, use of energy from renewable sources and use of district heating and cooling when planning, designing, building and renovating industrial or residential areas.

(a) Conceptual model, logical chain and exposure

The four key points of the Directive are:

- a common methodology for calculating the integrated energy performance of buildings;
- minimum standards on the energy performance of new buildings and existing buildings that are subject to major renovation;
- systems for the energy certification of new and existing buildings and, for public buildings, prominent display of this certification and other relevant information. Certificates must be less than five years old;
- regular inspection of boilers and central air-conditioning systems in buildings and in addition an assessment of heating installations in which the boilers are more than 15 years old.

It requires member states that all new buildings comply with 'near zero-energy buildings' standards by 31 December 2020 (and 31 December 2018 in case of public buildings).

All areas with buildings could be potentially affected by this directive. This should result in a significantly lower consumption of fossil energy.

Most effects will be on the level of individual new or renovated buildings. From an architectural perspective buildings will be designed in different ways in order to make maximum use of natural climatologically conditions (orientation and angle to the sun, shading etc.), to use different construction materials, to integrate renewable energy production (solar panels, wind turbines, geothermal heat etc.) and may come in adjusted shape, for example with thicker walls.

In terms of physical territorial impact effects are mainly to be expected at the level of a building block or neighborhood in terms of adjusted urban design. In particular in cities where the temperature can be significantly higher due to the dense urban fabric certain urban design provisions can be expected to facilitate the penetration of water and cool air from outside the city. This includes also measures such as lowering the amount of soil sealing, i.e. pavements, roads, at a district level. The overall effect

could be a lowering of the amount of buildings per hectare and in effect a more inefficient use of land. On the other hand, it could at the same time lead to a higher degree of mixed land use precisely due to the fact that the direct building print will be decreased.

There will be increasing attention in urban and neighborhood design for the integration of heat and cold storage and exchange systems, including water as a cooling device. The implementation of such systems involve new underground infrastructure (mainly tubes). Depending on the local situation it can this may also influence decisions on land use and locations for new urban development.

In particular in urbanized regions the directive will lead to more innovation and new small middle sized consultant and advisory companies in the tertiary sector. Another social effect could be further segregation and uneven income distribution in terms of disposable income.

The directive foresees in establishing monitoring systems including energy performance certificates for several building categories, national plans to achieve targets, policies and incentives. This will mainly affect the efficiency of government in terms of additional tasks. The complexity of the planning procedure may also increase to a limited extent due to an additional national plan which will influence other plans and the certificate system that may play a role in issuing permits.

(b) The regions affected by the directive

The main type of regions that will be affected concern mainly densely populated, urbanized and growth regions. Two more specific types of regions can be identified where effects may be relatively large. This concerns first regions with a high share of **cultural heritage** in terms of historic buildings (F11). Another type of region that will be more strongly affected are regions where **income distribution** is unbalanced (F22, see also Map B 7). A very indirectly affected type of region, concern regions that are vulnerable to climate change. Because of less **fossil fuel consumption** (F43) there will be less **CO_2 emission** (F7) which reduces the speed of climate change. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

The territorial impact of the directive on energy performance of buildings is considerable as it applies to nearly all types of buildings. This means that all regions will be affected. Its objectives are ambitious and the impacts will be visible to people. The main impact will be on the level of buildings, housing blocks and neighbourhoods, which will be designed in different style in order to reduce energy consumption and integrate innovative clean technologies. Another visible outcome of the directive will be energy certificates on buildings. In particular innovation and the tertiary sector will be positively affected by the directive. Some additional efforts are

required in terms of governance. Most affected will be densely, urbanized and growth regions. Regions with a high share of cultural heritage (historic buildings) and regions with uneven income distribution will experience negative impact. Overall the directive will lead to a huge reduction of (fossil) energy consumption and contribute significantly to reaching the objectives of the Kyoto protocol and Europe 2020. From that perspective the combined impact should be regarded as positive.

Map B 7: Territorial Impact of Directive 12 on equal income distribution

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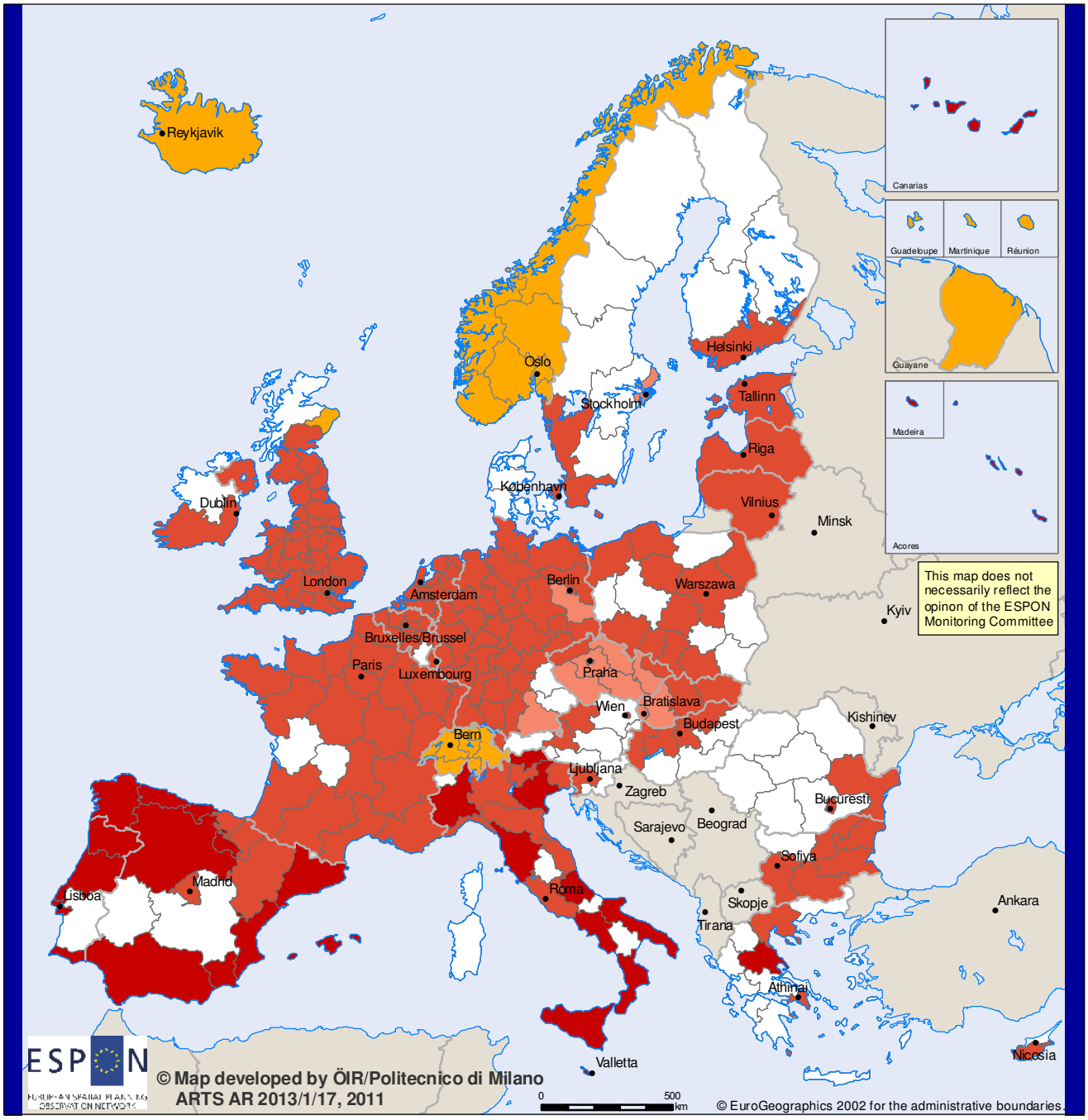

Territorial Impact of Directive 12 on equal income distribution

Negative Impact	Positive Impact	
Very high impact	Minor impact	No Data
High impact	Moderate impact	Neighbourhood Countries
Moderate impact	High impact	
Minor impact	Very high impact	
Not affected		

Types of regions affected: urban, agglomerated

2.3.3 Territorial Impact on three selected EU Directives and their in depth analysis

Based on the conceptual model of the directives for three selected directives in depth analysis were conducted. Thereby, the different logic chains of reasoning in terms of cause-effect relations were analysed in different types of regions reflecting also different alternatives in implementing the policies. Methodologically, this was done by "branching" the directives according to different types of regions/different implementation strategies. The different "branches of the directives policy implications were discussed taking into account potential policy alternatives.[11]

Directive on the promotion of the use of biofuels or other renewable fuels for transport)

This directive does no more than set minimum percentages for renewables in transport fuels. Member states have to determine for themselves how they will meet these targets. Since fuel types are mixed at the petrol station, the directive mainly affects the process of conversion of raw materials into diesel or petrol, not the transport from refinery to petrol station or the use of the fuel in vehicles.

