



**European Committee
of the Regions**



Territorial Impact Assessment

Cohesion as a value: the effects of EU decarbonisation initiatives on the cohesion spirit of the EU

Staff working document



**European Committee
of the Regions**

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Territorial Impact Assessment

Cohesion as a value: the effects of EU decarbonisation initiatives on the cohesion spirit of the EU

Disclaimer

This report was produced by the European Committee of the Regions secretariat to assist the COTER commission in analysing how EU decarbonisation initiatives can affect the cohesion spirit of the EU. The findings of this report are not binding for the European Committee of the Regions and do not prejudice the final content of its opinions. This report is for information purposes only.

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This territorial impact assessment report is the outcome of an expert online workshop held by the European Committee of the Regions and ESPON EGTC on 15 and 16 March 2021.

The ESPON TIA Tool is designed to support the quantitative assessment of potential territorial impacts according to the Better Regulation guidelines. It is an interactive web application that can be used to support policy makers and practitioners in identifying, ex-ante, potential territorial impacts of new EU Legislations, Policies and Directives (LPDs).

This report documents results of the territorial impact assessment expert workshop about the effects of EU decarbonisation initiatives on the cohesion spirit of the EU. It serves information purposes only. This report and the maps represent views and experiences of the workshop participants. It is meant to be used for decision support only and does not necessarily reflect the opinion of the members of the ESPON 2020 Monitoring Committee.

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Acronyms and legend

CoR	European Committee of the Regions
EP	European Parliament
ESPO	European Observation Network for Territorial Development and Cohesion
LRA	Local and Regional Authority
MS	Member State(s)
NUTS	Nomenclature des unités territoriales statistiques Common classification of territorial units for statistical purposes
OIR	Austrian Institute for Spatial Planning (ÖIR)
TIA	Territorial Impact Assessment

Effects of the directives – colour code

	Positive effects
	Minor positive effects
	Neutral
	Minor negative effects
	Negative effects

Legend – direction of effects

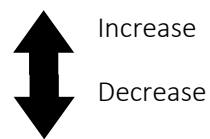


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1 Introduction

Rationale

The European Committee of the Regions has started a study project to reflect on a wider concept of cohesion as a value for the European Union. While promoting economic, social and territorial cohesion by reducing disparities between development levels across the EU's various regions is an EU Treaty objective, it is often seen only as a legal basis for Cohesion Policy as we know it today. But the Treaty states that the Union must promote cohesion and in this way it becomes an overall value of the EU. It is therefore essential to reflect on whether the EU policies as such are meeting this objective or not.

To support this examination, the CoR worked closely with ESPON to carry out a territorial impact assessment investigating whether and to what extent future EU policies have to be designed to meet the "Cohesion as a value" obligation. HERE

The workshop gathered experts who had already been consulted in the discussions of the Cohesion as a Value inception report and the workshop was held in close cooperation with ESPON EGTC.

The study will contribute to the role of the CoR as a pro-active player in the wider debate of cohesion as an overall value and objective of the EU. In particular, it will anticipate a number of discussions in the COTER Commission and the results will feed into the drafting of the 8th Economic, Social and Territorial Cohesion Report and the second annual CoR Barometer report of Cities and Regions expected for the end of 2021.

Results of the Inception Report

The draft inception report presented by Spatial Foresight (the contractor) put forward a specific understanding of the "cohesion spirit" in EU policy making, a methodology to assess how policy contributes to cohesion as a value and a proposal for 15 policies, strategies and instruments suggested for the assessment by the contractor.

There was a broad consensus among the experts that cohesion is much more than what is said in the Treaty; it is a global value and a transversal policy objective. The concept of "cohesion spirit" was welcomed as an appropriate one by most of the experts. The consensus amongst them was that stability and reforms should be considered in the principles mentioned and covered by the definition of cohesion spirit. Many of the experts stressed that places matter and with regards to territoriality expressed concerns that they could be left behind.

The experts proposed that the cohesion report should consider the impact of EU cohesion policies. Spatial Foresight suggested the following 15 policies and instruments:

EU Policies	EU Strategies	EU Instruments and Programmes
1. European Green Deal	6. EU Biodiversity Strategy 2030	8. Next Generation EU
2. Europe fit in a Digital Age	7. Annual Sustainable Growth Strategy	9. EU Single Market Programme
3. Common Agricultural Policy		10. Rights & Values Programme
4. Internal market and competition policy		11. ESF+
5. European Health Union policy		12. ERDF / CF
		13. InvestEU
		14. Connecting Europe facility
		15. Horizon Europe

Topic

Since decarbonisation is a key EU mission in the years to come that will affect many of its policies identified in the inception report it can serve as a good example for a “cohesion as a value” test. Complementing the report which assessed the extent to which “cohesion as a value” was included in EU policies, the TIA will focus on the actual cohesion effects of the selected policy. To further guide the assessment, an analysis of the main decarbonisation policies has identified the fields of transport, housing, energy and manufacturing, which will be the focus of the assessment.

Guiding questions for the TIA workshop

- What are the effects of these policies on different EU territories? (assuming a scenario of similar focus on cohesion spirit in the policies -> “Business as usual” scenario)
- What effects do these policies have on the development of regions in general?

- What aspects of cohesion will be fostered or limited by these policies?
- In what way can these effects be taken into consideration when shaping future policies on decarbonisation? (input into “more cohesion” or “less cohesion” scenarios)

Workshop introductory session

Mr Kai Böhme initiated the session by defining cohesion as a value: an aspiration of policies. According to their studies, there are four components to be assessed in every policy. Firstly, the cohesion principles, understood as mutual interdependencies, equality, equity and justice. Secondly, the cohesion objectives, which are economic, social, territorial and interpersonal. Thirdly, the component of embeddedness, which assesses the policy objectives, priorities and measures and at what stage this is embedded in the specific policy. Finally, the governance arrangements evaluated are the multilevel governance, the interdisciplinary cooperation among policy sectors, robustness and citizens' involvement and participation. In other words, there is more than just a territorial dimension in the evaluation of policies.

Figure 1 - Cohesion spirit understanding



Source: Spatial Foresight

Ms Maria Toptsidou explained that the fifteen policies evaluated in the study this TIA workshop is supporting had been examined in order to have a picture of how cohesion can be understood. She added that it was rather complex to develop overall common perceptions of the cohesion spirit and that some elements may be stronger than others in certain policies. In short, cohesion may fit differently in each policy. Last but not least, in terms of what aspects of cohesion are present in policies, the more prominent are economic cohesion and mutual interdependencies, with interpersonal cohesion less strong.

2 Methodology: ESPON Quick Check

The concept of territorial impact assessment (TIA) aims to show the regional differentiation of the impact of EU policies. The ESPON TIA Tool¹ is an interactive web application that can be used to support policy makers and practitioners in identifying, ex-ante, potential territorial impacts of new EU Legislations, Policies and Directives (LPDs). The “ESPON TIA Quick Check” approach combines a workshop setting for identifying systemic relations between a policy and its territorial consequences with a set of indicators describing the sensitivity of Europe's regions.

It helps to steer an expert discussion about the potential territorial effects of an EU policy proposal by checking all relevant indicators in a workshop setting. The results of the guided expert discussion are judgements about the potential territorial impact of an EU policy taking into account different policy fields (economy, society, environment, governance) for a range of indicators. These results are fed into the ESPON TIA Quick Check web tool.

The web tool translates the combination of the expert judgements on exposure with the different sensitivity of regions into maps showing the potential territorial impact of EU policy at NUTS3 level. These maps serve as a starting point for further discussion of the various impacts of a concrete EU policy on different regions. The experts participating in the workshop therefore provide an important input for this quick check on potential territorial effects of a given EU policy proposal.

The workshop on the effects of EU decarbonisation initiatives on the cohesion spirit of the EU (hereafter: cohesion effects of decarbonisation initiatives) was held on 15 and 16 March 2021 as an online event and brought together a number of experts representing various organisations and LRAs.

Three moderators from the OIR, provided by ESPON, organised and guided the workshop and handled the ESPON TIA tool.

2.1 Identifying the potential territorial effects considering economy, society, environment and governance aspects – drafting a conceptual model

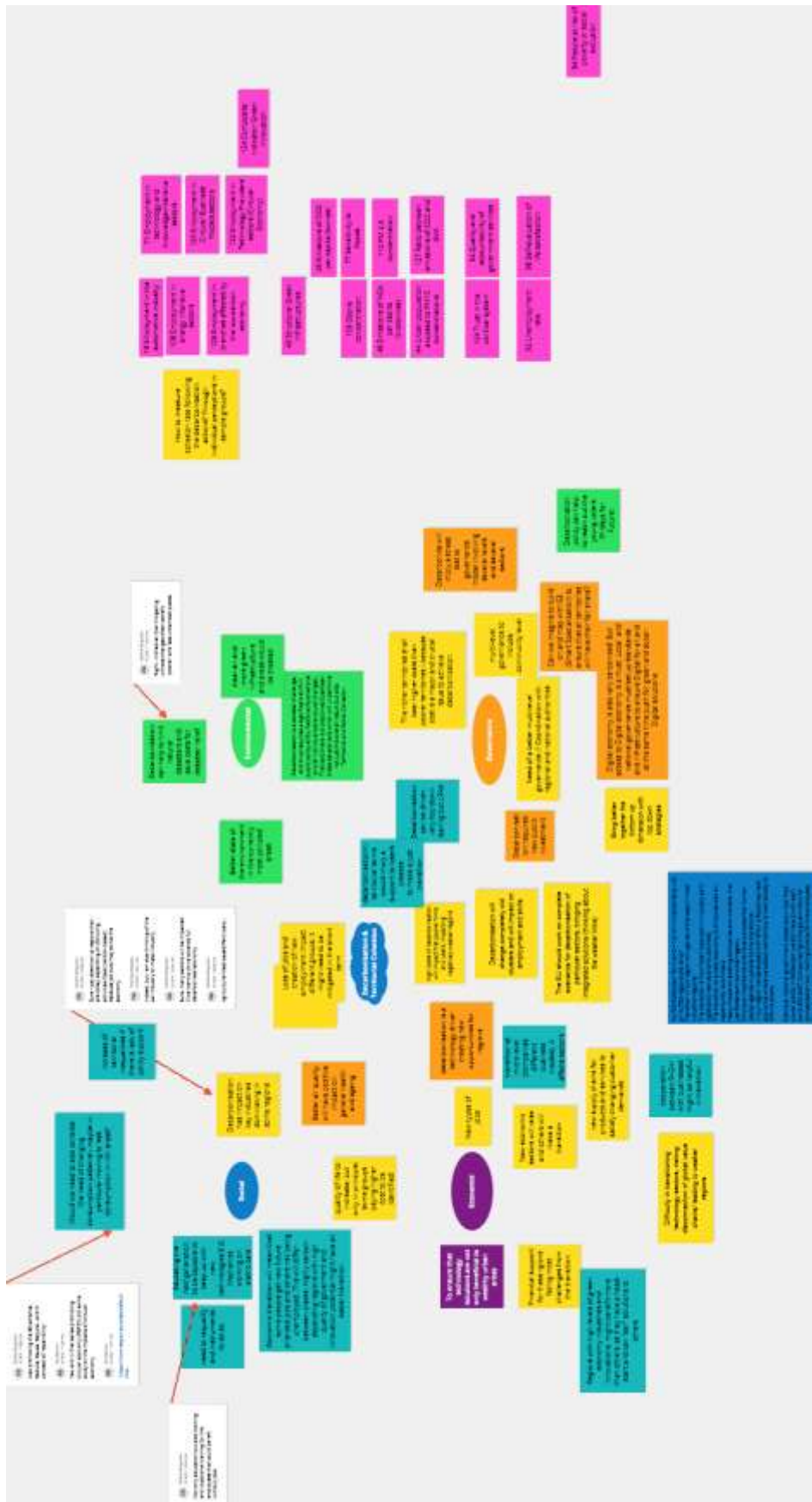
At the beginning of the TIA workshop the experts discussed the potential cohesion effects of decarbonisation initiatives using a territorial or place-based approach.

This discussion revealed potential territorial impacts of potential effects of the implementation of decarbonisation initiatives considering economy, society, environment and governance related

¹ https://www.espon.eu/main/Menu_ToolsandMaps/TIA/.

indicators. The participants identified potential linkages between the implementation of strategy and the effect on territories, including interdependencies and feed-back loops between different effects (see figure below).