(a) Conceptual model, logical chain and exposure

The logical chain has different branches: Branch a implies large-scale import of raw materials from overseas. These are then industrially converted into fuels. Large-scale transport generally occurs over water, both over sea as well as over inland waterways. Raw materials have to be off-loaded, stored and processed, which means the occupation of space in industrial areas, situated next to waterways.

As opposed to branch a, production of raw material for biofuel takes place in the European territory itself. The European norm leads to an increased demand, that prompts farmers to switch from food to biofuel crops. This decision depends on the price of biofuels, the price of alternative crops and local specificities. In many areas of Europe, biofuels cannot compete with other crops. Only in areas where current crop production is very unprofitable, is there a chance that farmers will switch to biofuel production (both first generation (sugar, starch, vegetable oil) as second generation (cellulose)) (Rutz & Janssen, 2007).

Two further branches relate to the use of waste material from food crops for producing biofuels; and to a different management of nature areas, in which can rest products of forest or park management is utilized.

Branches c and d are not being taken into account in the Territorial Impact Matrix, because the two first branches are expected to show the most impact. Branch c will

[11] Nevertheless, it was not possible to develop complete systems of alternatives to existing directives, as this would call for a very specialized in depth knowledge in the different fields. However, developed method of the TIA allows the comparison of different policy scenarios

not change land use, only contributing a little to the margin on farming (although this can mean the difference for the survival of the farm). Branch d is an interesting, but relatively indirect possible impact of the directive.

(b) Type of regions affected by the directive

In parallel with the description of impacts of the other directives, only for two of the branches the types of regions have been identified and impacts haven been estimated. For branch a, harbours (both sea and inland ports) have been selected (ESPON indicator: accessibility of sea harbours within 30 min). For branch b, regions with a low agricultural profitability (a proxy indicator of farm size was used). A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

For the production of biofuels – whether imported or from domestic origin – industrial areas need to be expanded, plants built and put into operation. This can have various impacts, of rather local nature. The NUTS-2 classification used on the maps render in this case a relatively crude picture.

The directive is expected to affect the **natural environment** in a number of ways. As regards **soil sealing** (F3), the model results show the greatest (negative) impacts in already heavily urbanized regions such as Inner London, Wien and Berlin. Regarding **biodiversity** (F9) the picture is different: the two most affected regions are both in Spain: Canarias and Comunidad Valenciana. Other areas which show negative impacts on this indicator are Slovenia, Abruzzo (IT), Yugoiztochen (BG) and Algarve (PT). Finally, as regards land-use, the major negative impacts can be found in the largest cities, which is most likely the product of the sensitivity measure used, rather than an expectation that these areas will experience the most **urban sprawl** as a result of the biofuels directive.

The extra harbour activity resulting from the directive is also expected to have a negative impact on air quality, specifically that **pollution in the air** (F6) and **CO_2 emissions** (F7) are expected to increase. The areas with the most impact are: Sud (RO), Mazowieckie (PL), Düsseldorf (DE), the Dutch regions of Limburg and Noord-Brabant, and the Paris region Île de France. The CO_2 emissions is expected to produce the most impact in harbour regions where there are is already a high level of vehicular traffic (sensitivity) such as Bremen (DE), Greater Manchester and Merseyside (UK) and Hamburg (DE).

Regarding the economic impact of importing biofuels via harbours, the most significant positive results on **economic production** (F12) can be found in relatively poor regions, which also indicates the effect of the sensitivity adjustment. The top five regions profiting are all in Bulgaria and Romania, with Severozapaden and Severen tsentralen (BG) and Sud-Vest and Sud (RO) topping the list. A similar situation is

apparent as regards the impact on **employment** (F23) – areas with high unemployment are more sensitive and thus stand more to gain from the benefits from the directive. Interestingly, the top three regions are all French peripheral island regions (Reunion, Guadeloupe and Guyane). These are followed by Zachodniopomorskie (PL) and three eastern German regions.

The impacts of the directive along branch b are particularly of interest in those areas where normal crop production is relatively unprofitable. As crops for biofuel compete with normal crop production, in these areas it is more likely that farmers will switch than in others.

Impacts on the regional economy is generally seen as positive, due to the promise of another source of income in disadvantaged rural areas. The impact on **economic growth** (F12) is most significant in areas where the regional sensitivity is highest, namely the poorer regions. In fact, the top ten most affected regions are all in Romania and Bulgaria, with Nord-Est in Romania topping the list. The variable **employment in the primary sector** (F16) is also positive in eastern Europe, but is much more spread out than GDP. The main beneficiaries (in order) are: Közép-Magyarország (HU), Bucaresti (RO), Ionia Nisia (GR), Nyugat-Dunántúl (HU) Slaskie (PL) and Lithuania.

Map B 8: Territorial Impact of Directive 5 (branch b) on economic growth (GDP/capita)

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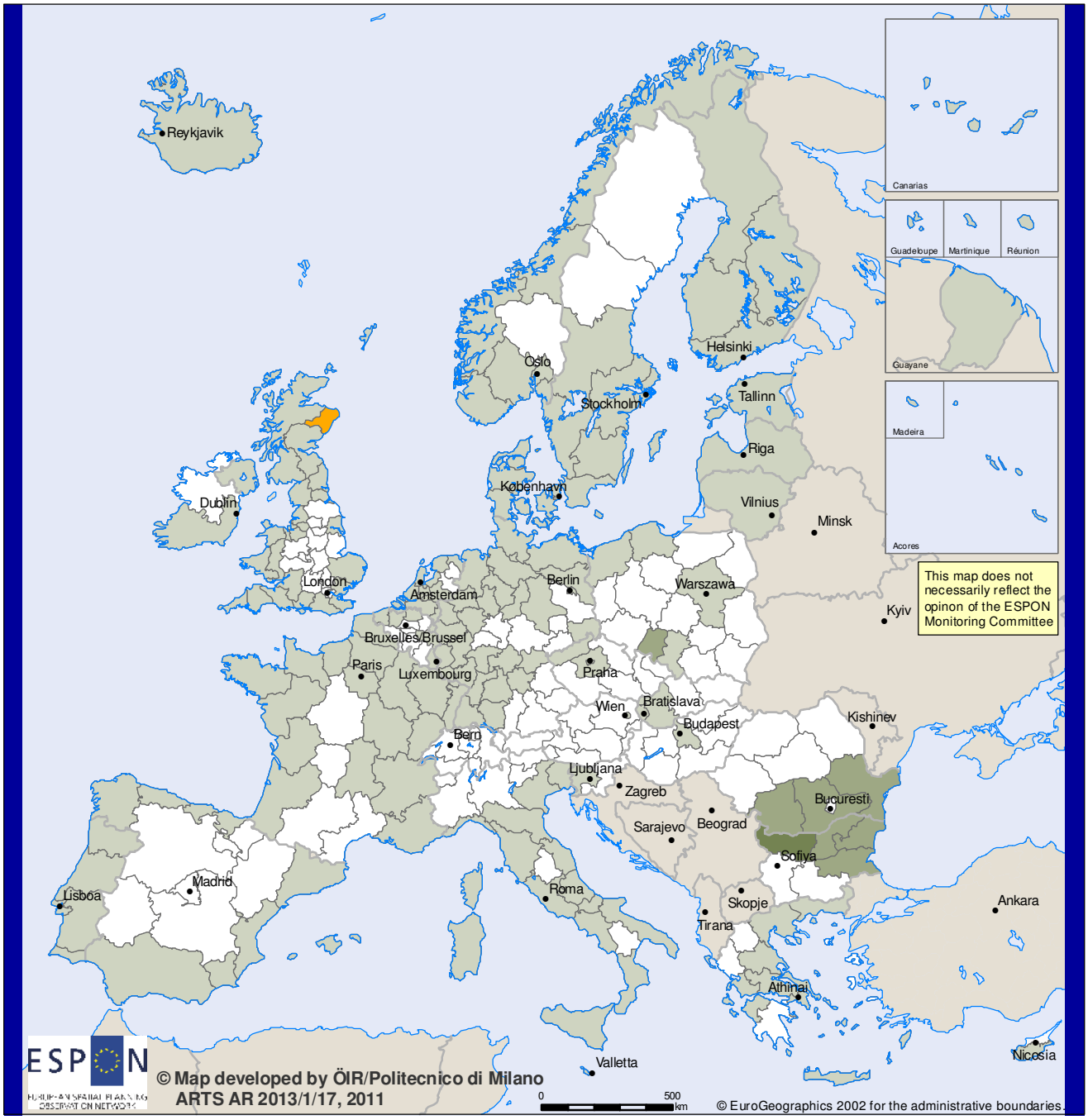


Territorial Impact of Directive 5 (branch b) on economic growth (GDP/capita)

Negative Impact

- Very high impact
- High impact
- Moderate impact
- Minor impact
- Not affected

Positive Impact

- Minor impact
- Moderate impact
- High impact
- Very high impact

- No Data
- Neighbourhood Countries

Types of regions affected: harbour regions

Directive on the recognition of professional qualifications

This Directive establishes a framework one the recognition of professional qualifications within the EU. It aims to clarify and consolidate the current rules in place and to facilitate free movement of qualified professionals between Member States.

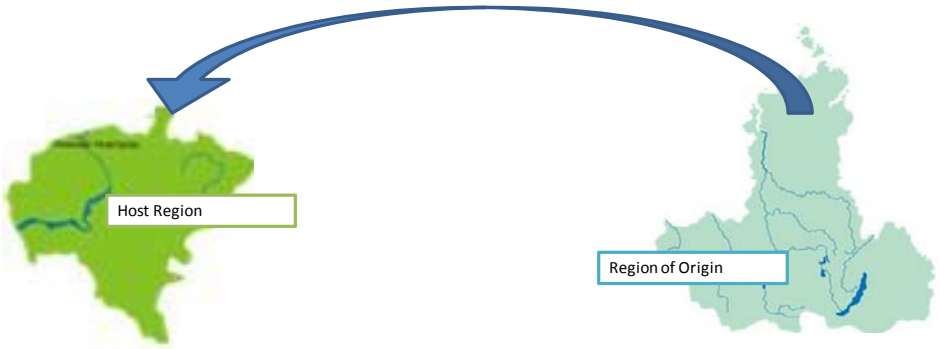
(a) Conceptual model, logical chain and exposure

The simplification and harmonisation of recognising professional qualifications benefit governance mechanism across all regions. When considering the effects of this Directive it becomes apparent, that urban and wealthy regions (branch a) are affected differently than shrinking regions (branch b). Mobile professionals are inclined to leave 'unattractive' regions and migrate to urban and wealthy regions where working conditions (especially wage levels) are more promising. The access to labour markets facilitates freedom of movement and service provision and also enables citizens to profit from cultural exchange

The recognition of professional qualifications triggers regional development in all sectors of economy in wealthy regions through creating a favourable environment for the movement of workers thus creating additional supply of labour and in due course prepares the ground for the establishment of service enterprises. For shrinking regions the effect can be opposite: jobs are lost in the secondary and tertiary sector which has negative effects on economic growth in the short run. In the long run rebound effects are expected due to relocation of production to regions with lower production costs.

The primary sectors being bound to land face competitive disadvantages opposite the high attractiveness of jobs in all other sectors in both, wealthy and shrinking regions.

The following table provides an overview of the short and long term effects for labour markets and income for both the host regions and the regions of origin:

Host Region	Region of Origin
	
Original condition	
High labour demand ⇨ relatively high wages due to underuse of resources/demand surplus in goods and services together with relatively higher cost levels	Relatively low wage levels ⇨ due to sufficient labour supply or supply surplus together with relatively lower cost levels
Consequence: short term movement of labour	
Labour market effects	
Labour market equilibrium on a relatively lower wage level compared to the original condition If the in-migration of labour continues until the marginal wage gains are more than compensated by the costs (transaction costs and additional cost levels to be borne in the host region) ⇨ stop of movement	Labour shortage and rising wage levels ⇨ increasing attractiveness of the region for in-migration of labour ⇨ possible counter movement of work force or in-migration of labour from other regions
Income equality effects	
Declining household income due to increased competition on the labour market for the economic sector concerned (e.g. health care). ⇨ generally increase in income inequalities (ceteris paribus)	Increasing household income due to labour demand over time ⇨ generally increase in income inequalities although in the long run closing of this gap if countermovement of the work force sets in.
Disposable Income	
In the economic sectors concerned the disposable income will go down on average with an overall increase of the work force. However this will not affect the general income levels on the macro scale significantly	In the long run the income level in the sectors concerned will rise – however with limited overall effect on the macro scale.

Generally in the short run this development increases income inequalities due to labour surplus in the host countries whereas in the long run labour market equilibrium establishes a more equal income distribution.

The general increase of economic activities and transport cause the CO_2 emission to go up. Furthermore population growth in the host regions increases the demand for housing, water and energy. The opposite can be expected for the regions of origin. This also has effects on the landscape diversity: Population growth and urban sprawl entails a loss of characteristics in growing regions.

(a) The regions affected by the directive

The Directive is expected to affect urban, agglomerated and wealthy regions (branch a) differently than shrinking regions (branch b). The rationale behind this is that urban and wealthy regions are attractive to mobile professionals who seek better working conditions. While these regions attract further population, regions with less promising job prospects are left behind. A map depicting regions affected can be found in A5.

(b) The Territorial impact of the directive

The Directive bears diverse impacts on **regional economy**. All in all the **economy** (F12) in wealthy regions will growth further whereas economy in shrinking region is impacted negatively. However, in both branches this impact will be mostly minor. Only in already poor regions in Bulgaria, Romania, Hungary and Poland the impact will be stronger (moderate). The greatest magnitude of positive effects can be found in regions in terms of **entrepreneurship** (F14) for both wealthy and shrinking regions. In both, the regions are mainly affected very highly positive, an exception being Peloponnisos (GR) where the impact is only moderate. Considering **employment in agriculture** (F16) both branches bear minor negative effects for all regions. More pronounced is this in city regions, like e.g. Vienna, Brussels, Hamburg, Munich in Oberbayern, Île de France, Luxemburg, Groningen (NL), Stockholm and London, were already there is only a small share of farming. Positive effects on **Tourism** (F20) in all affected are minor, except shrinking regions in Poland, Bulgaria and Romania which benefit more than others.

Harmonising the recognition of professional qualifications within the EU has very high positive impact on **income distribution** (F22) in shrinking regions. Within the agglomerated and wealthy regions those in southern Europe, especially in Portugal and Malta benefit in that regard although not to the same extent. This ameliorated social situation has strong positive effects on **health** (F28) in eastern European regions and the Baltics.

More differentiated are the impacts on **employment** (F23) and **migration** balance (F24). Shrinking regions will suffer in both regards a negative impact. While the effect on employment is negative but mostly minor (exception for some parts in Germany and Poland, where it is moderate), the negative impact on migration is on a greater scale and more differentiated, ranging from moderate to very high.

In agglomerated regions, the effects are the opposite. Attracting new residents, the impact on **migration** is strong and positive. More so in regard to the job market. Increased economic activity provides workplaces, which shows on the consistently high to very high positive impacts on the **employment** rate (F23). Most pronounced are these effects in European periphery, where agglomerated or wealthy areas stand out even more as centres for economic activities.

Following **branch a**, **wealthy regions** attract population, leading to the construction of housing, which has negative impacts on the share of **soil sealing** (F3), leads to **urban sprawl** (F35), accompanied by negative impacts on the level of **CO_2 Emissions** (F7) These effects are generally minor, although big urban agglomerations, already being more sensitive, show a moderate negative impact. These include regions like Brussels, Praha, Vienna, many cities in Germany (Bremen, Berlin, Hamburg) and the UK (London, West Midlands, Greater Manchester, Merseyside) and Ciudad Autónoma de Melilla (ES). Increased **fuel consumption** (F34) follows minor to moderate negative impacts on the regions, most affected are regions in southern Europe. The top 20 are found in Spain, Portugal, Greece and Italy. To a lesser dimension the stated impacts also affect the region's **landscape diversity** (F10) negatively, the Canaries (ES) being affected the most.