Figure 3 - Workshop findings: Systemic picture



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

2.2 Picturing the potential territorial effects through indicators

In order to assess the potential effects pictured in the conceptual model suitable indicators need to be selected related to the parameters that the experts discussed in the fields of the economy, environment, society and governance. The lack of availability of data for all NUTS 3 regions is posing certain limitations to the indicators that can be used. From the available indicators that the ESPON TIA Quick Check web tool offers the experts chose the following ones to describe the effects identified:

Picturing potential territorial impacts considering economy-related Indicators

- Employment in technology and knowledge-intensive sectors
- Composite indicator: Green Innovation
- Employment in Material Providers sectors (Circular Economy)
- Employment in energy-intensive sectors
- Employment in the automotive industry

Picturing potential territorial impacts considering environment-related indicators

- Urban population exposed to PM10 concentrations
- PM 2.5 concentration
- Emissions of NOx per capita (kilotonnes)
- Emissions of CO2 per capita (tonnes)
- Structural Green Infrastructures
- Sensitivity to floods

Picturing potential territorial impacts considering government-related indicators

- Quality and accountability of government services

Picturing potential territorial impacts considering societal indicators

- Self-evaluation of life satisfaction

2.3 Judging the intensity of the potential effects

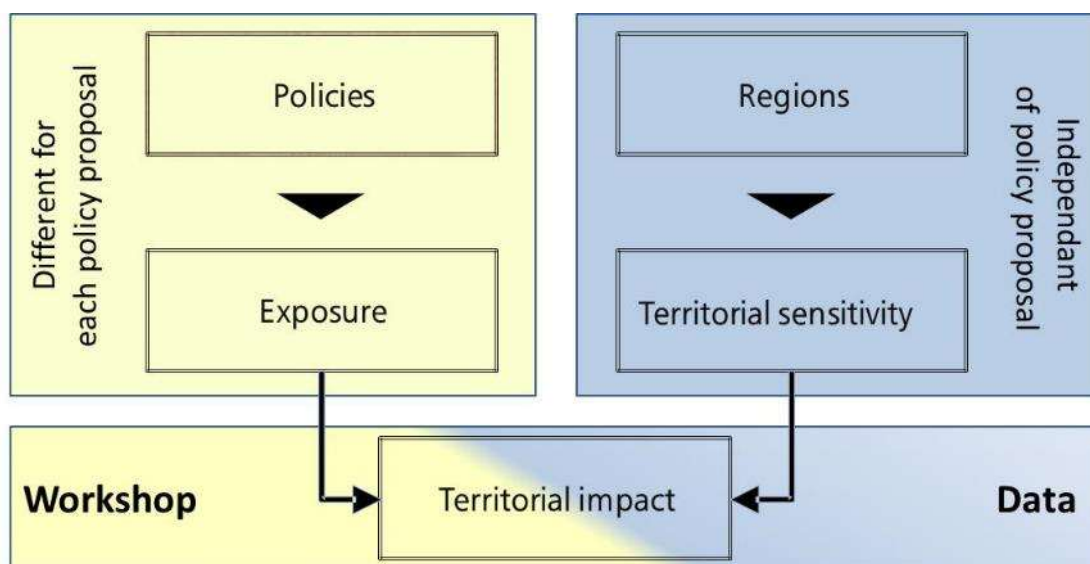
The participants in the workshop were asked to estimate the potential effects deriving from the potential effects of decarbonisation initiatives. They judged the potential effect on the territorial welfare using the following scores:

- ++ strong advantageous effect on territorial welfare (strong increase)
- + weak advantageous effect on territorial welfare (increase)
- o no effect/unknown effect/effect cannot be specified
- - weak disadvantageous effect on territorial welfare (decrease)
- -- strong disadvantageous effect on territorial welfare (strong decrease)

2.4 Calculating the potential “regional impact” – Combining the expert judgement with the regional sensitivity

The ESPON TIA Quick Check combines the expert judgement on the potential effect deriving from the impact of the potential effects of decarbonisation initiatives (**exposure**) with indicators picturing the sensitivity of regions resulting in maps showing a territorial differentiated impact. This approach is based on the **vulnerability concept** developed by the Intergovernmental Panel on Climate Change (IPCC). In this case, the effects deriving from a particular policy measure (exposure) are combined with the characteristics of a region (**territorial sensitivity**) to produce potential territorial impacts (see following figure).

Figure 4 - Exposure x territorial sensitivity = territorial impact



Source: OIR, 2015.

- “Territorial Sensitivity” describes the baseline situation of the region according to its ability to cope with external effects. It is a characteristic of a region that can be described by different indicators independently of the topic analysed.
- “Exposure” describes the intensity of the potential effect caused by the potential cohesion effects of decarbonisation initiatives on a specific indicator. Exposure illustrates the experts’ judgement, i.e. the main findings of the expert discussion at the TIA workshop.

2.5 Mapping the potential territorial impact

The result of the territorial impact assessment is presented in maps. The maps displayed below show potential territorial impacts based on a combination of the expert judgement on the exposure with the territorial sensitivity of a region, described by an indicator at NUTS3 level. Whereas expert judgement is a qualitative judgement (i.e. strong advantageous effect on territorial welfare/weak advantageous effect/no effect/weak disadvantageous effect/strong disadvantageous effect), the sensitivity is a quantitative indicator.

3 Expected economic effects

3.1 Workshop discussion

The effects on the economy include positive changes such as the creation of new economic sectors and new types of jobs, but there will also be challenges for certain regions and sectors. Decarbonisation will completely change old clusters and will impact on employment and skills.

Some experts agreed that regions with high levels of green economy industries and innovations might benefit more than others, as they have a head start and can “sell” solutions to others. While some new jobs and sectors will rise, others will make a transition. There will be new supply chains for products and services to satisfy the changing customer demands. Another expert drew attention to the need to ensure that technology solutions are not only beneficial to wealthy areas.

Financial support for regions facing more challenges from the transition will therefore be necessary.

Finally, some experts talked about the impact on industries and logistics because regions are normally linked to or dominated by one type of industry that may be affected. Industries and SMEs will have to invest and this should also be taken into consideration.

Although decarbonisation is a technology driver that will create new opportunities for regions, one expert stated that the transition might be difficult for technology sectors because of the risk of disconnection from global value chains in weaker regions

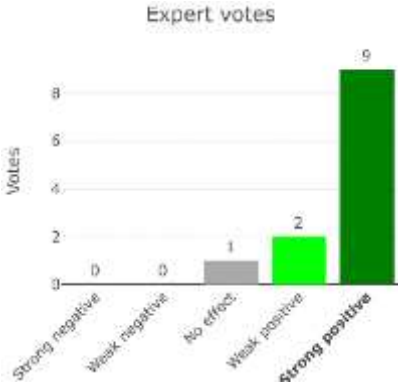
The high costs of decarbonisation will first impact poorer firms and users, negatively affecting the weaker regions. Furthermore, loss of jobs and creation of new employment will impact different groups, something that might need to be mitigated in the short term.

The EU should therefore work on complete foresight scenarios for decarbonisation of particular sectors, bringing integrated solutions.

3.2 Employment in technology and knowledge-intensive sectors

The experts concluded that regions with a high level of employment in technology and knowledge-intensive sectors might benefit more than others from the implementation of decarbonisation initiatives in the short term, as they have a “head start” and are well prepared for developing new “green” technologies which further strengthen the innovation sector in the region. The majority of the experts voted this effect as positive (nine strong and two weak). One expert did not see a relevant effect.

Figure 5 - Result of the expert judgement: regions in light of their employment in technology and knowledge-intensive sectors and the impact of cohesion effects of decarbonisation initiatives

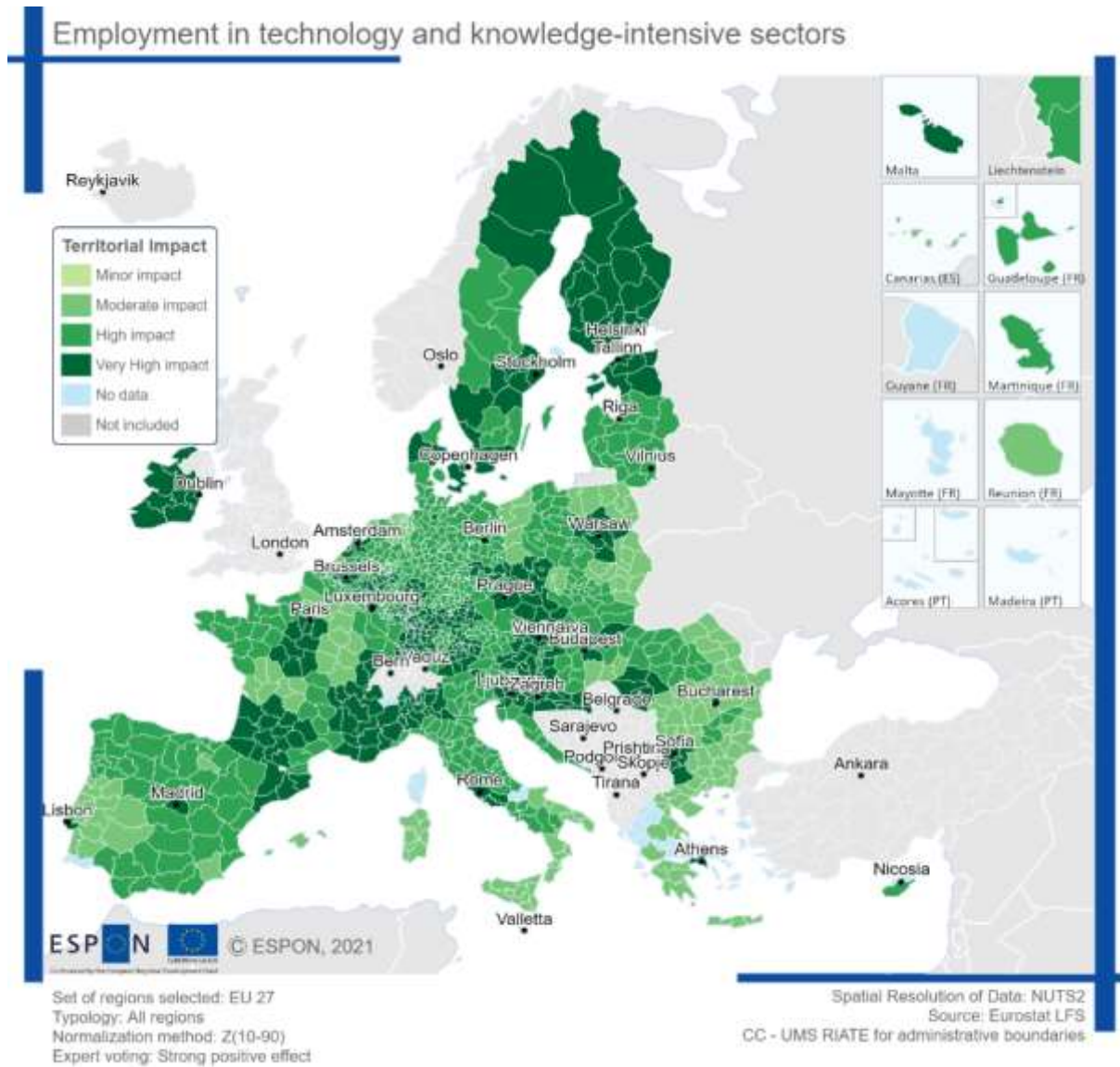


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The indicator shows the share of employment in high-technology manufacturing and knowledge-intensive high-technology services in total employment (reference year: 2015). Regions with a higher share of employment in these branches are expected to be affected more by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the share of employment in these sectors.

The following map shows the potential territorial impact of implementation of decarbonisation initiatives in light of the employment in technology and knowledge-intensive sectors. It combines the expert judgement of a strongly positive effect with the given sensitivity of regions. 36% of the regions would see a very high positive impact. These regions are distributed quite evenly over the EU. However, a few Member States (e.g. Finland, Estonia and Ireland) would be highly affected across the whole country. Most of the metropolitan areas would also benefit strongly as many technology and knowledge-intensive enterprises are usually located in larger cities which foster innovation clusters. 47% of regions could still benefit from a highly positive impact and 17% of them from only a moderately positive impact. Many of these regions are located in eastern and southeastern Europe. However, some regions in Germany, the Netherlands, France, Spain, Portugal and Italy are also expected to see the lowest impact.

Map 1 - Regions in light of their employment in technology and knowledge-intensive sectors and the impact of cohesion effects of decarbonisation initiatives – expert judgement: strongly positive effect

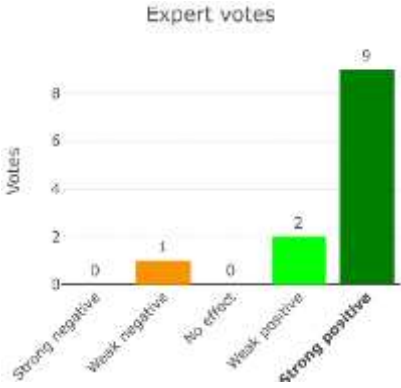


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

3.3 Composite indicator: Green Innovation

Regions with a high level of innovation capacity are expected to benefit more from the implementation of decarbonisation initiatives. In particular, those that show a high capacity in the field of green innovation could have an advantage over regions with low green innovation activities. These regions are especially likely to develop technological solutions provided to the economy. Most of the experts considered this effect as positive (nine strong and two weak). One expert voted for weakly negative.