The impact on the environment in **shrinking regions** is very limited and undifferentiated minor: slightly negative on the level of **CO_2 Emissions** (F7) and slightly positive on **landscape diversity** (F10), most so in Greece. The decrease in **fuel consumption** (F34) mainly profits (to a moderate extent) shrinking regions vulnerable to climate change, especially in Bulgaria, Hungary and Greece and Alentejo in Portugal.

Interpreting the territorial impact as analysis of negative unintended effects it becomes clear that the effect on shrinking regions is problematic.

In general the trade off between two carrying principles of the EU becomes visible by the analysis of intended and unintended effects of this directive:

Principle of freedom of movement of factors of production (labour)/goods and services

The European Union's Internal Market seeks to guarantee the free movement of goods, capital, services, and people – the EU's four freedoms – within the EU's 27 member states.

The Internal Market is intended to be conducive to increased competition, increased specialisation, larger economies of scale, allows goods and factors of production to move to the area where they are most valued, thus improving the efficiency of the allocation of resources.

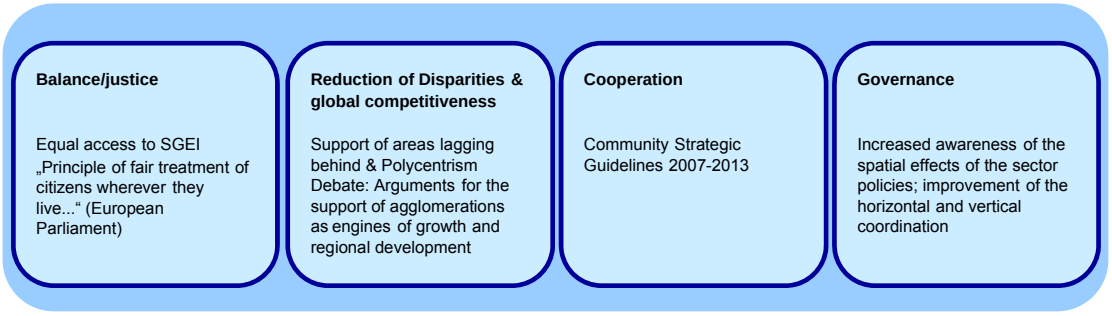
It is also intended to drive economic integration whereby the once separate economies of the member states become integrated within a single EU wide economy. Half the trade in the EU is covered by legislation harmonised by the EU.

Principle of Territorial Cohesion

Since the Treaty of Amsterdam (1997) the term has been embedded in EU constitutional law – esp. in connection with Services of General Economic Interest –

SGEI. It is often seen as “synonym“ for the encouragement of regional development within the EU and still shows a certain vagueness of its concrete meaning.

However in principle there are four dimensions to be distinguished:



Based on our assessment this **directive** impedes economic growth in already shrinking regions by supporting emigration of professionals that leave these regions in search for a more favourable economic environment. In this sense favouring the goal of freedom of service provision and movement, the Directive hampers the objective of European cohesion at least in the short run. More specifically the aspects of “reduction of disparities” and “balance” are clearly contradicting the primacy of the free market logic underlying the free movement principle. The negative effects on the regional scale are neglected in favour of the expansion of the global/EU development path. Following this train of thoughts we can conclude that policy alternatives should focus on mitigating negative effects due to brain drain.

Map B 9: Summative positive impact of Directive on recognition of qualifications

Map B 10: Summative negative impact of Directive on recognition of qualifications

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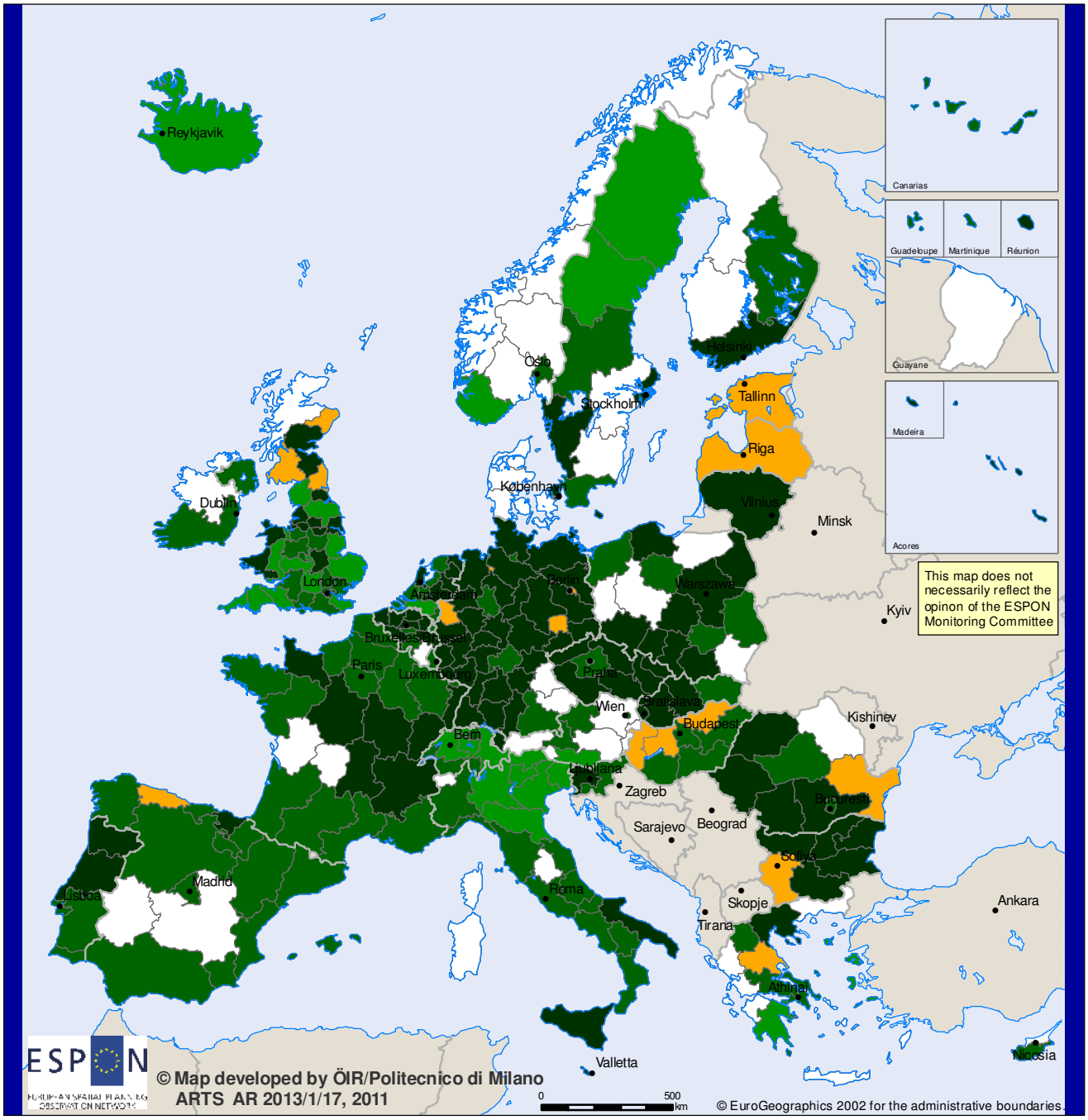

Summative positive impact of Directive on recognition of qualifications

Number of indicators with high or very high impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: wealthy regions, urban, agglomerated, shrinking regions

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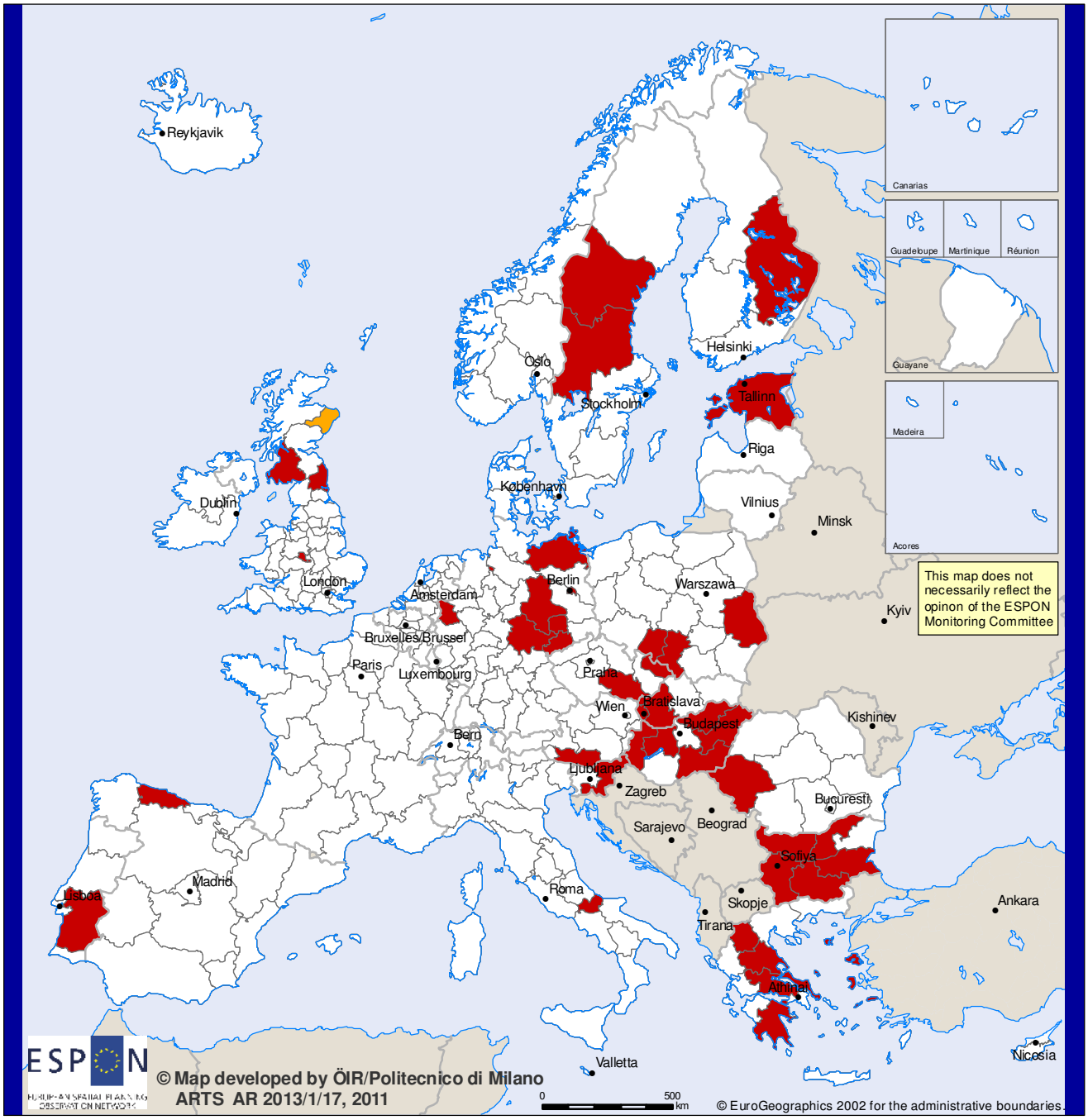

Summative negative impact of Directive on recognition of qualifications

Number of indicators with low or very low impact

- 0
- 1
- 2
- > 2
- No Data
- Neighbourhood Countries

Types of regions affected: wealthy regions, urban, agglomerated, shrinking regions

Directives on the promotion of clean and energy-efficient road transport vehicles

This directive aims at the introduction of specific measures in the transport sectors to address energy use and greenhouse gas emission with the ultimate goal of a better integration of transport and energy policies. Specifically, this directive aims at stimulating the market for clean and energy-efficient road transport vehicles, namely standardised vehicles produced in large quantities such as passenger cars, coaches and trucks, to sustain the purchase and in turn stimulate further investments in the design and production of clean and energy efficient vehicles. A special attention is recommended on the procurement of public transport services. To this end, the directive entails a list of criteria in terms of lifetime energy and environmental impacts and pollutants to be met by vehicles purchased in accordance to public procurement rules.

(a) Conceptual model, logical chain and exposure

The directive impacts are expected to follow two distinctive channels: On the one hand, impacts are channelled by the demand side, meaning through the incentives to the adoption of cleaner and more efficient vehicles, leading to positive impacts on the natural environment in terms of lower emissions and pollutants in air as well as reduced fossil fuel consumption (**branch a**).

On the other hand, impacts are channelled by the supply side, meaning through the investment and production of cleaner and more efficient vehicles, leading to some impacts on employment and GDP and generating a push effect on the development of inventions and innovations in cleaner and green technologies (**branch b**).

The exposure fields affected in branch a) of this directive refer to the natural environment field, namely a moderate reduction of CO_2 emissions and the level of pollutants in air (PM10). This teams with a moderate reduction on the dependency of fossil fuel consumption. The impact is expected to be moderate since the directive does not aim at a full substitution of vehicles fleet, but basically addresses fleet renewal. Also, vehicles can be considered as a substantial although not exhaustive component of C02 emissions.

On the other hand, the impact via the supply side (i.e. branch b) will bear moderately positive on GDP and employment (namely in manufacturing) since it affects a limited part of the manufacturing sector. Some impact may also be expected on the share of arable area, permanent grass area, permanent crops areas, since the extra production of bio-fuels may require an extension of cultivated areas. The impact on innovation is differently expected to be considerable since car producers may engage in extra investments in alternative and superior vehicles technologies.

(b) The regions affected by the directive

We expect that the regions more hit by this directive are agglomerated regions in the first case and regions with a considerable share of employment in vehicle production (i.e. identified as those regions falling in the top 25 percentile of the distribution of employment in vehicles production over total employment in manufacturing) in the second case.

The rationale behind this expectation is as follows. In the first case, benefits from the directive will be particularly high in regions that are more congested and polluted, typically agglomerated ones. These regions cover mainly capital cities and highly densely populated regions in Central Europe.

Conversely, benefits stemming from the implementation of this directive will touch mainly regions that are highly specialised in vehicles production which may experience an increase in production and employment. These regions concentrates in Central Europe again, with some hotspots in Italy (namely Piemonte, Abruzzo, Molise and Basilicata), Spain (Galicia, Pais Vasco, Aragón, Castilla y León, Cataluña), France (Basse-Normandie, Nord – Pas-de-Calais, Franche-Comté) and British and Swedish regions in Northern Europe. Also several Eastern Europe regions look potentially affected by this directive especially, in Slovakia, Poland, Czech Republic and Hungary. A map depicting regions affected can be found in A5.

(c) The Territorial impact of the directive

Looking at the impacts channeled by the demand side, this directive seems to bear minor positive impact (i.e. a reduction of) on **pollutant in air** (F6) with the exception of Bucaresti that highly benefit from it. Similarly, impacts on the **emission of CO_2** (F7) will be positive albeit minor with the exception of Région de Bruxelles and Ciudad Autónoma de Melilla (moderate) and Inner London (high). Lastly, impact on **fossil fuel consumption** (F36) will be again positive and minor but a larger number of regions seem to be moderately affected in Italy (Liguria, Lombardia, Veneto, Lazio, Campania), Spain (Aragón, Comunidad de Madrid, Cataluña, Comunidad Valenciana),and other Mediterranean regions (Provence-Alpes-Côte d'Azur, Attiki, Malta, Lisboa), as shown in Map B 11 below.

Looking at impact channeled by the supply side, this directive seems to bear minor positive impact on **economic growth** (F12) in all regions with the exception of five regions in Eastern Europe (Észak-Magyarország, Podkarpackie in Poland, Centru, Sud, Vest in Romania) showing moderate impacts, as depicted in Map B 12 below. Differently, impacts on **innovation** (F13) will be positive and high across all European regions affected by this directive. Lastly, impacts on **the share of arable area** (F17) will be overall positive and minor, being moderate in some German and Czech regions as well as in some Polish, Romanian and Hungarian ones and high in

a few regions, i.e. Basse-Normandie, East Riding and North Lincolnshire, Herefordshire, Worcestershire and Warks.

This directive touches a very relevant aspect connected to the green economy (i.e. the shift towards clean and energy-efficient transport vehicles) and highlights two channels along with European directives may eventually show territorial impacts, the supply and production side on the one hand and the demand and adoption side on the other.

This suggests that **policy options** in this specific field may be conceived and developed in accordance with this double channel of impact.