Figure 6 - Result of the expert judgement: regions in light of green Innovation (compositive indicator) and the impact of cohesion effects of decarbonisation initiatives

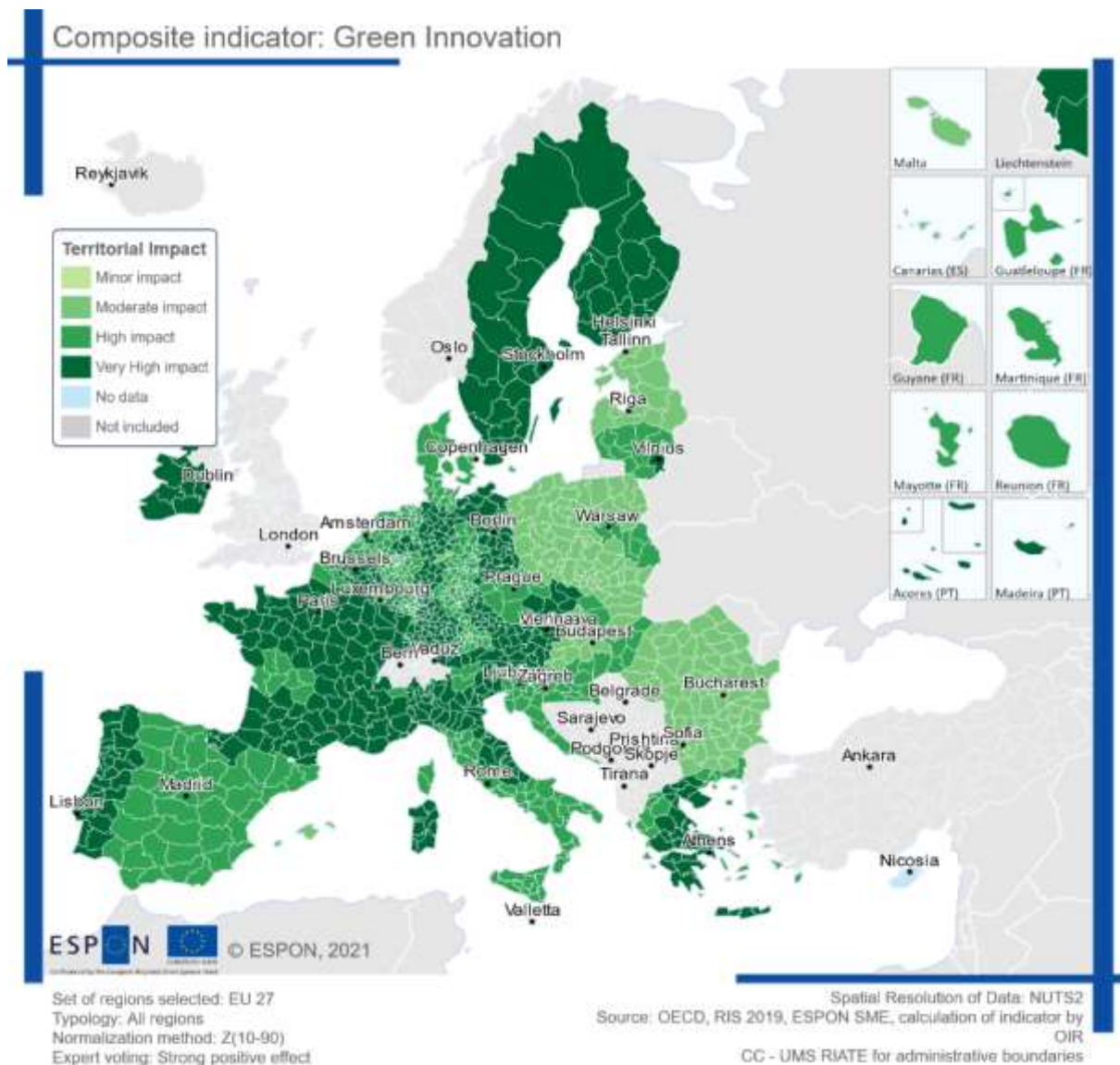


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This composite indicator shows the “green innovation capacity” of the regions. It is calculated as the sum of 1) the share of patents in environment-related technologies out of total SMEs and 2) the share of SMEs that introduced product or process innovations out of total SMEs (reference years: 2013, 2019). Regions with a higher green innovation capacity are expected to benefit more from the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the level of the green innovation capacity.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives in light of the “green innovation capacity”. It combines the expert judgement of a strongly positive effect with the given sensitivity of regions. Almost half (47%) of the regions would see a very high positive impact. Some countries such as Sweden, Finland, Ireland, Portugal, France, Belgium, Austria and Greece are potentially highly affected. Germany, the Netherlands, Lithuania, the Czech Republic and Italy would receive the highest impact at regional level. 38% of the regions would still gain a high positive impact and 15% a moderately positive impact. Regions that are expected to get the lowest impact can be found in Eastern Europe.

Map 2 - Composite indicator: regions in light of green Innovation (composite indicator) and the impact of cohesion effects of decarbonisation initiatives: strongly positive effect

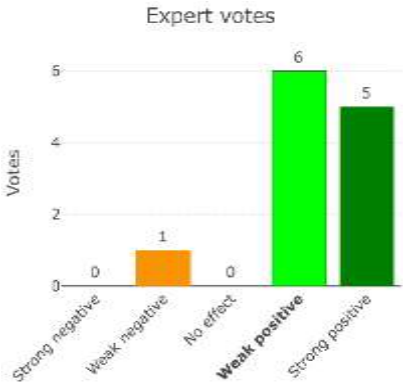


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

3.4 Employment in Material Providers sectors (Circular Economy)

The transformation to a circular economy is one of the most relevant goals for achieving decarbonisation targets in the resources and waste sector. Thus, similarly to the discussions regarding innovation activities, the experts agreed that regions with a high share of material providers (in terms of the circular economy) would benefit more than other regions. Again, the majority of the experts voted for positive (five strong and six weak). On the other hand, one expert did not consider these regions to have an advantage and voted for weakly negative.

Figure 7 - Result of the expert judgement: regions in light of their employment in material providers sectors (in terms of the circular economy) and the impact of cohesion effects of decarbonisation initiatives

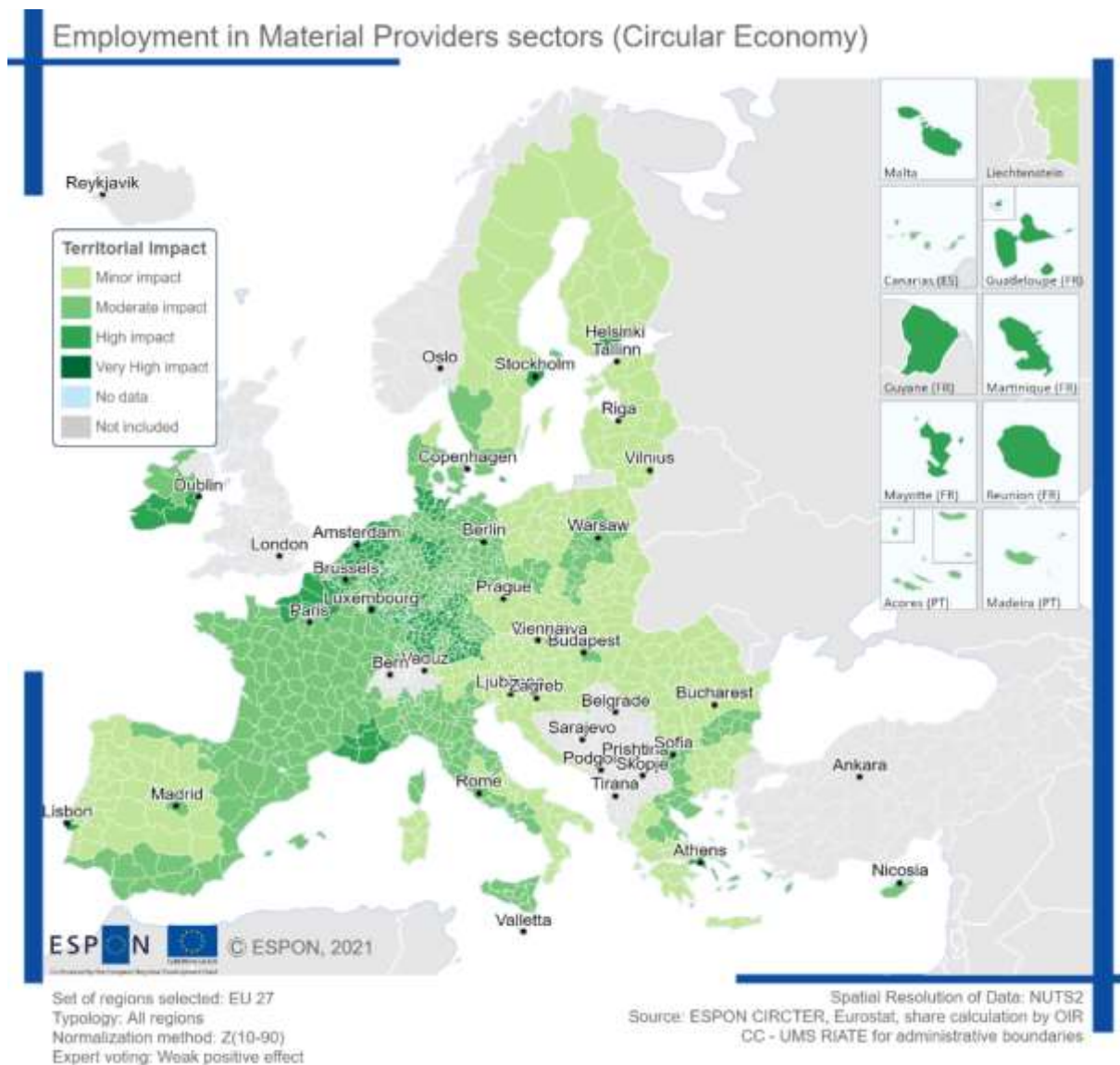


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator depicts the share of employment in the material providers sectors out of total employment (reference year: 2015). In terms of the circular economy, material providers are involved in the biological cycles as well as the recycling of waste into existing value chains. Regions with a higher share of employment in the material providers sectors are expected to be affected more by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the share of employment in these sectors.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives in light of the employment in material providers sectors. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 24% of the regions could get a highly positive impact. These regions are located in Germany, the Benelux countries, France and Ireland, as well as in a few large cities such as Stockholm, Helsinki and Vienna. 43% of the regions would encounter a moderately positive impact and 33% a minor positive impact.

Map 3 - Regions in light of their employment in material providers sectors (in terms of the circular economy) and the impact of cohesion effects of decarbonisation initiatives – expert judgement: weakly positive effect

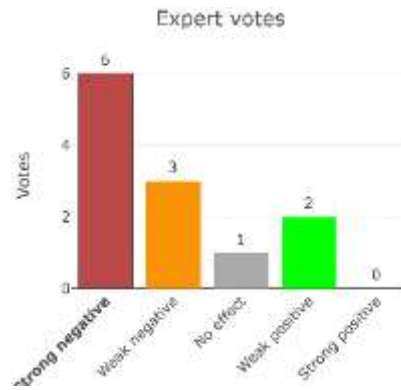


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

3.5 Employment in energy-intensive sectors

Stricter measures to increase energy efficiency or to reduce the energy use in industries are likely to have an effect on those industries. Many of the experts concluded that those effects might be negative, e.g. through increased efforts necessary for production or a need for high investments to cope with new regulatory measures. Consequently, they judged the implementation of decarbonisation initiatives as negative (six strong and three weak). However, the effects might also be somewhat positive as e.g. increased energy efficiency can significantly reduce operating costs. Two experts shared this point of view and voted for weak positive. One expert did not see a relevant effect.

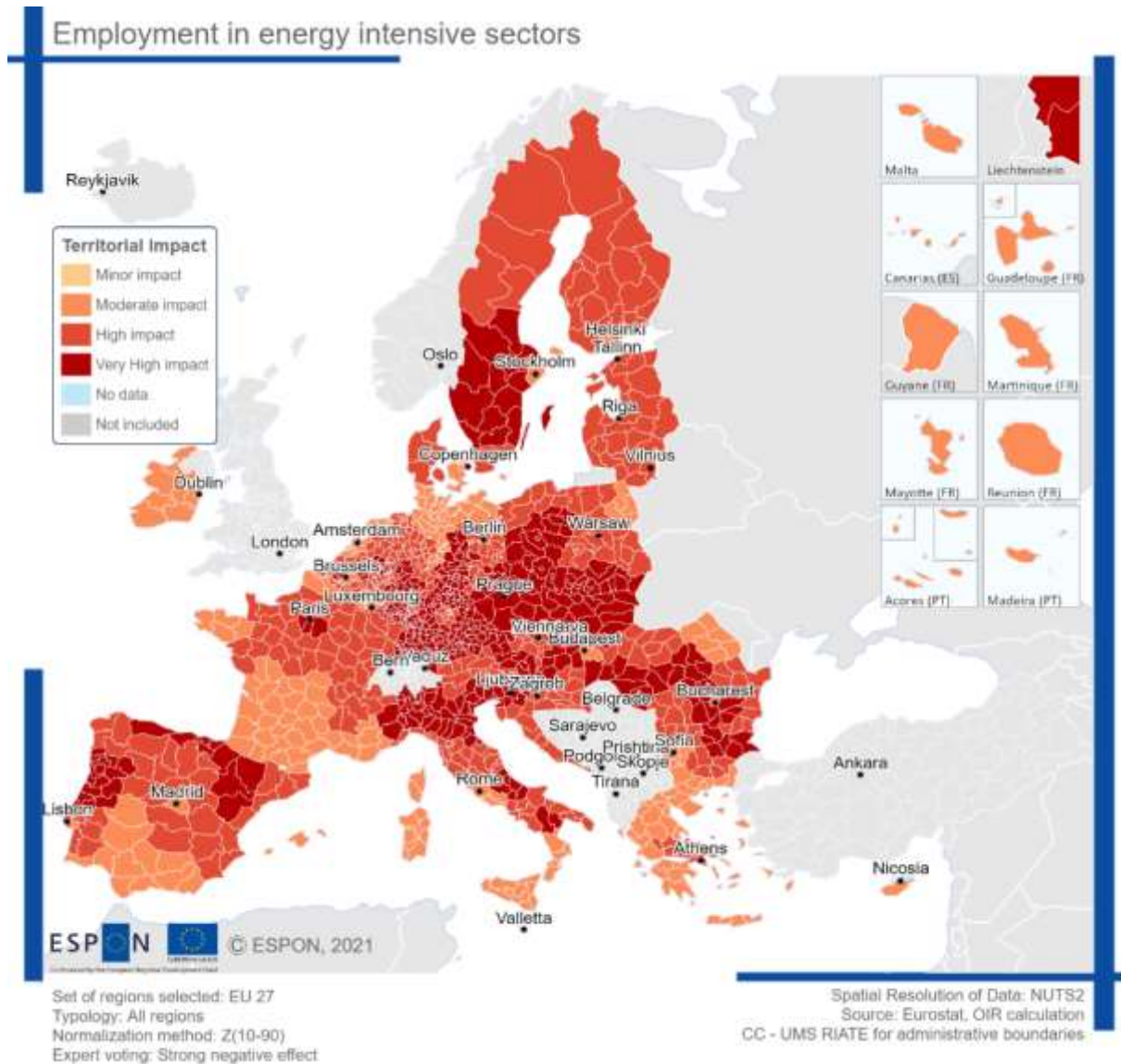
Figure 8 - Result of the expert judgement: employment in energy-intensive sectors affected by cohesion effects of decarbonisation initiatives



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The indicator depicts the share of employment in energy-intensive sectors out of total employment (reference year: 2018). It has been calculated ad hoc based on the data from Eurostat. Sectors that are considered to be energy intensive are related to the manufacture of coke and refined petroleum products, chemical products, non-metallic mineral products and metal products, as well as mining of coal and lignite and manufacture of motor vehicles. Regions with a higher share of employment in energy-intensive sectors are expected to be affected more by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the share of the total workforce employed in these sectors.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the employment in energy-intensive sectors. It combines the expert judgement of a strongly negative effect with the given sensitivity of regions. 40% of the regions could suffer a very highly negative impact. These regions can be found in almost all Member States. However, some countries are highly affected. Stronger effects are concentrated in particular in eastern Europe as well as some industrial clusters in northern Italy, the industrial centres of eastern and southern Germany and northern Spain. 37% of the regions would still receive a highly negative impact and 23% of the regions a moderately negative impact.