In particular, at a first stage, policies may be aimed at incentivizing and promoting the production side, namely through the support to investments in research and innovation in order to develop and produce more advanced and efficient (i.e. greener) technologies to be applied in transport vehicles. Next, and perhaps once technologies become sufficiently stable and relatively cheaper, policies may be aimed at incentivizing and promoting the adoption side, either through additional ad-hoc directives or by specifically envisaging policy instruments in the new Structural Funds allocation in the upcoming Financial Perspective which is currently under discussion. Especially in this regard, coordination among MS in support of the adoption of greener technologies in transports looks crucial in order to limit selective and uneven adoption patterns across the European territory.

Also, our analysis points to the potential connection and the integration of this directive with other policy measures affecting the production and adoption of other green technologies, especially in the energy sector (e.g. bio-mass, bio-fuels). For example, our TIM approach highlights the link of this directive with agricultural and energy policies since it directly affects the share of agricultural lands and may also introduce a shift in the crops been cultivated in order to meet a potentially increasing demand of bio-fuels.

Map B 11: Territorial Impact of Directive 11 (branch a) on fossil fuel consumption

Map B 12: Territorial Impact of Directive 11 (branch b) on economic growth (GDP/capita)

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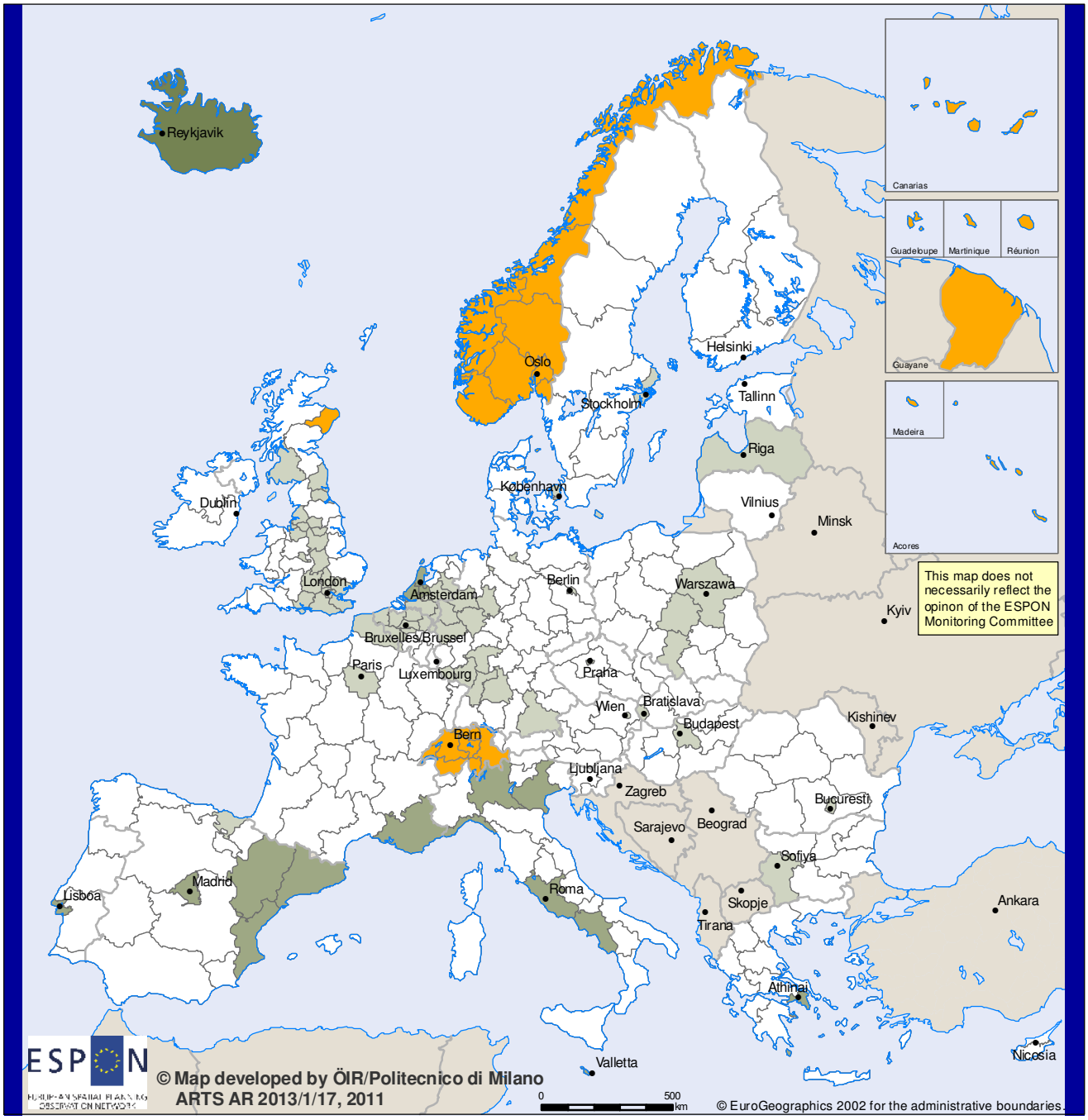

Territorial Impact of Directive 11 (branch a) on fossil fuel consumption

Negative Impact

- Very high impact
- High impact
- Moderate impact
- Minor impact
- Not affected

Positive Impact

- Minor impact
- Moderate impact
- High impact
- Very high impact

- No Data
- Neighbourhood Countries

Types of regions affected: agglomerated

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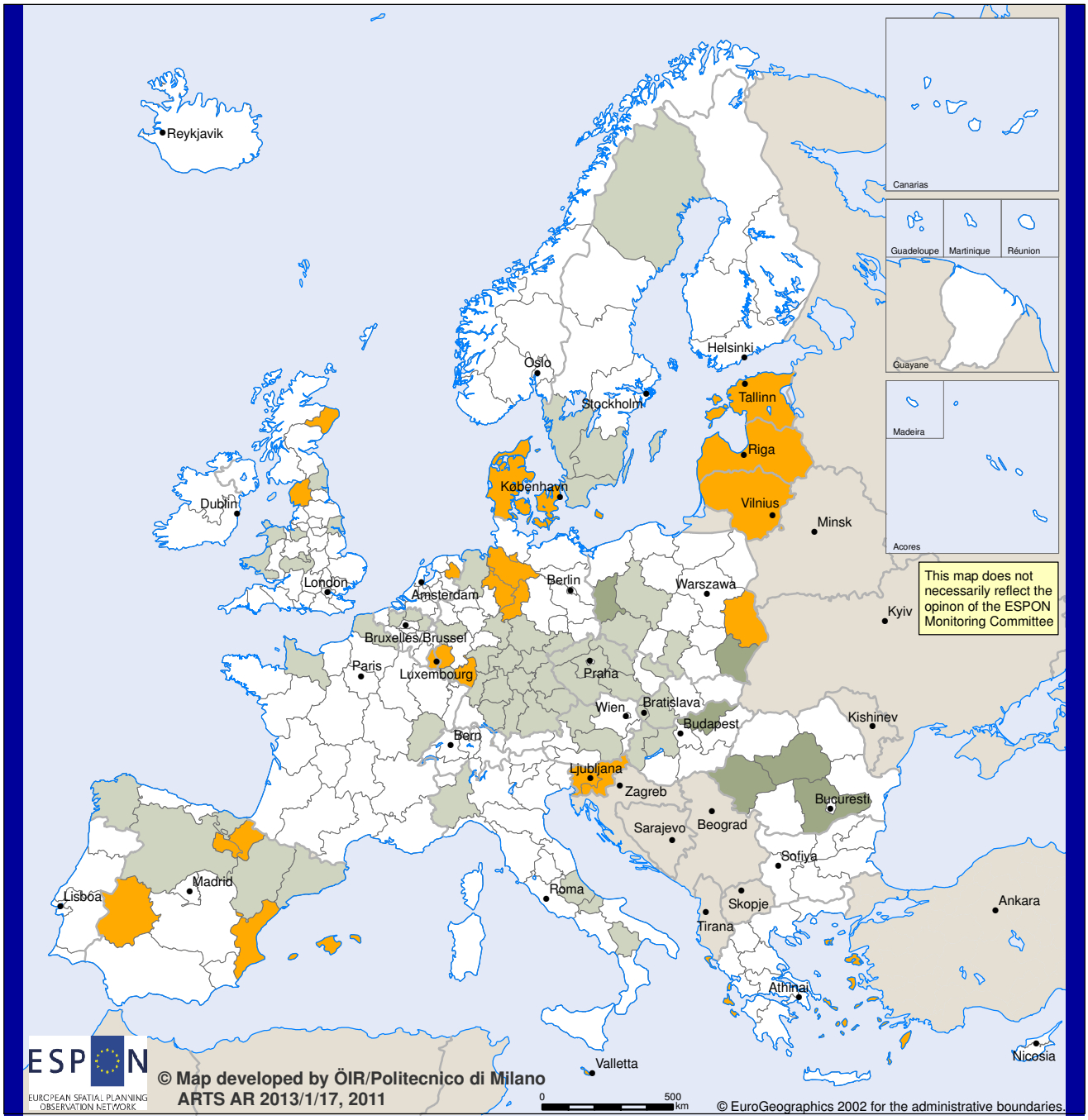