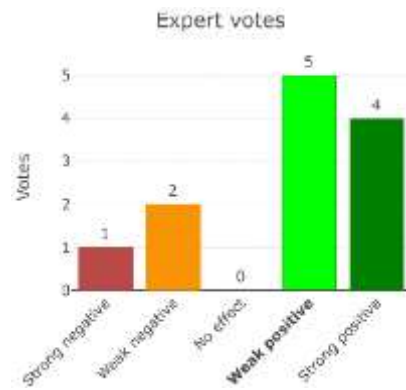


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

3.6 Employment in branches affected by the low-carbon economy

The majority of the experts assumed that decarbonisation would be a technology driver resulting in new economic sectors and the creation of jobs opportunities. Rebuilding of city districts to improve their quality is also expected to increase construction activities. The majority therefore voted for a positive (four strong and five weak) effect for regions with a high share of employment in branches affected by the low-carbon economy. On the other hand, some experts did not expect this economic change and rated the decarbonisation initiatives negative for these regions (one strong and two weak).

Figure 9 - Result of the expert judgement: employment in branches affected by the low-carbon economy affected by cohesion effects of decarbonisation initiatives

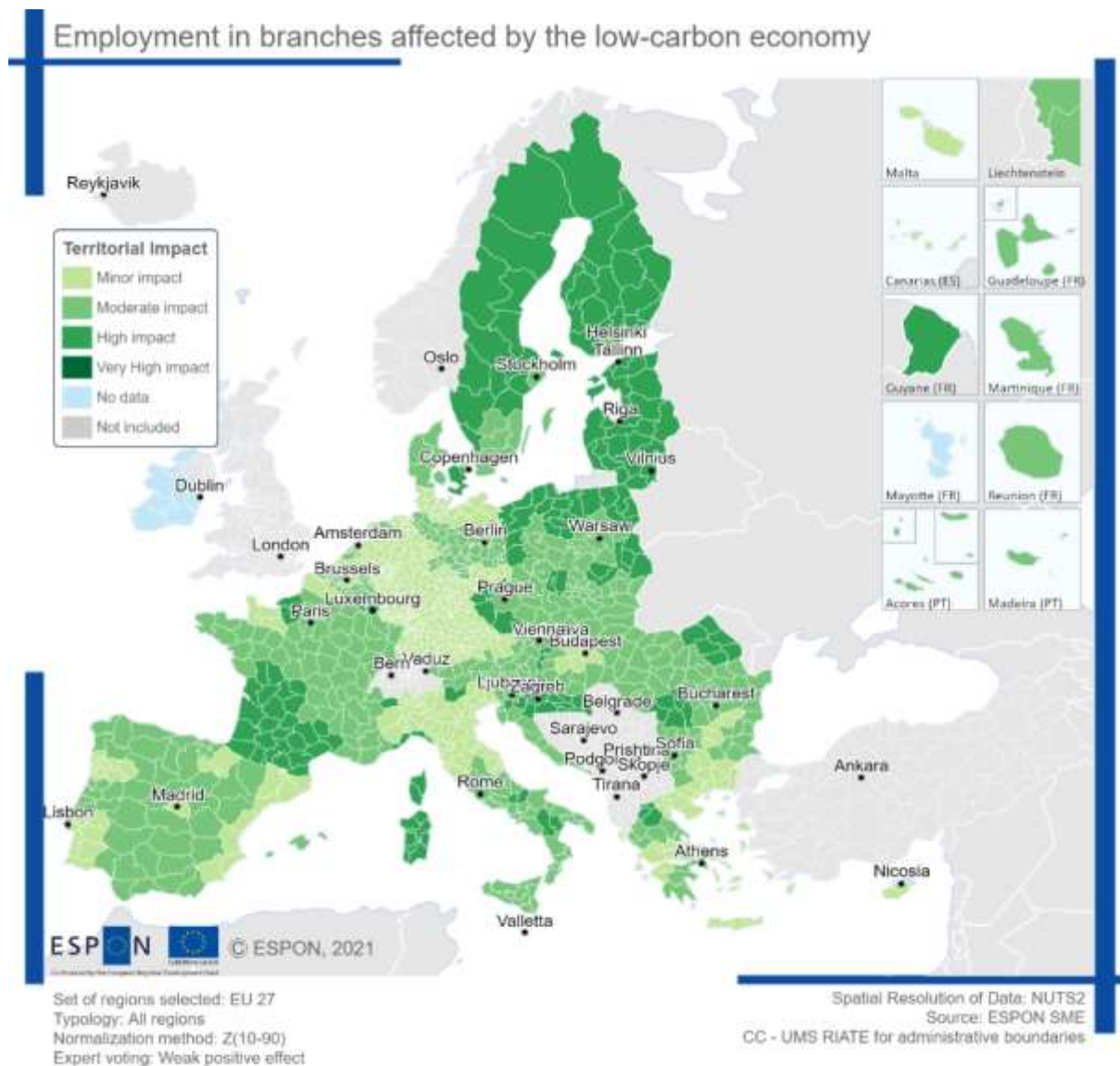


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The indicator “employment in branches affected by the low-carbon economy” depicts the share of people employed in industries that will be affected by the low-carbon economy (e.g. transport, energy, building and construction sector, water and waste management etc.) out of total employment (reference year: 2015). Regions with a higher share of employment in these sectors are expected to be more affected by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the share of employment in these branches.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the employment in branches affected by the low-carbon economy. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 16% of the regions would gain a highly positive impact. A few countries such as Sweden, Finland and the Baltic states would be highly affected. Poland, the Czech Republic, Austria, Romania, Croatia, Greece, Italy and France could receive the highest impact at regional level. 38% of the regions are expected to see a moderately positive impact and 46% a minor positive impact.

Map 5 - Employment in branches affected by the low-carbon economy affected by cohesion effects of decarbonisation initiatives – expert judgement: weakly positive effect

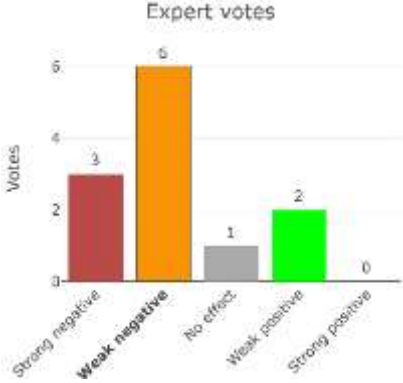


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

3.7 Employment in the automotive industry

The decarbonisation initiatives will clearly have an impact on the automotive industry. The transition from the conventional combustion technology to more climate-friendly solutions could be a challenge for this sector because costs and effort would increase. Furthermore, change in behaviour favouring less carbon-intensive public transport could reduce sales potentials for the automotive industry. The majority of the experts therefore judged the effects of decarbonisation initiatives as negative (three strong and six weak). On the other hand, two experts assumed that new job opportunities could be created, similarly to the effect mentioned before. They therefore voted for (weak) positive.

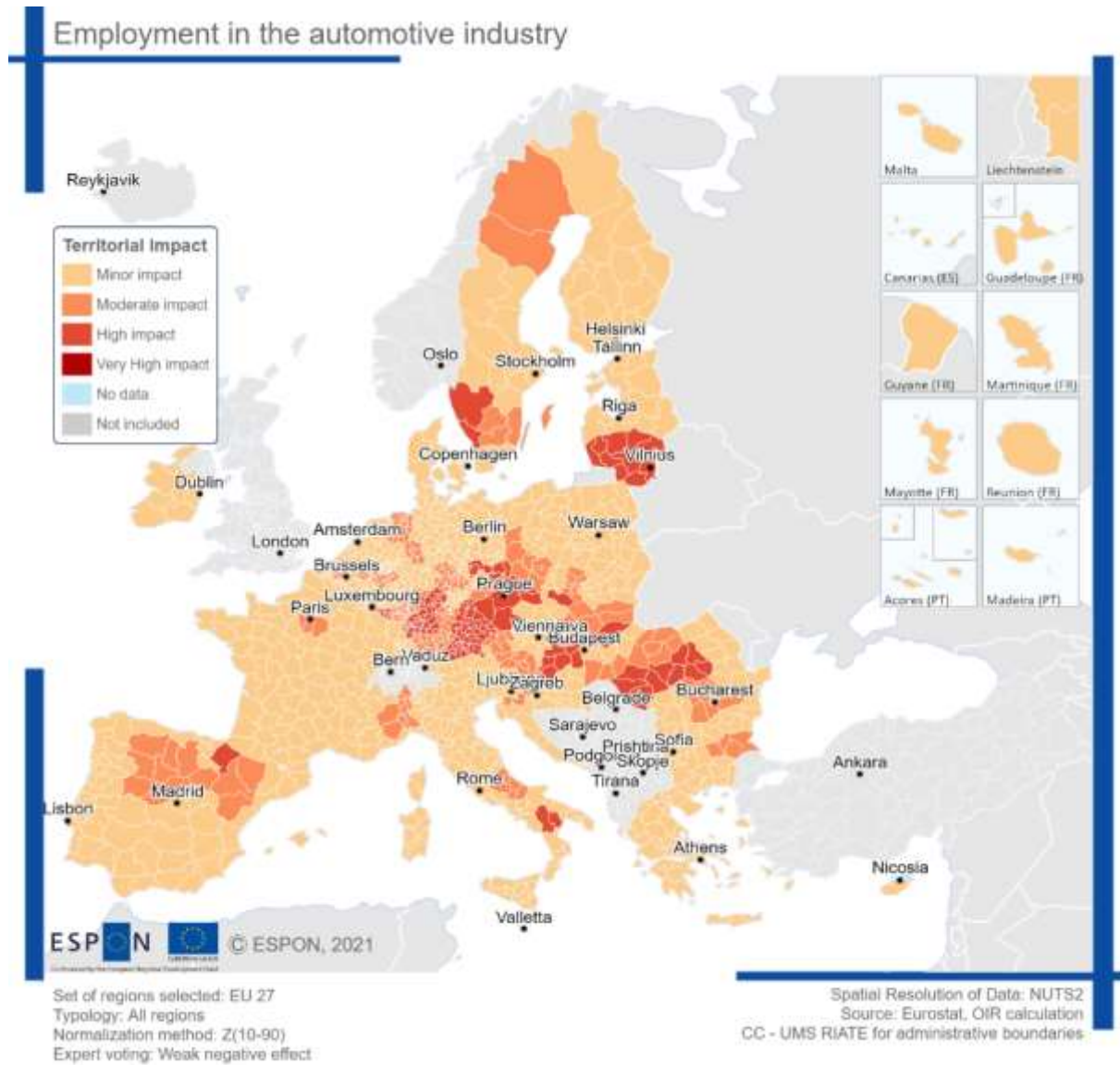
Figure 10 - Result of the expert judgement: employment in the automotive industry affected by cohesion effects of decarbonisation initiatives



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator measures the share of employment in the automotive industry (manufacture, wholesale and retail) out of total employment (reference year: 2015). Regions with a greater share of employment in this sector are considered to be more sensitive to cohesion effects of decarbonisation initiatives. Sensitivity is therefore directly proportional.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives on employment in the automotive industry. It combines the expert judgement of a weakly negative effect with the given sensitivity of regions. 12% of the regions would see a highly negative impact in the years to come. Large automotive manufacturers (e.g. Germany) or suppliers (e.g. eastern Europe) are located in many of these regions. 20% of the regions are expected to receive a moderately negative impact and the majority – 68% – only a minor negative impact.



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4 Expected environmental effects

4.1 Workshop discussion

In the environmental area there was a general consensus that decarbonisation initiatives will have a positive effect. However, there are some aspects that should also be taken into account.