Territorial Impact of Directive 11 (branch b) on economic growth (GDP/capita)

Negative Impact

- Very high impact
- High impact
- Moderate impact
- Minor impact
- Not affected

Positive Impact

- Minor impact
- Moderate impact
- High impact
- Very high impact

- No Data
- Neighbourhood Countries

Types of regions affected: highest share of employment in automotive

2.4 Manual for practitioners

The TIA-methodology developed within the ESPON ARTS project combines a standardised indicator based tool developed in Excel with a methodology to collect expert knowledge in a workshop atmosphere. The expert contribution serves as input for the analysis and for providing the interpretation of the output of the impact indicators.

The tool is applied in a half day workshop with experts in the subject of the directive analysed and experts in territorial development. The impact assessment of a directive can be done during a half day workshop guided by a host along the following steps.

(1) Setting the frame: The conceptual model

In a first step it is necessary to detect the potential effects of a directive on territorial development. In a workshop atmosphere the experts draw a picture of the conceptual model of the directive translating the text of the directive into cause effects relations. A host is responsible for the concentrated discussion and for keeping the following points in mind:

- To tackle all relevant potential effects (The list of thematic fields and exposure indicators helps to touch all relevant issues.)
- To focus on the most important effects on one hand but also to think on unwanted/unintended effects on the other hand
- To think about different types of regions.
- To picture cause effect relationships (The standardised syntax helps to get a common picture).
- To stick to the text of the directive (and not to speculate about the various options for its implementation)

The result is a systemic picture showing the conceptual model of the directive according to its intervention logic and the potential effects.

(2) Considering different types of regions – the Regional Exposure Matrix

A directive could touch only particular regions (e.g. coastal regions, regions with presence of particular productions or facilities like nuclear power plants etc.) or different types of regions could be touched in different ways by a directive. The Regional Exposure Matrix provides a set of pre-selected types of regions allowing to decide, if a certain type of region is not touched at all. Moreover it enables to define the exposure differently for different types of regions.

Based on the conceptual model in step 2 the decision is made,

(c) If a directive does not affect a certain type of region (according to the pre-selected types of region) at all? or

(d) Is it necessary to distinguish the exposure resulting from a directive along different types of regions? (= “branching of directives” into two or more logical chains)

The host of the workshop provides the list of pre-selected types of regions, guides the discussion and ticks the finally selected types of regions in the Regional Exposure Matrix.

(3) Filling in the Directive/Exposure Matrix

In step 2 the conceptual model of the directive is translated into the directive exposure matrix that describes the intensity by which EU directives and policies affect European regions along a pre-defined set of thematic fields covering natural environment, regional economy as well as society and people.

For each field the exposure of a directive has to be defined according to the following classes:

- high positive exposure intensity
- low positive exposure intensity
- no exposure
- low negative exposure intensity
- high negative exposure intensity
- unknown exposure intensity

If in Step 2 a “branching” was decided then the Directive/Exposure Matrix has to be completed for each branch.

The host of the workshop guides the discussion along the list of thematic fields/indicators and fills in the matrix in the excel tool.

(4) Calculating the TIM and plausibility checks

Based on the Directive/Exposure Matrix and the Regional sensitivity matrix, which is a standardised part of excel tool the territorial impact matrix (TIM) is calculated automatically. It provides for each thematic field/indicator and for each region the impact of the directive in a region along the following classes:

- Very high positive impact
- High positive impact
- Moderate positive
- Minor positive impact
- No impact

- Minor negative impact
- Moderate negative impact
- High negative impact
- Very high negative impact

The TIM displays the different values in different scales. In a first overview the following checks have to be discussed:

(a) Are the indicators with high and very high positive and negative impact plausible? – If no – rethink the values in the directive exposure matrix.

(b) Are the regions touched with high impacts plausible? If no – rethink your selected types in the regional exposure matrix or the values in the directive exposure matrix.

(5) Mapping the Territorial impact

If the plausibility checks are positive (maybe after a modification of the regional exposure matrix or directive exposure matrix) the maps showing the impact along the different indicators can be drawn. As there is a long list of indicators and not all indicators show positive and negative impacts it would be good to concentrate on a few selected indicators. For these indicators maps are drawn. Additionally "summative" impacts of a directive on each region, considering together all impacts on the different fields can be drawn.

The host provides a standardised template for the maps and draws the maps

(6) Discussion on policy implications

Based on the maps the discussion on policy implication can be done. Focusing on the positive impacts of a directive as well as on negative effects. The host moderates the discussion and writes the minutes.

(7) Writing the minutes

Based on the results of the meeting and the discussion minutes are elaborated according to the following structure:

- the intention of the directive
- the conceptual model, the logical chains and the exposure
- the regions affected by the directive
- the territorial impact of the directive (including the maps with the territorial impact indicators)

2.5 Governance

In this study the focus is on three governance aspects of TIA: 1) the use of a TIA instrument (section 2.6.2 and 2.6.3), 2) governance as an explaining factor of territorial impact (2.6.3) and, 3) the question how governance can be factored into the ARTS methodology (2.6.4).

2.5.1 TIA in European countries

At the 2001 ECTP/CSD conference several participants indicated that in their country bits and pieces of what could be called territorial impact assessment were carried out, although the regulatory base differs greatly and is not always there (ECTP/CSD 2001). Only in a few countries is some form of territorial impact assessment standard practice, i.e. Germany, Switzerland and Austria. In the latter two – where the partly obligation to carry out a TIA or a *Raumverträglichkeitsprüfung* is based on law – TIA is directed to the identification of possible territorial impacts in relation to concrete projects. What is important is that among the Member States there is no common understanding of TIA.

2.5.2 Impact Assessment procedure in the Commission relevance for TIA

It was found that for political as well as substantive reasons the Commission's Impact Assessment (IA) practice qualifies as one of the best opportunities to get TIA implemented at the EU level (Zonneveld & Waterhout 2009).

IA offers opportunities to introduce territorial thinking in the development process of EU directives. Currently this barely happens, even not in cases where it seems obvious that the directive will have territorial effects. There are two key challenges: 1) to get involved in the IA process, and 2) to prove with ready-to-use evidence that the directive under consideration has a likely effect on territorial development and/or policy making. The first challenge concerns an institutional/organisation issue which needs to be solved between key stakeholders. The second challenge concerns a research and design issue. Currently there is neither sufficient persuasive territorial data available, nor are there easy-to-use tools and instruments. The ESPON ARTS project should be understood in this context.

2.5.3 Governance as an explaining factor for territorial impact

One aim of the ESPON ARTS project is to develop a more thorough understanding of the role of governance as an explaining factor for the territorial impact of EU directives. The basic hypothesis underlying is that domestic governance structures can have either an *amplifying* or a *mitigating* effect on the potential territorial impact of EU directives.

The key issue is that directives (in contrast to regulations) need to be transposed in domestic policies and need to be held up by domestic institutions in domestic administrative and cultural contexts. This means that several follow-up decisions have to be taken during the transposition process, decisions that each member state takes in its own right.

For a better understanding one needs to look in a more detailed way at the process that directives go through before they are being implemented and applied. Based on a meta-analysis of literature addressing the impact of EU directives and on developing the logical chains and exposure matrices in this project, we discern between four policy stages that directives go through:

(1) Development of the EU directive

(2) Transposition/translation in national legislation

(3) Implementation into existing or new policies

(4) Actual use and jurisprudence.

In each of these four policy stages specific government and governance decisions play a role and can lead to unexpected territorial impact (this is further explained in chapter 6).