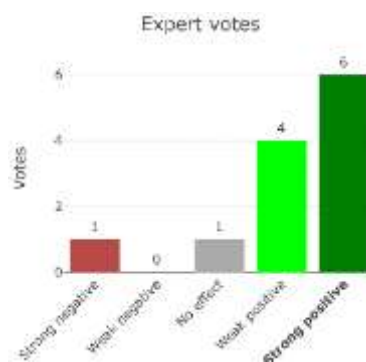
On the one hand, experts said that the transition is a big opportunity: more green areas and cleaner air could encourage improvements in biodiversity and reduce risks of natural catastrophes. The environment will also improve in the most polluted areas. The transition from fossil fuels in industry and logistics will also create new economic activities.

On the other hand, the transition will be huge in most industrial regions and could have a big impact on existing companies and workers. One expert remarked on the importance of having a substantial human capital agenda in parallel to the transitions. Lastly, decarbonisation is a societal challenge and requires a significant shift in public policy at EU/national/regional/individual level. One expert highlighted the fact that a disconnection between these levels could undermine the overall policy goals and threaten territorial and social cohesion.

4.2 Urban population exposed to PM10 concentrations

The main objective of the decarbonisation initiatives is the reduction of emissions. In order to reach this objective, energy-efficient measures will be promoted and the consumption of fossil energy sources will be reduced. This will also lead to a decrease in PM 10 concentration, as burning fossil fuel is one of the main sources of this. Additional measures such as rebuilding and greening of urban districts, especially when introducing clean air corridors, could reduce even further the number of the population exposed. Most of the experts saw a positive effect (six strong, four weak). However, one assessed this effect as (strongly) negative. One expert did not see a relevant effect.

Figure 11 - Result of the expert judgement: regions in light of their urban population exposed to PM10 concentrations and the impact of cohesion effects of decarbonisation initiatives

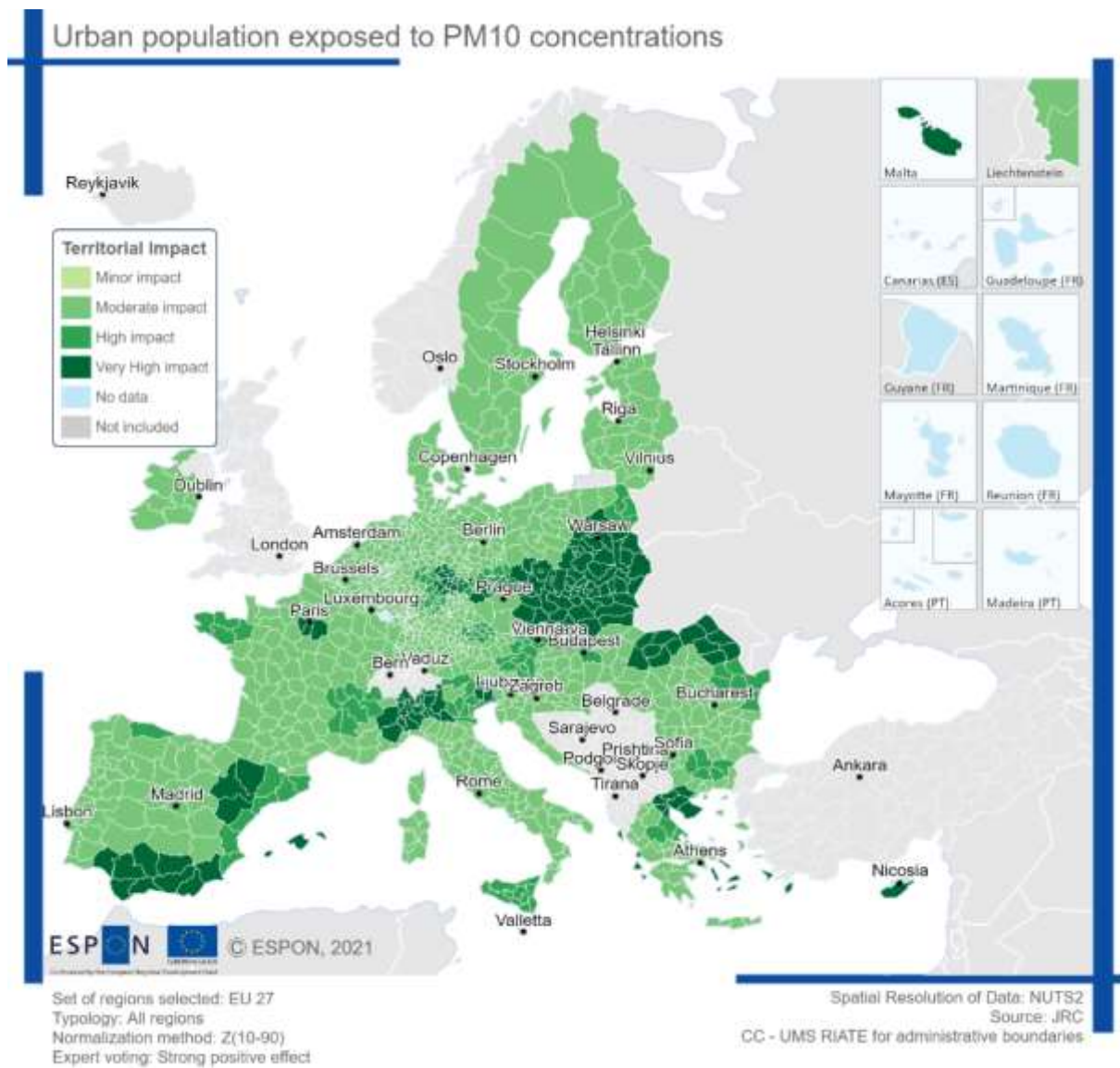


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator depicts the percentage of the urban population exposed to PM10 concentrations exceeding the daily limit value (50 µg/m³) on more than 35 days in a year (reference year: 2020). Regions with a higher percentage of this population group are expected to be affected more by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to the share of the urban population exposed to PM10 concentrations.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives in light of the population exposed to PM10 concentrations. It combines the expert judgement of a strongly positive effect with the given sensitivity of regions. 14% of the regions could receive a very high positive impact. These regions are located e.g. in Spain, the metropolitan region of Paris, in the north of Italy, Germany, Greece, Cyprus and Romania. A larger cluster of regions receiving the highest impact can be detected in the area of Poland, the Czech Republic and Slovakia. 10% of the regions are expected to receive a high positive impact and 76% would receive a moderately positive impact. It must be taken into account, however, that many of these regions are located in more rural areas and are thus not expected to have a high share of population exposed to PM10 in urban areas from the outset.

Map 7 - Regions in light of their urban population exposed to PM10 concentrations and the impact of cohesion effects of decarbonisation initiatives – expert judgement: strongly positive effect

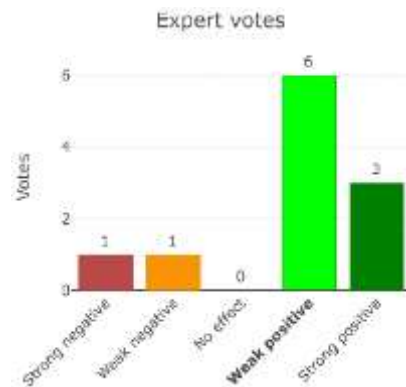


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4.3 PM 2.5 concentration

Similarly to the impact on PM 10 concentration, the experts agreed that the decarbonisation initiatives would also influence the emission of the finer PM 2.5 in the same manner. Consequently, most of the experts voted for positive (three strong, six weak), meaning that the concentration of this pollutant could be reduced. Two experts did not share this opinion and therefore voted for negative (one strong, one weak). Three did not see a relevant effect.

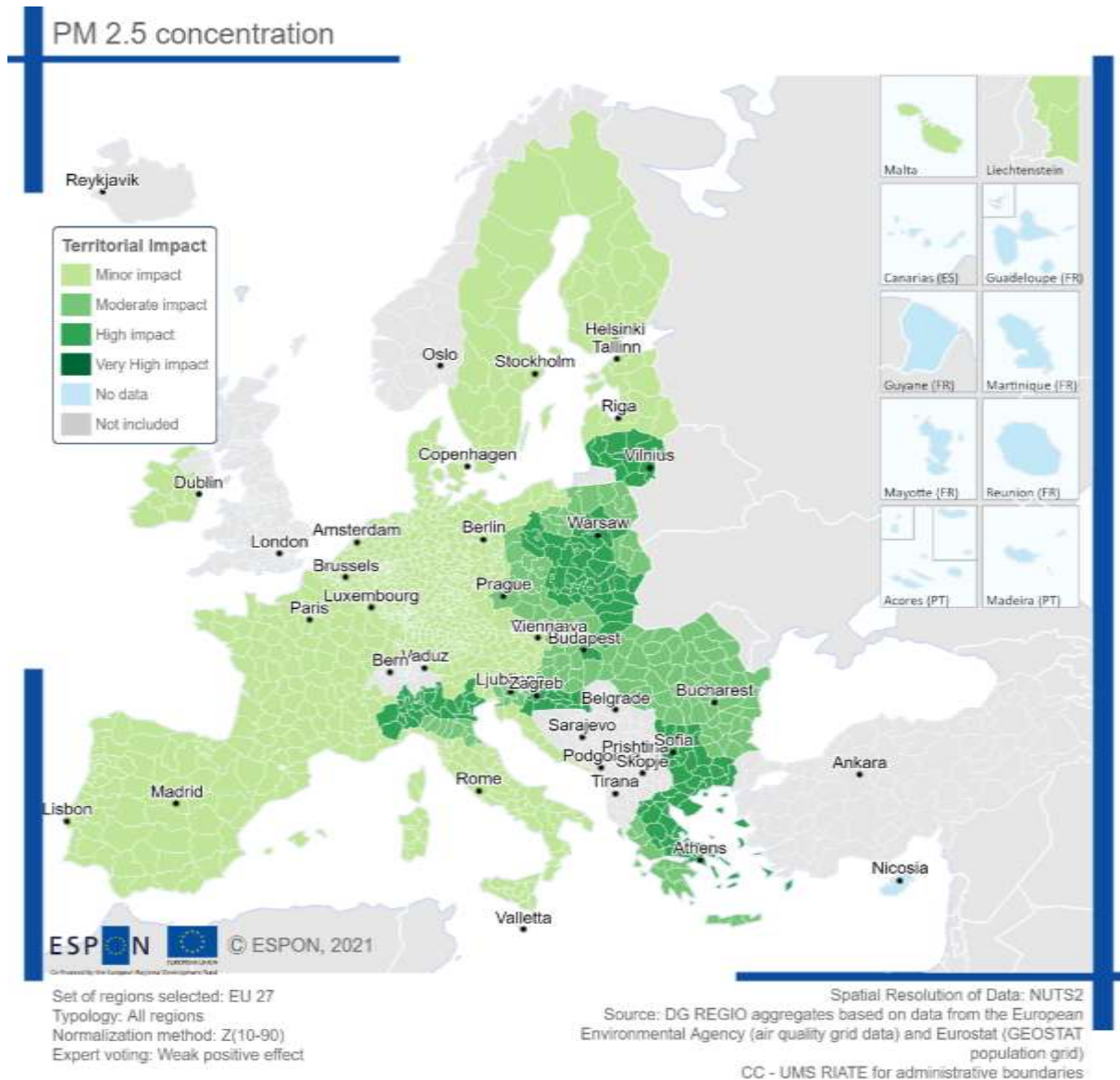
Figure 12 - Result of the expert judgement: PM 2.5 concentration affected by cohesion effects of decarbonisation initiatives



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator shows the population weighted average of the yearly average PM 2.5 concentration in $\mu\text{g}/\text{m}^3$ (reference year: 2017). It is interpolated at grid cell level and combined with the grid population data of GEOSTAT (both in a 1 km² resolution). The concentration is capped at the limit yearly value (25 $\mu\text{g}/\text{m}^3$) of the EU Ambient Air Quality Directive (2008/50/EC). Regions showing higher concentrations of PM 2.5 are expected to benefit most from the implementation of decarbonisation initiatives. Sensitivity is thus inversely proportional to the concentrations of this pollutant.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the PM 2.5 concentration. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 13% of the regions could receive a high positive impact. They are located in eastern and southeastern Europe (Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Croatia, Bulgaria, Greece – i.e. traditional target regions of EU cohesion policy) as well as in northern Italy. 13% of the regions would receive a moderately positive impact. These regions can be found in the aforementioned countries and in Slovenia. The majority of the regions would see a minor negative impact.

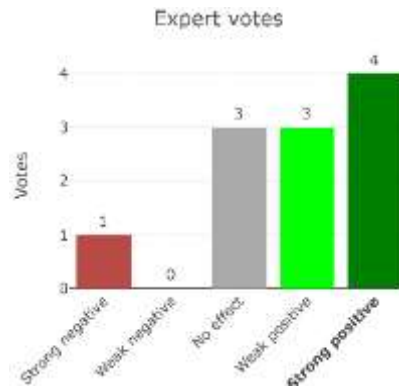


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4.4 Emissions of NOx per capita (kilotonnes)

As the main source for NOx emissions, transport is one of the main sectors addressed by the decarbonisation initiatives. Consequently, the experts agreed that these initiatives could have an impact on the emissions of NOx. Again, the majority of the experts thought that climate-friendly measures would achieve a reduction of this pollutant and therefore voted for positive (four strong, three weak) effects. On the other hand, one expert saw the opposite effect and voted for (strong) negative, arguing that regions with high emissions of NOx are probably road-traffic dependent and would see negative effects related to emission-reduction measures. Three experts did not see this indicator as relevant.

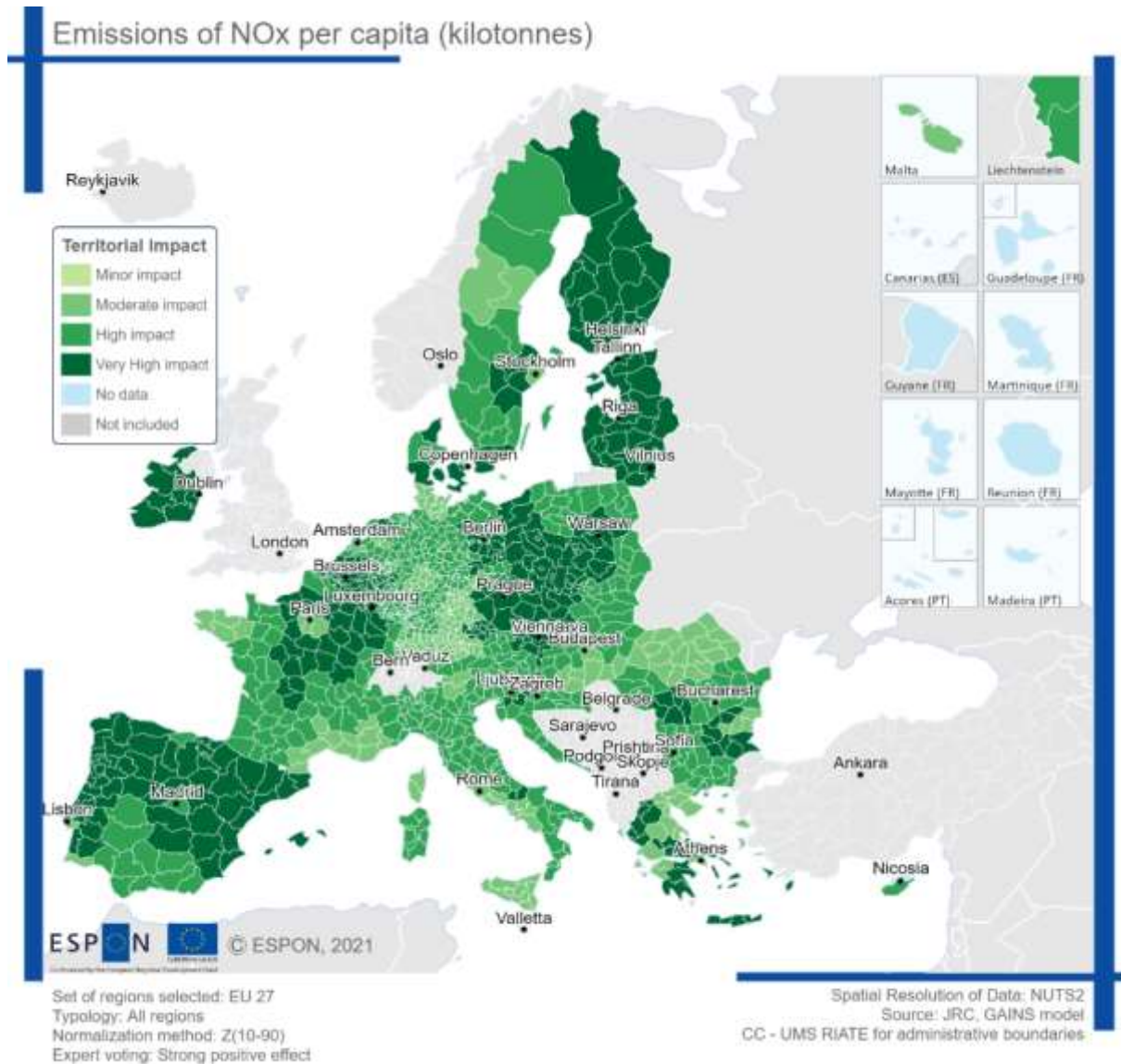
Figure 13 - Result of the expert judgement: emissions of NOx per capita (kilotonnes) affected by cohesion effects of decarbonisation initiatives



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator measures the yearly NOx (nitrogen oxides) emissions in kilotonnes per capita (reference year: 2020). Regions with a higher amount of NOx emissions are likely to be more affected by the implementation of decarbonisation initiatives. Sensitivity is thus directly proportional to NOx emissions.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the emissions of NOx per capita (kilotonnes). It combines the expert judgement of a strongly positive effect with the given sensitivity of regions. Almost a third (31%) of the regions would potentially receive a very high positive impact. These regions are distributed fairly evenly throughout Europe, though several countries would particularly be affected positively. Half of the regions (49%) would still experience a highly positive impact and 21% a moderately positive impact. One striking pattern is a lower intensity of impacts in urban (especially capital) regions, while the surrounding suburban regions show a very high or high impact.

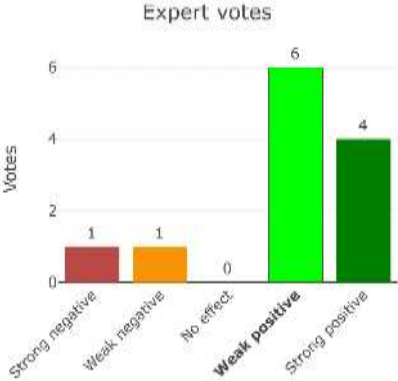


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4.5 Emissions of CO2 per capita (tonnes)

The decarbonisation initiatives will support environmentally friendly ways of production with less consumption of fossil energy sources. They will therefore contribute to reducing the emission of CO2 per capita through the changes induced by the various initiatives. The majority of the experts voted for positive (four strong, six weak), meaning the decarbonisation initiatives would reduce the CO2 emissions. However, two experts saw a negative effect (one strong, one weak).

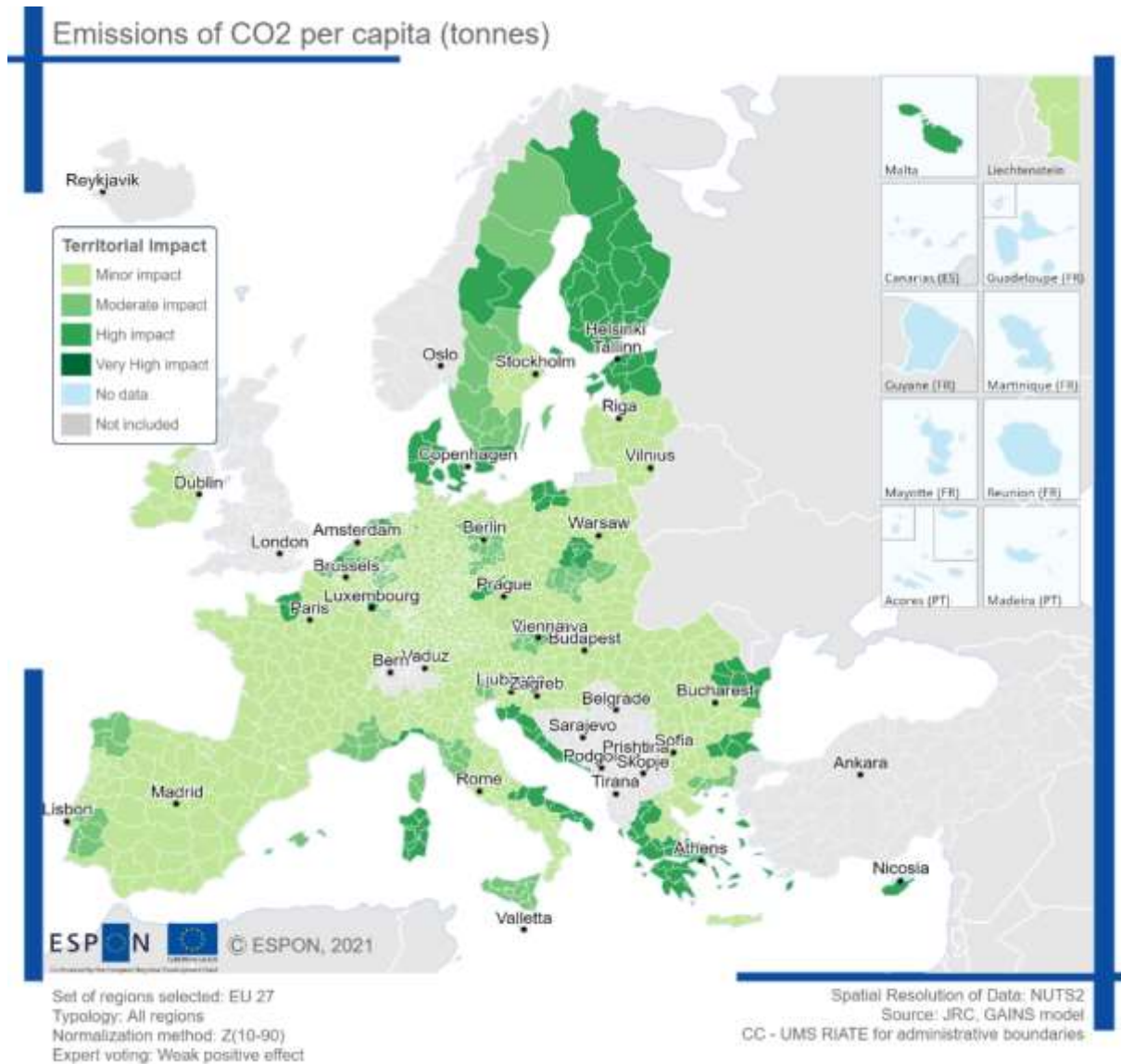
Figure 14 - Result of the expert judgement: emissions of CO2 per capita (tonnes) affected by cohesion effects of decarbonisation initiatives



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The indicator pictures the sensitivity of a region according to the yearly emissions of CO2 in tonnes per capita. Regions showing higher concentrations of CO2 per capita are expected to be more sensitive. Sensitivity is thus directly proportional to the emissions of CO2 per capita.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the emissions of CO2 per capita. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 12% of the regions could benefit from a highly positive impact in terms of reduction of CO2 emissions. Many of these regions are port regions or industrial regions. Sparsely populated regions with high CO2 emissions per capita in Sweden and Finland also showed high impacts due to the low numbers of inhabitants and also larger dependency on road transport, resulting in a high level of CO2 per capita. 13% would see a moderately positive impact and 75% a minor positive impact.

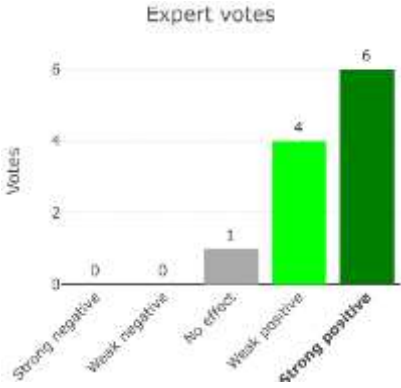


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4.6 Structural green infrastructures

The targets of the decarbonisation initiatives are not only to reduce CO2 emissions, but also to decrease negative effects linked to fossil fuel burning and the related emissions. This will probably lead to the creation of green spaces in order to mitigate the consequences of climate change, reducing air pollutant impacts as well as furthering fresh air channel effects in cities. The majority of the experts agreed that regions with a low share of green infrastructures would benefit from the decarbonisation initiatives and therefore voted for positive (six strong, four weak). One expert did not see a relevant effect.

Figure 15 - Result of the expert judgement: regions in light of their structural green infrastructures and the impact of cohesion effects of decarbonisation initiatives