A number of preliminary conclusions can be drawn:

- Coordination mechanisms, horizontal and vertical, during development, transposing and implementation stages can be instrumental in avoiding negative impact of directives. In member states where mechanisms are in place to pro-actively organize inter-sectoral, multi-level and stakeholder consultation directives generally cause less unwanted and unexpected territorial impact.
- Roughly two models are applied when transposing directives into national legislation: 1) issuing new legislation in an isolated way or 2) integrating it into existing legislation. In particular the latter model contains risks in a sense that directive obligations and logic do not always match those of the domestic legislation. In case of the first approach the problem may be that the implementation and application (actual use) stages require additional effort.
- The most crucial decision in the context of explaining territorial impact is being taken during the implementation phase where it is decided which measures and instruments a directive will be used in order to reach the directive's objectives.
- Some member states apply EU directive thresholds in a strict way, whereas others provide for more flexibility and balance thresholds with various interests and compensation measures. In the case of the first the impact is more directly felt and leads to risk avoiding behaviour by public stakeholders when developing new plans, projects and programmes. In case of the second model the planning and decision making processes are less influenced, but new plans and projects can be questioned during later stages.

- Legal systems do have strong influence on the use of a directive and its impact. Countries with an accessible system tend to experience higher territorial impact of EU directives than others.

2.5.4 Governance as part of the ARTS methodology

It has been considered to integrate the factor governance in the ARTS methodology. Roughly there are two options: 1) integrate governance in the exposure and regional sensitivity matrices, or 2) developing a separate 'governance filter' as a final step of the model. From the perspective of understanding governance as a mitigating or amplifying factor, the second option would be preferable as this would offer the highest level of transparency and allow distinguishing between territorial impact proper and impact related to governance. Also from a perspective of durability this option would be preferable since governance aspects generally tend to change more often and quickly than territorial characteristics. For reasons explained in the chapter 6 a governance filter has not been developed, nor would we advise to develop one.

At a more modest level some governance elements have been factored into the ARTS methodology. This concerns the impact fields:

(1) efficiency of government/governance mechanisms (efficiency/effectiveness of public administration)

(2) duration or complexity of planning procedures (introduction of new administrative tasks/mechanisms/units/structure)

(3) participation rate

(4) Societal transfer (e.g. tax added)

(5) transnational cooperation between member states

In contrast to the type of governance elements which amplify or mitigate the impact of a directive, i.e. that are related to domestic institutions, the governance elements that are part of the methodology are directly related to the contents of directives themselves. This concerns for example the obligation in the Air Quality Directive and Directive on energy performance of buildings to develop national plans. Such measures have a direct impact in countries and regions by increasing administrative tasks and adding complexity to the domestic territorial governance system. A similar type of impact is for example caused by the Water Framework Directive which demands better ecological and chemical water quality across Europe and requires water management plans at the level of river catchment areas. The first translates into a number of measures and will require administrations to raise additional tax (societal transfer). The second requires cross border co-operation in the case that rivers cross national borders. These governance elements are unavoidable effects of the directive itself, regardless of the governance context within a region or country.

Although five governance factors have been factored into the model, the possibilities to confront them with the territorial sensitivity matrix and differentiate their impact to

regional characteristics are rather limited. The impact field 'cross-border co-operation' can be operationalized in a meaningful way. Other impact fields such as complexity of panning process a societal transfer are relatively difficult to operationalize as they are not stable over time. In so doing the exposure fields relating to governance primarily have a signalling function. They indicate to policy makers that the implementation of the directive will impact upon the current domestic governance system. To what extent this will occur cannot be made clear. It nevertheless enables policy makers to take the effect into account in the wider process of assessing the desirability of the directive in its, at that moment, unfinished form.

3 Options for policy development

Implementation of the TIA procedure in the IA of the Commission

The impact assessment (IA) procedure on the Commission level was introduced in 2002 and further developed by means of a gradual process that allowed Commission officials and organization to grow with it. The basic idea of the IA procedure is that ex ante impact evaluation, parallel to the policy making process, will improve the original ideas and result in robust, effective, efficient and widely supported policies.

An IA usually takes about a year to one and a half year and is intended as a bottom-up process. In principle each and every stakeholder is invited to be part of the IA process.

IA procedures always make use of existing knowledge and never develop data themselves. In terms of addressing territorial impact this may have consequences as (apart from ESPON) there is little territorial data available.

Therefore, the Commission's Impact Assessment practice qualifies as one of the best opportunities to get TIA implemented at the EU level (Zonneveld & Waterhout 2009). The TIA as developed in ESPON ARTS could serve as a first pre-check on the expert level of the Commission and add the territorial dimension to the IA procedure. It enables to identify those regions with would benefit intensely and those regions with likely high negative impacts. The result of TIA could feed in into the further stakeholder driven process of the Commission's Impact Assessment.

Another option would be to use the TIA procedure as part of the strategic environmental assessment (SEA). This would put the focus on the impacts of a directive on the environment, whereas the TIA approach developed analysis also economic and societal consequences.

Taking the EU neighbourhood on board

The analysis concentrates on the direct and indirect effects within in a region of the EU27 where the directive is directly implemented. However, each directive will also produce spill over effects towards the neighbouring countries. These effects are not covered by the TIA procedure up to now. Analysing the impacts of EU legislation on the EU neighbourhood could be a new part of the EU neighbourhood policy in order to support the neighbouring to be better prepared.

4 Issues for further analytical work and research

The results of the TIA of the selected directives show very clearly what kind of additional analytical work is needed:

Additional indicators

The analysis of the impact of the directives should cover all relevant fields of territorial development: covering natural environment, regional economy as well as society and people. We defined 41 indicators to cover that wide range. However, we found only for 30 indicators values allowing to picture sensitivity of regions. Missing indicators were especially concerning:

- land use
- governance (efficiency of government/governance mechanisms, duration or complexity of planning procedures, participation rate, societal transfers)
- innovation and market barriers
- cultural heritage

Additional indicators would be needed in order to provide the full range of possible impacts of directives.

Additional and more specified types of regions

When setting up the conceptual model for the selected directives, we came often to the conclusion that they induce different effects in very special types of regions (eg. regions with chemical plant, intense agriculture etc.) The existing typologies do by not cover the types that would be necessary. So it would be very useful to extend the list of pre-selected types of regions of the regional exposure matrix. Only if I can provide a suitable type of region for the analysis, I can do the TIA in the format of the workshop. Otherwise the TIA procedure will last longs, when looking for new typologies.

Indicators on NUTS 3

Due to the indicators used the TIA was conducted on NUTS2 level. NUTS 2 is quite a large scale for the distinction of effects of some directives e.g. when directives aim at urban areas etc. So, it would be good to get the list of indicators as well as the list of types of regions on NUTS 3 level to get more precise results.

A better solution for describing summative effects easy and reliable

At the moment the TIA delivers usable results for each indicator. For policy makers it would be interesting to get also an overview about “summative” impacts of a directive on each region, considering together all impacts on the different fields. At the moment we chose the simplest solution: counting all fields in which the impact on the region was considered “high”. This leads to very simple results.

Additional research would be interesting how to picture this “summative” effects better. One approach would be computing a weighted multi-criteria impact index, in the same way as it was done in the ESPON Tequila Models. This solution implies the definition of a shared system of weights for the single impacts (through experts judgement, policy maker’s priorities, etc.) and of some thresholds beyond which compensation among impacts is excluded (the FLAG methodology in the Tequila 2 model). Another option would be a cluster analysis. Then you would not need weights, but a cluster analysis cannot be standardised for applying it directly in a workshop.

Depicting spill over effects

The analysis focuses an depicting the impact of the EU legislation within a region. Additionally also spill over effects and cross boarder effects could be analysed.

Alternative approach for the TIA analysis on governance issues

Instead of trying to model governance in order to predict where problems might occur, a different approach is to help stakeholders with identifying potential issues in the process of developing, transposing, implementing and using the directive. This could be done by developing a guidance and check-list which provides general and stage specific guidance. Such a check-list should inform policy makers about how to act in specific situations and what the possible options and their likely effects are. A general guidance, applying to all possible directives, could act as a framework and tool for policy makers.

Going one step further the challenge becomes to adapt the general guidance in such a way that it becomes attuned to a specific directive. Here the ARTS model comes back in. With the outcomes of the ARTS model and the elaborations by means of the logical chains and reports the guidance could become further specified in a qualitative way by taking account of specific territorial characteristics of the directive under consideration.