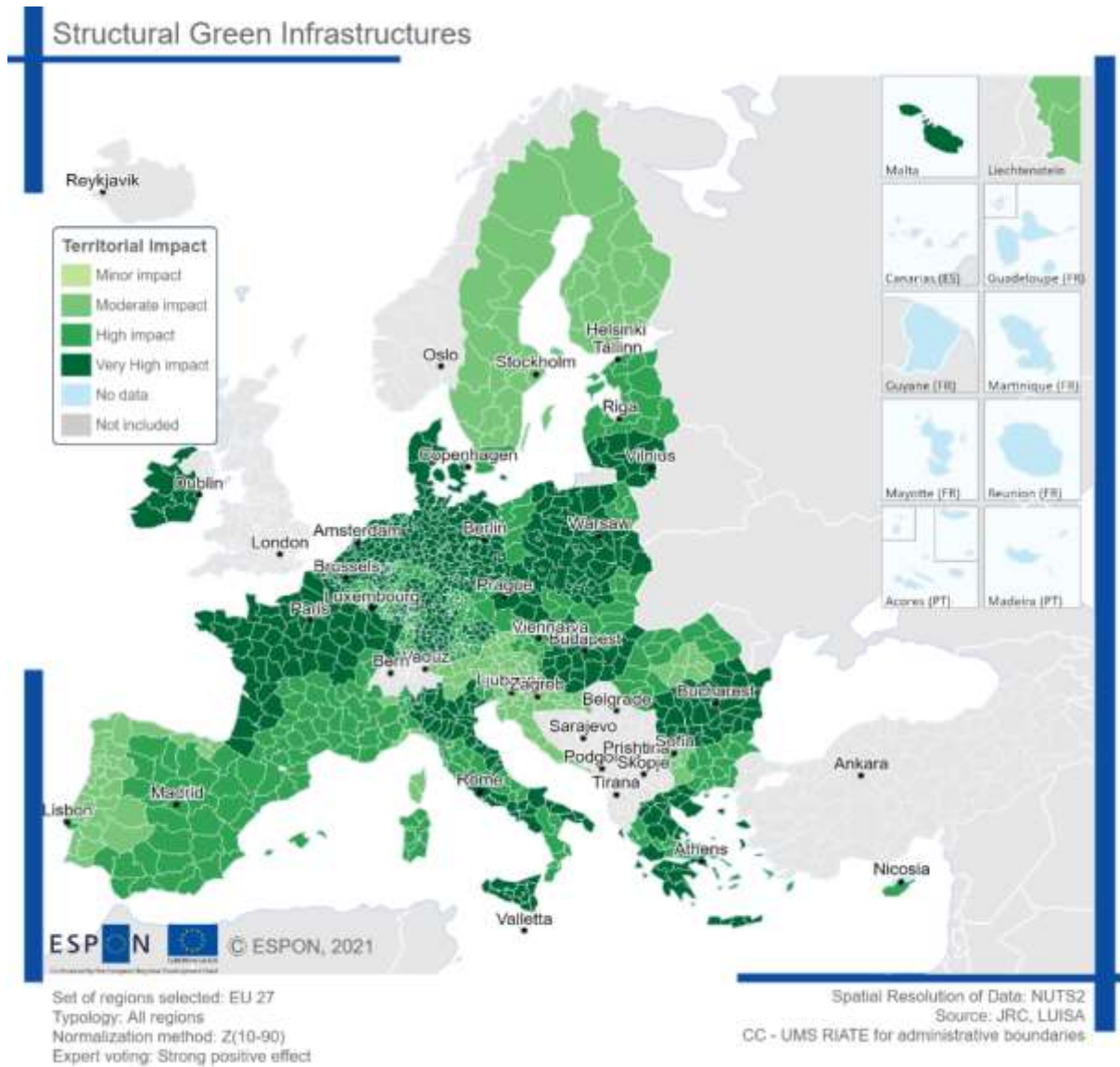


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator shows the share of structural green infrastructures out of the total area of a region (reference year: 2020). Regions showing a lower share of structural green infrastructures are expected to be more sensitive to cohesion effects of decarbonisation initiatives. Sensitivity is thus inversely proportional to the share of green infrastructure.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives in light of the structural green infrastructures. It combines the expert judgement of a strongly positive effect with the given sensitivity of regions. The majority (58%) of the regions could receive a very high positive impact. Ireland, Germany, Denmark, Lithuania, Poland, Hungary, Romania and Greece would benefit the most. France, the Czech Republic, Slovakia and Italy could get the highest impact at regional level. 29% of the regions would still get a highly positive impact and 13% a moderately positive impact.

Map 11 - Regions in light of their structural green infrastructures and the impact of cohesion effects of decarbonisation initiatives – expert judgement: strongly positive effect

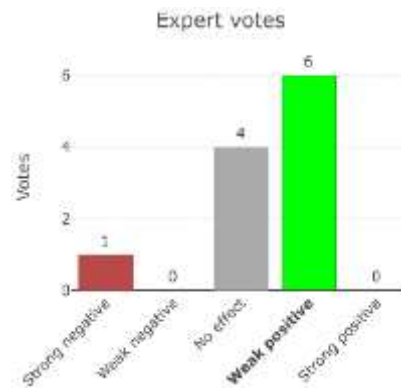


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

4.7 Sensitivity to floods

As many types of natural disasters increase with rising CO2 levels in the atmosphere, the measures to achieve the targets of the decarbonisation initiatives would contribute to reducing natural disaster risks in the regions. Flooding was selected as one of the main relevant disasters for which pan-European risk assessments are available. Six experts expected that the climate measures could reduce flooding frequency and therefore voted for (weak) positive. On the other hand, one expert expected an even higher probability of flooding events and consequently voted for (strong) negative. Four experts did not expect any effects.

Figure 16 - Result of the expert judgement: sensitivity to floods affected by cohesion effects of decarbonisation initiatives

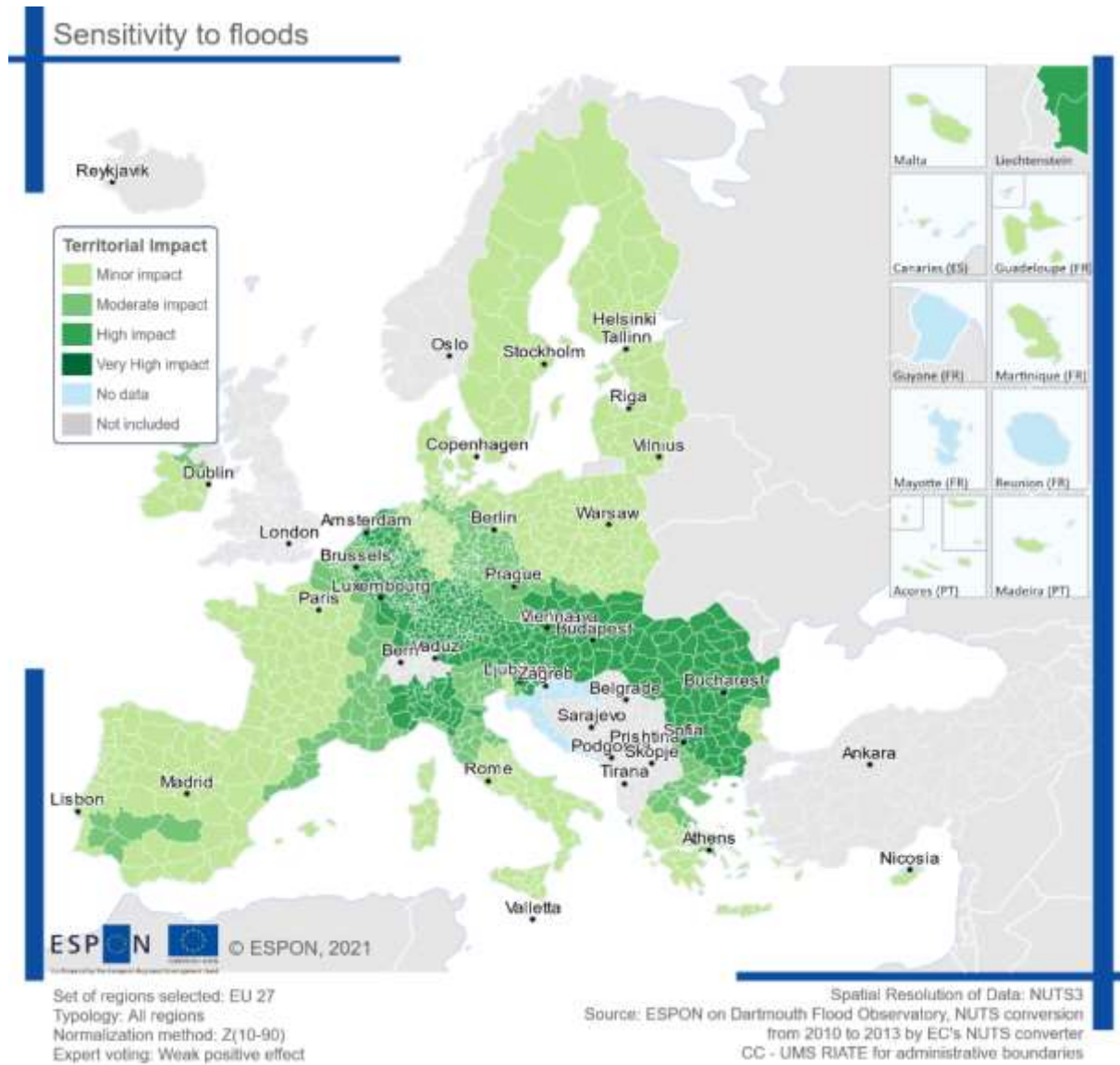


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The sensitivity of a region to floods is expressed as the spatial likelihood of floods occurring (reference year: 2012). It is indicated on a scale from 1 (= very low) to 5 (= very high). Regions showing a higher flood risk are expected to be more sensitive to measures to reduce the likelihood of floods. Sensitivity is thus directly proportional to the likelihood of floods occurring.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on the sensitivity to floods. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 39% of the regions would gain a highly positive impact. Regions where there is a high risk of flooding, e.g. in the Alps, the Danube basin, the Rhine basin or the Elbe basin, would benefit most. 21% of the regions are expected to receive a moderately positive impact and 40% a minor positive impact.

Map 12 - Sensitivity to floods affected by cohesion effects of decarbonisation initiatives – expert judgement: weakly positive effect



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

5 Expected governance effects

5.1 Workshop discussion

The most important aspect discussed in this topic was multi-level governance. The participants stressed the need to have a better coordination between the regional and the national authorities and also to include the local level in the discussion.

Sometimes local and regional authorities are not allowed to participate in regulation because of the competences attributed to them. One expert said local communities also needed more economic support. A given policy proposal might not really be suitable for all regional and local needs and could generate more costs. For example, a carbon-related income from taxes may be reduced in the future and should be taken into account to adjust public services and investments that are significant for the local and regional level. One expert considered that it was necessary to ensure that the governance was in place before decarbonisation.

The participants said there was a risk of LRAs being left out if decarbonisation were driven too much by a top-down model. It was also a fact that decarbonisation would be a stress test to the governance model involving several levels and sectors.

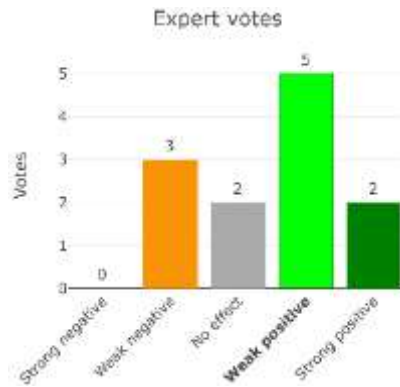
Another expert suggested the creation of a Smart Specialisation Strategies roadmap to ensure that all territories would have their fair share.

Finally, one participant highlighted the need for richer territories to bear higher costs than poorer ones because cost is a major and crucial issue in achieving decarbonisation.

5.2 Quality and accountability of public services

The availability of strong governance structures on the regional level was deemed an important success factor in the implementation of decarbonisation initiatives. As multilevel governance is a key aspect in delivering those initiatives, an increase in the quality of governance structures was seen as one of the main effects. Seven experts therefore voted for positive (two strong, five weak). On the other hand, three experts expected the opposite effect and voted for (weak) negative. Two experts did not see a relevant effect.

Figure 17 - Result of the expert judgement: regions in light of their quality and accountability of government services and the impact of cohesion effects of decarbonisation initiatives

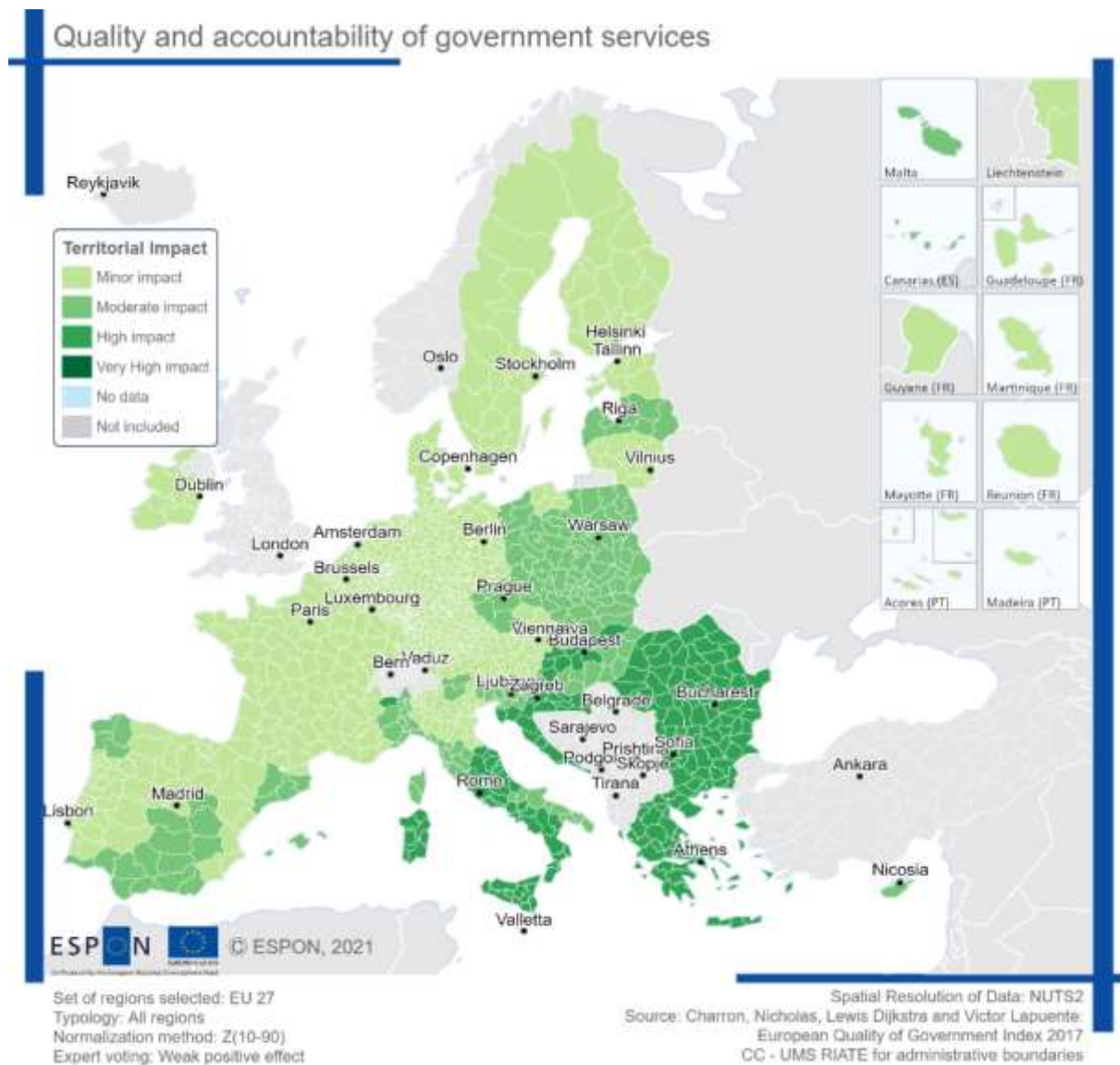


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

This indicator is computed on the basis of the results of a survey and the national estimates from the World Bank Governance Indicators (reference year: 2017). In the survey, people were asked to rate the quality of the public services health care, education and law enforcement in their area. Regions showing lower quality and accountability of public services may benefit more from cohesion effects of decarbonisation initiatives. Sensitivity is thus inversely proportional to this indicator.

The following map shows the potential territorial impact of cohesion effects of decarbonisation initiatives in light of the quality and accountability of public services. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 17% of the regions could receive a highly positive impact. All of these regions are in eastern and southeastern Europe and in Italy – i.e. most of them are traditional target regions of cohesion policy. 16% of the regions would see a moderately positive impact and the majority a minor positive impact.

Map 13 - Regions in light of their quality and accountability of government services and the impact of cohesion effects of decarbonisation initiatives – expert judgement: weakly positive effect



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

6 Expected societal effects

6.1 Workshop discussion

The discussion about the social effects of decarbonisation in the EU mainly focused on employment, education and training, technology solutions, consumption and quality of life.

Regarding education, one expert remarked on the need to educate the next generation to keep up with new technologies. For example, the territories would need mechanics to work on electric cars. Apart from education, experts considered that it was necessary to promote training and vocational training for employees who could lose their jobs. It is nevertheless uncertain whether educational authorities and institutions will promote the necessary adaptations, and it is also not certain whether society (families, employers, students) will adapt to the new needs.

Employment is a crucial matter. For this reason, many experts agreed that the economic transition will bring with it two different scenarios: some people will get new future-oriented jobs and others will risk becoming unemployed. This can also differ between territories: highly carbon-dependent regions might have an easier transition if they have a good governance and innovation potential. In short, there is a need for re-skilling and we will need the instruments with which to do this.

As far as quality of life is concerned, decarbonisation could bring improvements, but one expert was more nuanced. This was only true in principle, since some groups pay a higher cost for the transition. Another expert added that territorial inequalities could increase if there is a lack of policy support. It was also suggested that there was a need to change consumption patterns, in particular moving to less consumption in rich areas.

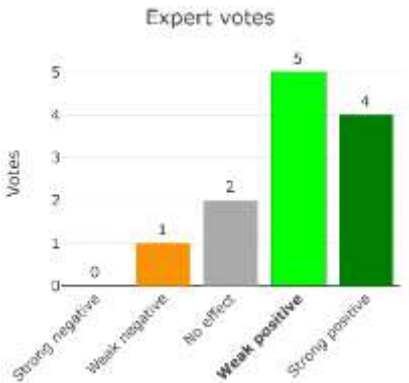
Finally, some experts discussed the importance of ensuring that technological solutions are beneficial not just to wealthy urban areas. One reason was that decarbonisation has an impact on key industries that dominate in some regions. One expert called for attention to be paid to regions that are today dependent on polluting activities (fossil/carbon-based) because job cuts could damage the economy. Many sectors will therefore be impacted if we want to move towards a fully decarbonised economy.

6.2 Self-evaluation of life satisfaction

Most of the experts assumed that the decarbonisation initiatives could have a positive impact on health and the quality of life. As the consumption of fossil energy source would be minimised, the emission of pollutants would be also reduced. This will increase health and the quality of life and therefore a higher life satisfaction of the population could be achieved. The majority of the experts voted this effect

positive (four strong, five weak). One expert expected a (weakly) negative effect and two experts did not consider this indicator as relevant.

Figure 18 - Result of the expert judgement: self-evaluation of life satisfaction affected by cohesion effects of decarbonisation initiatives

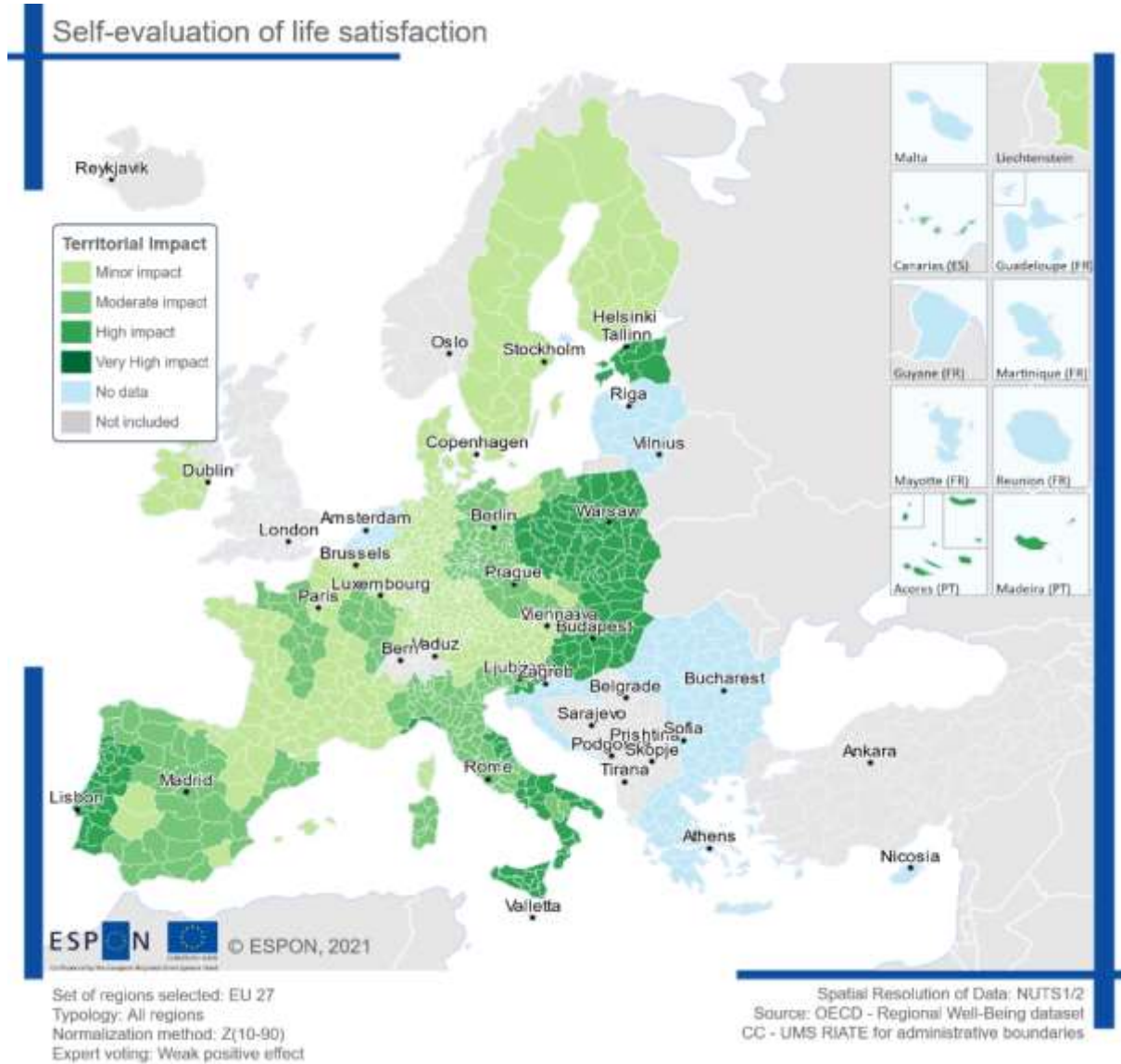


Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

The indicator “self-evaluation of life satisfaction” is measured on an average score from 0 to 10 of people who replied to the following question: “On which step of the ladder would you say you personally feel you stand at this time?” (reference year: 2014). Regions with a higher share of people with low life satisfaction are expected to be more sensitive. Sensitivity is thus inversely proportional to the level of life satisfaction.

The following map shows the potential territorial impact of the implementation of decarbonisation initiatives on life satisfaction. It combines the expert judgement of a weakly positive effect with the given sensitivity of regions. 17% of the regions would see a highly positive impact. These regions are concentrated in eastern Europe as well as Portugal and in particular the southern parts of Italy. 25% of the regions are expected to have a moderately positive impact and the majority a minor positive impact.

Map 14 - Self-evaluation of life satisfaction affected by cohesion effects of decarbonisation initiatives – expert judgement: weakly positive effect



Source: Territorial impact assessment expert workshop, 15 & 16 March 2021

7 Conclusions and policy recommendations

The maps related to **employment** show that less developed regions are positively affected. Decarbonisation is a key factor with which to assess cohesion as an overall value. In this sense, one expert asked whether decarbonisation as a positive **benefit in less developed regions** will be translated into **more cohesion as a value** or whether this will be better achieved with **benefits spread across Europe**.

In the light of this discussion, another expert suggested that it has to do to with what we understand by cohesion: different elements, more equality or equity. In general, the future will be positive, but also negative for certain regions.

On the **notion of cohesion as a value**, the broadness of the concept is aimed at indicating a horizon, but not a specific conclusion; the different indicators would nevertheless point to the same trend. One expert pointed out that the severity of the impact is what is shown on the maps combined with already established and recent data.

One expert also suggested that cohesion will not to be seen as a regional phenomenon but as a local one and that there is now a **more equal distribution** of the problem.

One expert considered that the **social aspect was not sufficiently depicted**. Employment is not always the same as inclusion. For this reason, poverty and social inclusion indicators are fundamental in our society. Social inclusion must be integrated as a goal of cohesion.

This discussion about social justice drew attention to the available environmental technologies and the fact that the impacts will affect people differently.

The point was also made that, despite positive developments being expected throughout Europe, this is not what the trends have shown. Some regions, despite receiving cohesion funds for decades, continue to lose out. The causes of lingering (and in some case growing) gaps between countries and regions must be investigated beyond European policies and traced back to national politics.

It was generally agreed that there will be a very important impact in the **automotive industry**. One expert underlined the fact that indicators such as the automotive sector are good ones because in those regions where this sector is strong it leads and pulls the local and regional economy, its effects being visible well beyond the direct wealth and jobs involved in it. Such indicators will give a good idea of how these regions are affected.

Another expert used data to illustrate the problem. For example, it is problematic to draw policy conclusions for northernmost Europe due to the size of NUTS3 areas and the location of population clusters there.

Finally, the experts discussed the problem of combining strategies with bottom-up initiatives. They reiterated the need to have better **multi-level governance**. Location counts not only in terms of giving an accurate picture of policy impacts, but also in terms of political and civic participation in policy design.

Decarbonisation presents opportunities in terms of R&D and new business models. In terms of potential for green innovation, some countries – such Sweden, Finland, Ireland, Portugal, France, Belgium, Austria and Greece – would be potentially greatly affected. Germany, the Netherlands, Lithuania, the Czech Republic and Italy would gain the highest impact at regional level. The circular economy would be a driver for a highly positive impact in a quarter of EU regions, mostly located in Germany, the Benelux countries, France, Ireland as well as a few large cities such as Stockholm, Helsinki and Vienna.

Regions that are expected to get the lowest impact can be found in eastern Europe, thus countering traditional economic cohesion activities. Nevertheless, these same regions could benefit the most in the environmental field (Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Croatia, Bulgaria, Greece – i.e. traditional target regions of EU cohesion policy), as well as northern Italy.

The transition will be hard in most industrial regions and could have a heavy impact on existing companies and workers. Two out of five regions could receive a very highly negative impact. These regions can be found in almost all Member States. However, stronger effects are concentrated in particular in eastern Europe, as well as some industrial clusters in northern Italy, the industrial centres of eastern and southern Germany, and northern Spain, northern Portugal and southern Sweden.

The workshop showed that some regions have the potential to benefit from decarbonisation and yet face many structural challenges. Maintaining the cohesion spirit in decarbonisation policies requires a strong agenda in the field of human capital in parallel with the promotion of the energy transition. Labour mobility and training will be very relevant in mitigating the negative social effects of decarbonisation policies in regions already under social and economic pressure.

Summary of the findings

Territorial patterns of challenges and benefits

While the distribution of benefits is spread across many regions, some problems are very local. Furthermore, some regions both have the potential to benefit from decarbonisation and face many structural challenges.

Challenge: maintaining the cohesion spirit in this policy, which may impact negatively areas already under pressure.

Social issues

There is a clear consensus that social cohesion and inclusion is very relevant in this field, with labour mobility and training being relevant to mitigating negative social effects of decarbonisation policies.

Challenge: adopt a people-centric vision, taking into account the perceptions of citizens when adopting decarbonisation policies.

Supporting transition

Since many regions that are negatively impacted by this policy are already supported by the Just Transition Fund, the JTF has a positive impact on cohesion. The question remains whether this fund will only mitigate growing problems or will help to make the supported territories more competitive.

Targeted funding

Funding must be based upon regional strategies that can show a path of development focused on phasing out energy dependency, and redirection of regional growth drivers coherent with a decarbonised economy.



European Committee of the Regions

Created in 1994, after the entry into force of the Maastricht Treaty, the European Committee of the Regions is the EU's assembly of 329 regional and local representatives from all 27 Member States, representing over 447 million Europeans.

Its main objectives are to involve regional and local authorities and the communities they represent in the EU's decision-making process and to inform them about EU policies. The European Commission, the European Parliament and the Council have to consult the Committee in policy areas affecting regions and cities. It can appeal to the Court of Justice of the European Union as a means of upholding EU law where there are breaches to the subsidiarity principle or failures to respect regional or local authorities.

